Dr. Edward Siegel

 (“physical-mathematicist”)

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 “FUZZYICS” @

 Pacific Beach Institute for the Utter-Simplicity of (So Called) “Complexity” Optimality (PBISCO)

 &

 La Jolla Institute for the Utter-Simplicity of (So Called) “Complexity” Optimality (LAJISCO)

 @ La Jolla Institute for Biochemopsychotechnoinformaticsoscientifico(so called)”complexity”...-Babble Spin-Doctoring

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 [BEST: PACIFIC-time::

 after t > 5:00-6:00 P.M., 7-days;

 weekends before t < 12:00 or 1:00 or 2:00;

 worst: mornings before t < 9:00 AM-but often O.K. until 12:00-1:00-2:00 PM.]

 To Whom It May Concern

 Dear “To Whom”:

 Semantics can be and often is the major/only problem between people.

Cognitive-semantics linguistics (a la Langacker-Fauconnier-Turner-...-Hofstadter) gets, or at least tries to get, to the heart of this matter.

“FUZZYICS”, with its Synergetics Paradigm & Dichotomy (SPD) and its INEVITABILITY\_-WEB implements semantics and cognitive-semantics this for physics, pure-mathematics, and extends into other sciences, to ***automatically unify*** with ***optimality*** ostensibly-disparate “specificity-of-(so called)‘complexity’” (SoC)-tactics: [“theories”, “models”, “mechanisms”, “processes”, “computer-simulations” and “number-crunchings” (at best numerical-experiments with less thought/believability than the truly analog experiments!), “parameters” (ad infinitum!!), ..., “assumptions” (ad infinitum!!; ad nauseum!!!), and even experiments] in ostensibly-disparate “fields-of-endeavor” (foes!). This is done by asking continually: before, during and after, asking: by-rote traditional questions: how? and how much?, ostensibly orthogonal questions: ***What***??, ***Where***? (+) ***When***?, ***Why***?? (and perhaps even ***WHY*** ???): ***continually***: ***before***, ***during***, and ***after***!!!

“FUZZYICS”, its Synergetics Paradigm & Dichotomy (SPD) and its INEVITABILITY\_-WEB is the ***intersection***, if not ***union*** of: [classic (“pure-mathematics”): Riemann(1851)-Menger(1929)-Hurwitz(1898)-Hurwicz(1941)-Hurewicz & Wallman(1949)-...] ***dimension-theory*** **∩/∪** Noether’s-theorem ***star*** of *possibilities* Dichotomy:symmetries/invariances concomitance to preservation/conservation-laws centrality throughout all field-theories, hence all of physics,... **∩/∪** [classic (“pure-mathematics”): Menger-Eilenberg & Steenrod-...] ***category-theory* ∩/∪** [classic: Menger-Zadeh] fuzzy-logic**∩/∪** [“classic”: Siegel-Pawlak-Ziarko & Jackson-Slowinski-...] (*purposely* membership-function*less*) ***rough-sets*** theory **∩/∪** [classic: Wierzbica-Langacker-Fauconnier & Turner-Bobrow et. al.-Preditis et. al.-...] ***cognitive-semantics* ∩/∪** [“classic”: Cohen & Stewart(1992) called for: bottom-up “induction” “complic-ity” **∩/∪** top-down: deduction “simple-xity”, **∩/∪** ***automatically both simultaneously***, with ***optimality*** (in an (*purposely* open to modification) ongoing continuing evolution!)] **∩/∪** [“classic” Siegel(1986) & (1989)-Stikleather(1995)-Davenport & Prusak(1998)-...] “***hierarchy of thinking***” (“***HoT***”): [data information knowledge understanding meaning wisdom “inspiration” “spirituality” “???”] **∩/∪** [classic: Tryon(1939)-Tryon & Bailey-...] “knowledge-acquisition via database-mining via clustering (of ***meaning*!**)” **∩/∪ [**Keneko(197?)] call for unification of nonlinear-dynamics physics **∩/∪** classic [Nambu(1981)] call for unification of all of physics **∩/∪ ...???...?**

It might be looked upon as a *summary* of: physics, pure-mathematics, ..., other sciences and engineering, .. in vertically read (like Japanese Kanji or Chinese) tabular/list-format analysis.

But it is a “summary” that can and does ***predict*!** [much like logic’s Venn diagram, but without by-rote questions: how?, how much? versus the ***before***, ***during*** and ***after*** asked and answered orthogonal questions: : ***What***??, ***Where***? (+) ***When***?, ***Why***?? (and perhaps even ***WHY*** ???): ***continually***: ***before***, ***during***, and ***after***!!!

The result is the ***exact same identical*** answers, is ostensibly-disparate SoC-tactics: ..., throughout ostensibly-disparate foes**!**

**That**is what is so amazing, the ***utter-simplicity*** of “it all”**!**

**This** is what “FUZZYICS”, its Synergetics Paradigm & Dichotomy (SPD) and its INEVITABILITY\_-WEB tries to capture, ***succinctly*!**

What emerges is commonality of ostensibly-disparate SoC-tactics:... in ostensibly-disparate (foes!), an ***utter-simplicity*!!!**

It’s “*simply*” ***the*** *way* “things” (throughout: physics, pure-mathematics, ..., any/all sciences and engineering) ***are*** (organized): ***utterly-simple*!**

One should not get tense nor threatened by it, but learn to embrace it wholeheartedly as a new insightful tool to permit one to evolve upward (up the “***HoT***”): data information knowledge understanding meaning wisdom “inspiration” “spirituality” “???”**!!!**

One should embrace it for more personal ego-driven reasons as well: it is about your work and you, just summarized *purposely* *simply* and *succinctly*. After all, You are part of it, along with everyone else. It doesn’t supersede you nor your work in any way whatsoever, but only organizes it, and “the literature”, via a tabular/list-format, to highlight/bring our the similarity/ies if not outright identity/ies, versus difference/es, to other’s same work, and other’s other ostensibly-unrelated works: ostensibly-disparate SoC-tactics: ..., in ostensibly-disparate foes!

John Doyle’s very entertaining recent UCSD talk illustrates this. I asked him whether he meant (so called) “complexity” or/*versus* “complicated”, and he did not know, in fact, did not know the difference, or perhaps just had never given it much thought.

This, by the way, is a common failing that I myself suffered from for almost two decades before I “saw the light” (a. k. a. wised up). Metallurgy often says: “Different alloys are different, differently.”. Unless they are the same, or at least similar. This is the tool of chemistry, a tabular/list-format analysis highlighting/stressing commonality versus differences between the chemical-elements, hence their compounds and alloys, the Mendeleev periodic-table of elements. Imagine the “chaos” of chemistry without it! Physics, and separately pure-mathematics, were like that heretofore and are like that today!

“FUZZYICS”, its Synergetics Paradigm & Dichotomy (SPD) and its INEVITABILITY\_-WEB serve to remedy this gap/lack for (throughout) physics, and extending into pure-mathematics, and beyond into: biology,..., other sciences, even back to chemistry itself, which, even withg its Mendeleev periodic-table of elements, has, like biologists, not even discovered, muchless learned to understand and use, Fourier’s(1798-1822)-Laplace’s(18??)-Brillouin’s(1921) inverse-dual-space integral-duality-transforms to first finally understand, and then to decisively solve, all sorts of problems. Had solid/state/condensed-matter physics not done so, one’s very large/heavy computer would be powered by some very large/heavy vacuum tubes still. And electrical-engineering’s signal-processing woul;d simply not exist, without such concepts and words as: band, energy-band, frequency-band, bandwith,... To quote seminal classic Brillouin: “***Bands***, ***not*** ‘bonds’**!**”

One, these days it seems biology and biologists, in this (so called) “century of biology”, can become so “full of oneself (importance), i. e. one’s own ego, that one can and does become “full of it”, in the 1950’s Jackie Gleeson T. V. vernacular “bushwaaaaaah” (decidedly *not* meaning middle-class, bourgeois!).

That is not to say that biology is not important, but, for example, only that “simpler”, hence more advanced sciences/disciplines(!): mathematics and physics and even electrical-engineering, have respectively: two and one centuries of success with some common tools, most especially dual-inverse-space integral-(Fourier, Laplace,.., Brillouin[who did the Nobel Prize-winning theory of X-ray diffraction, and was the father of solid-state/condensed-matter physics, Wave-Propagation in Periodic-Structures, Dover (1921), which led to the first solid-state physics textbook, Theory of Metals and Alloys by Mott and Jones (1932)])-transforms, [from space to inverse-dual wavevector/wavenumber; and/or from time to inverse-dual frequency, transforming a space-time (so called) “energy-landscape” into a wavevector/wavenumber-frequency *dispersion-relation*, ref: E. Siegel, J. Noncryst. Sol. 40, 453 (1980)-best summary with detailed references!; Phys. & Chem. Of Liquids: 4(4) (1975); 5(1) (1976) -8 papers! (in which I discovered this the hard way, for classical-liquids)] *the* tool of physics and electrical-engineering for over two centuries (Fourier’s first mention of an inverse-dual integral-transform to solve problems was in 1798; his book was in 1822 [ref: B. B. Hubbard, The World According to Wavelets, Peters (1996), a superb book with complete history for the layperson (a. k. a. biologist and chemist)], by now (witness words: energy/ frequency-band, bandwidth, stop-band, pass-band, dispersion-relation, Feynman-diagram/graph,...], and the (newly “self-important”) biologists simply do not want to learn lessons from other fields with several centuries of success. It is a foolish person who does not learn from his predecessor’s mistakes!

By the way, this space-time versus wavevector/wavenumber-frequency duality argument between chemists, and now biologists, versus physicists (originating with mathematicians (Fourier, Laplace,...). In high-school I worked part-time for Isidore Fankuchen at Brooklyn Polytechnic, a pioneer in X-ray diffraction. Everything was the biologist-chemist voiced need to do a diffraction-pattern “raw data:” wavevector/wavenumber-frequency Patterson-projection to “energy-landscape” pretty tinkertoy toy-models to show the kiddies in grade-school, and of course the equally unsophisticated funders. All the while, solid-state/condensed-matter physics was, and had been since 1921 Brillouin’s insight after Fourier’s 1798 and 1822 insight,, been making strides in its realization that all of condensed-matter, not just crystals nor solids, but as well plasmas, nuclei, particles, and liquids,... lives and works in the dual-inverse integral-transform wavevector/ wavenumber-frequency space.

Examples of this, for example in liquids, most specifically helium superfluids, were by Landau(1941) and Feynman(1957), partially leading to two Nobel Prizes. One ventures to say, without this generic insight, the response might well be Landau and Feynman *who*?, and Caltech *what/where*? Later, with the Hubbard-Beebe (J. Phys. C (1969)) extension to classical-liquids, then by me to glasses and powders, in my law of corresponding states [J. Noncryst. Sol. 40, 453 (1980); Ferroelectrics (1981)-reprint of a polymer conference], the further generality became self-evident.

So, biology, being made of condensed-matter, must live and work in this dual-inverse wavevector/wavenumber-frequency space, characterized by a dispersion-relation! If it does not, that would be simply amazing and very noteworthy!!

So, for example, when one sees a protein diffraction-pattern of spots and rings, *that* is where proteins *live* and *work*!!! If not, they just why should proteins, for example, be any different than any other condensed-matter, or for that matter, from all of physics? Aren’t proteins, for example, among other things (biochemical, biological,...), also physical entities??? [If not, maybe that is what facilitates life???. But, one thinks not! (unless the chemists and biologists have any more convincing argument other than their inability and unwillingness to think in the dual-inverse spaces of integral-transforms.] (If solid-state physicists persisted to think in space-time space chemistry crutch, your computers would still have big clunky vacuum tubes inside instead of transistors!).

Re the bio-ego question raised: one should read my (in)famous Physics Today letter: “BUZZWORDISM, BANDWAGONISM and SOLGANEERING for Fun, Profit, and Survival”. The title says it all. But, the *wise* man does not actually *believe* one’s own propaganda; that’s all merely “show biz”!

In magnetism it is between spin-models: Ising (1911 and 1917) and Heisenberg(1927) [note how old] versus Stoner-Wohlfarth (1937) and Hubbard(1957)-...-even my thesis and many subsequent papers(1970-1980).[note much later]. But as well, in chemistry it goes back to Kukle’s wandering-bond in benzene-ring molecule (1880’s?) and Longuet-Higgins(1953) chemical-bonding theories, which led to the Hubbard-model. Theoretically there is a 1:1-mapping dual-inverse-integral-transform between space-time (“energy-landscapes”) to wavevector/wavenumber-frequency dispersion-relations, but in practice: (1) new terms pop up which must be explained away, and (2) deeper insights very often exist!

This I presume is why your (so called) “systems-biology” was actually called for, if not actually created yet. To answer a need that space-time fixated biology and chemistry, simply was not meeting!?!

One must study cognitive-semantics. It is very important!!! Biology is inundated with a veritable flood of data, and fancy jargon, but I am left with the same feeling about it I had at C. C. N. Y. (with Sid Karin) some 45+ years ago. Lots of fancy words; few if any ideas! Fred Young, once of Genentech, a molecular biologist/biochemist by training, told me this a decade ago, and I continue to see the same “Tower of Babble”.

Biology desperately needs some *simplicity* to bring some unity to its self-trumpeted (so called) “complexity”

Yet it seems that your systems-biology is an attempt to break out of this biology straight jacket.

The most clever attempt in your field was a post ISMB-2000 conference one day symposium on Ontologies here last summer. These folks (including some right near you, most especially the keynote speaker from Los Altos) stressed the need to try to unify via simplify their intersection of computer (so called) “informatics”(?) with biology’s (so called) “complexity” to make this intersection into a true union. Their ideas were quite close to mine! They seem to be on the same path I came to shouting and screaming, after 1.5 decades of countless models, [now called “specificity-of-(so called)‘complexity’ (SoC)-tactics: models, theories, mechanisms, processes, computer-simulations, number-crunchings, parameters (ad infinitum!),..., assumptions (ad infinitum!; ad nauseum!!!)] some twenty years ago in physics, it too beset and befuddled as both biology and separately computer-(so called)”science”/(so called)“informatics” both seem to be separately. I shudder to think what confusion they engender when they intersect, muchless combine!

The prudent person may put out a lot of propaganda, a. k. a. media-hype spin-doctoring P. R., but to actually believe it himself? ***Caveat Emptor*!!!**

Amazingly, I had a meeting of the minds with Jim Stikleather, C. T. O. of Perrot Systems, once C. E. O. of T. R. C. (both in software) a software ontologist, who understood “FUZZYICS” almost immediately! Why? Because he had and has no axe to grind, nor ego invested in, neither physics nor mathematics nor biology. Together we concocted the “hierarchy-of-thinking” (HoT) [see abstract and paper], which Davenport and Prusak [Working Knowledge, Harvard Bus. Sch. Press (1994)] seem to have partially adopted!

Another meeting of the minds was biologist Jack Cohen (Oxford?, U. K.) with Ian Stewart (mathematician, or mathematical-physicist?, Warwick) which led to their book [The Collapse of Chaos, Penguin (1994)] separately calling for bottom-up induction “Complic-ity”, and separately top-down deduction “Simple-xity”. My “FUZZYICS” does both simultaneously, it being an ever evolving intersection/union of: category-theory with dimension-theory with fuzzy-logic with rough-sets with cognitive-semantics...! And, it works, to ***automatically*** unify ***optimally*** ostensibly-disparate “specificity-of-(so called)‘complexity’” (SoC)-tactics:... in ostensibly-disparate fields-of-endeavor (foes!).

How else can one explain this startling discovery I have made about DIGITS, that the 120-year old Newcombe(1881)-Weyl(1916)-Benford(1938) (*on average*) *statistical* inter-digit correlations “NeWBe”-logarithmic-law whose simple INVERSION yields Bose-Einstein(1927) quantum-statistics, and may indeed be the very origin of quantum-theory! Even to me the results seem bizarre, and I am (the first?) the one who *experimentally* discovered it! It’s right there, staring us all in the face, and for 120 years yet!

Why should this interest you biologists? Simply because in addition to I. R. S. and F. B. I. and S. E. C. adoption of this “digit-counting” to audit for fraud, so has the F. D. A. to audit drug tests. And that could and will include biologists’ “lab notebooks” experimental data! And, it has major implications for digital-: computing, ..., any/everything!!! About anything with DIGITS, the new watchword is, prudently, ***Caveat Emptor*!!!** And biologists don’t even know it exists!!! Its closeness to (the very famous) Frohlich’s ideas about health and life as a switchable protoplasm aqueous-electret Bose-Einstein condensation, with concurring evidence by: Li, Popp, Mossbauer, Gol’danskii, ... Chan, Anderson and Mandell, Goldberger, and now even Edelman,... is striking!

I am not a biologist, and what I have written in purposely sarcastic, because, as a physicist (a former co-worker some 20 years ago of Prof. Takeo Matsubara, Kyoto) who has invented rough-sets theory successor to fuzzy-logic, and optimized neural-networks, called “FUZZYICS”, I see biology making the same mistakes, and not learning from the lessons of/history of evolution of both physics and mathematics. For example, Leroy Hood’s work on systems-biology is merely a rediscovery of the classic Fourier(1822)-Brillouin(19*21*) (one or two) century-old method to do signal-processing and solid-state/condensed-matter physics, to think in the dual integral-transform inverse k/ω-(wavevector/frequency)-space, where ALL condensed-matter lives and works (with nearly a century of successes), even biology (if biology is made of condensed-matter!). The connection to Japanese “KI”/Chinese “CHI” so prevalent in Japanese/Chinese/Oriental: philosophy, religion, and medicine, is at once direct, immediate and automatic!

I am hard to reach, and my e-mail may not be working due to electrical problems, so a telephone call or hard-copy letter in response is best (this may change soon). Sorry for this inconvenience.

I discovered a *very very new* ***startling*** book [S. Bossomeier and D. Green (with Section by D. Seeley), Complexity, Cambridge University Press (2000)] and *very very new* ***startling*** paper [Barabasi et. al., Nature 406, 378 (July 27, 2000)] which *both independently* provide very exciting and ***very strong confirmation*** of my “**FUZZYICS**” S.P.D. “**Inevitability\_-Web**”. And, more important to you and your conference, startling confirmation of my work and its application(s) to systems-biology!!! Deep ideas for all to ponder reside separately in this book and this paper, including the *startling* yet *exciting* ***automatic*** inclusion ***of thermodynamics second-law entropy (i.e. information)*** in my “**FUZZYICS**” S.P.D. “**Inevitability\_-Web**”**!!!**

***I urge you to obtain and read this book and this paper immediately!!! You will find them both very exciting and thought-provoking as I recently did!!!***

***The paper, also about random-graph phase-transitions with applications to cells’-networks etc., is even more supportive! It is EXACTLY a confirmation of my original (1980-1986-1989-1990) “FUZZYICS” S.P.D. work!!!***

I my *original* five (1989) papers on my “**FUZZYICS**” S.P.D. **Inevitability\_Web** [Symposium on Fractals, Scaling,..., Materials Research Society Fall Meeting, Boston (1989)] I already had mentioned that graph-theory, both the Bossomeier-Green-Seeley stressed *random*-graph theory “sparse” to “giant” phase-transition ***INEVITABILITY*** of Erdos & Renyi(1960), but *also* the much much much earlier *non*-random graph-theory dimensionality-dominated “recurrence” to “transience” phase-transition ***at*** dimension = ***2***  (“dimensionality-domination”) (DD)-**INEVITABILITY** of: Nash-Williams, Polya(1921) and Lord Rayleigh (1***8***70) [the best reference to the technical details and its long history in the delightful *simple* little book by P. Doyle and J. Snell, Random-Walks and Electric-Networks, Mathematics Association of America (1984)], ***both*** “*exhibit*” my “**FUZZYICS**” S.P.D. “**Inevitability\_-Web**”’s “automatic-mathematical-catastrophe(s)” (“AUTMATHCAT(S)”) “***dimensionality***-catastrophe(s)” (“DIM-CAT(S)”) CROSSOVER(S), [as does the celebrated Jordan curve theorem “boundaryful” to “boundaryless” phase-transition ***at*** dimension = ***2*** root-cause ultimate-origin of topology [good reference, but far from unique (any topology textbook will mention it - Stillwell spends some 100 pages trying to prove it to illustrate why this 1870 theorem was not proven until circa the 1960’s! (that’s how hard it is to prove!!!) : J. Stillwell (another Australian!!), Algebraic-Topology and Combinatorial Group-Theory, Springer (1981)].

Versus my 1989 work, Bossomeier, Green and Seeley,... and Barabasi, Albert and Jeong (it seems as far back as 1993), in the new book (2000) and paper (2000), take the position that this Erdos-Renyi (1960) *random*-graph phase-transition is a universal at least “model” for, if not the root-cause ultimate-origin of, much if not all of biology (among many other things), hence most certainly your systems-biology.

But they, not being physicists [it seems that they are mathematicians who do control-theory?, (I believe)], except for token but insightful to the so-called “Bak et. al.” “self-organized-criticality” and “punctuated-evolution” use of 1/f-“noise” power-spectrum, [actually taken from my work in burst acoustic-emission dislocation/defect avalanches [see my two papers in Physica Status Solidi (19***71***), one paper in IEEE Ultrasonics Symposium, Monterey (19***73***), two papers in Scripta Metallurgica (19**74**), one paper in Acta Metallurgica (19***77***), and perhaps most easy for you to find in Japan, one major paper in the Third Intl. Conf. On Acoustic-Emission, *Tokyo* (19***76***) - published by J. I. P. A. (19***77***) - right there in Tokyo!]] they hardly even mention the all-important (to/***totally dominating both***: signal-processing and classic-physics since Rayleigh(1***7***95 & 1***8***22)) and to solid-state/condensed-matter physics Brillouin(19***21***) *for over two-centuries now, yet totally absent from biology and biochemistry except for token by-rote inclusion in Arrhenius rate-terms e-E/kT ~ e-hω/kT in “chemical”-kinetics*) [for excellent treatment including eye-opening long history, see charming book by B. B. Hubbard, A Beginners Guide to Wavelets (1994)].

So, attached please find my new works, two separate on-going manuscripts (to be combined sometime in the future) in progress but uncompleted yet, in detail paraphrases and critiques both the Bossomeier-Green book (with important Seeley chapter), and the Barabasi-Albert-Jeong paper, yet includes both of their works as a special-case subset of my list-format “**FUZZYICS**” S.P.D. **Inevitability\_-Web**, and extends it *in detail* into the ***proper*** Fourier-Laplace-Brillouin duality-integral-transform k/ω-dual-space(s), in addition to adding on the all-important unique classic Noether’s-theorem/Symmetry(ies)/Conservation-Law(s) component, totally missed by them!

(In fact, you might want to invite them, Bossomeier, Green and Seeley, and separately Barabasi, Albert and Jeong, heretofore unknown to me or anyone else here, to speak at your conference! Just separately read their book and their paper(s)!! You’ll see its relevance/importance/seminality to your systems-biology!!!)

Hence please find attached both of these papers in progress, the on-going long but still uncompleted Bossomeier-Green-Seeley manuscript in progress, and the on-going long but still uncompleted Barabasi-Albert-Jeong manuscript in progress, for consideration/inclusion at your conference as yet another one or two posters, or as part of a (six + these new two = one mega-poster), at your convenience depending upon space limitations. I will have finished these last two on-going papers and then can reduce them down to the six-page manuscript(s) format desired, within a month or so.

But uniquely since my “FUZZYICS” permits their integration, hence I can combine all eight posters into one mega-poster, but would request the separate printing of the seven manuscripts as seven or eight distinct papers!

 Most Respectfully,

 Dr. Edward Siegel

 “Physical-Mathematicist”

1. S.

 Relevant to the latter abstracts and papers on DIGITS, and our digits-dominated (so called) “high”-technology society (or relevance to not only drug-testing auditing, but to digital-computing, hence (so called) “informatics” and now (so called) “bioinformatics” [don’t forget, the verysame Simon Newcombe invented the first analog-computer!; it’s in the lobby of the Smithsonian Institution.]:

WARNING: Digits aren’t (modeled after) quanta, but quanta were (modeled after) digits, ab initio by definition, integer-numbers with nothing (no fractions possible, no decimals possible) in between them. Hence this (just below explained) digits : quanta 1:1-mapping should not be startling at all, only common-sense. (leading to conclusion that 1 + 1 = 2 is (so called) “quantum-computing”).

Hence the bizarre sounding abstracts about my *experimental* [anyone who would *theoretically* predict this probably belongs in a mental-hospital’s “rubber-room” for observation and their own safety for a very long time!] discoveries about DIGITS, simply by *experimental trivial* INVERSION [of the 120-year old Newcombe(1***8***81)-Weyl(19***16***)-Benford(19***38***) DIGITS’ “NeWBe”-Logarithmic-law [proven by Hill in 1995 via ***scale-invariance*!!!**] to yield  (DIGITS are (*on average*) *statistically* ***bosons*!**, and can and do ***Bose-Einstein CONDENSE*** to d = 0 ground-state; just think of how one numbers energy-levels 1:1-mapping to digits! Of course DIGITS are quanta! [A blank check is a Bose-Einstein condensate of zeros (00.00), which is excited by writing in other digits! ($10.00, or $01.00, or $27.50 etc.]. In fact, actually, quanta are(by definition: 1:1-mapped onto) DIGITS!!! It’s that simple and obvious, yet shocking and profound/deep!], and *experimental trivial* EXPANSION to , to Shlesinger-West-...-Montroll’s 1/f-“noise” ***INEVITABILITY***, lead to such bizarre results and conclusions that one begins to doubt one’s own sanity. (Believe me, I did for awhile!). Yet the conclusions are arrived at *experimentally* and *trivially*! The understanding, meaning and wisdom and even history about it required and still requires some very deep thinking! (For example, historically did: Planck?, Einstein? (close to Weyl), Bose?,... know about it??? After all, it does not take an Einstein, nor a Planck, nor a Bose,... to INVERT it; even I did it! But, am I the first in some 120 years? One wonders...).

 Physics and mathematics used to be one subject called “natural philosophy”. If you had said to Huygens, or his student Leibnitz, or Newton, or even Rayleigh that calculus versus mechanics are two different subjects in two different fields-of-endeavor, “pure”-physics versus “pure”-mathematics, the would have thought that you were crazy, and had you confined in that little rubber room. Yet physics “versus” mathematics have collided repeatedly (for example in the Wilson-Kadanoff-... renormalization-group (again, via scale-invariance!). This is another such collision, one of Sir Charles Frank’s [Sir Charles Frank: FRS, OBE (1990?)] “interconnections” and a “surprise in theoretical-physics”, but its also a surprise in pure-mathematics, Wigner’s “on the unreasonable effectiveness of mathematics in physics” inversion to “on the unreasonable effectiveness of physics (quantum-statistical-mechanics) in ‘pure’-mathematics”! [Since Wigner, (as was Weyl), was (were) a(both) mathematical-physicist(s) par excellence, I bill myself in my stumbling *experimental* INVERSION and EXPANSION discovery(ies) as a “physical-mathematicist” (also, separately about the primorials!).

[Gian-Carlo Rota [recently (2000) deceased], the great probabilist from M.I.T. and Los Alamos, and I discussed this discovery often. He had independently proved, via his “Umbral-calculus”, that Euler-numbers caused Fermi-Dirac versus Bernoulli-numbers caused Bose-Einstein, both quantum-statistics being pure-mathematical and having “nothing whatsoever to do with physics” (per se), except that they dominate physics completely! It makes one wonder...]

 But, it also leads to unbelievable opportunities for statistical-physics/mechanics practitioners since the auditors, accountants, tax authorities(IRS), securities auditors (SEC,...), forensic police(I. R.S. , F. B. I., S. E. C.,...), drug testers(F. D. A.), legislators (it’s U.S. & CA. Tax law already!), governments, ... have discovered and are using it, and after all “digits are (*on average*) *statistically* ***bosons*!!!** [Ierley and I have named them “spin(***e***)less-BoZos”, or “SoB’s”] (which they have never even heard of, muchless know anything about!!!).

 The applications and opportunities, yet ***deeply troubling and always lurking questions***, for quantum-theory/statistical-mechanics and their quantum-theorists/statistical-mechanists practitioners are literally unlimited. Just think of what percent of our globalizing/ globalized world society is digital, depending completely upon DIGITS, “now” with these “new” 120-year old inter-digit (*on average*) *statistical* correlations, upon INVERSION with *hidden* DIGITS’ quantum-theory/statistical-mechanics ***lurking*** literally everywhere that digits do upon any sort of *statistical averaging*, hence [quoting famous pure-mathematician statistician Herman Chernoff (emeritus: Stanford, M.I.T., Harvard), [in addition to (sadly untimely deceased) great pure-mathematician probabilist Gian-Carlo Rota (M.I.T.) , with whom I am/was in frequent discussion about this), “meshugge!(Yiddish)/unmöglich”!] !!!

Possible implication for: : statistical-physics/mechanics, quantum-theory/mechanics, quantum-statistical-physics/mechanics inherently/intrinsically embodying all sorts of averages and expectation-values proliferation (both implementations, and more significantly, meaning!), experimental-physics,..., experimental-any-/every-thing, could be both deep and profound practically**!!!** Generic-symbols , any/all-*averages* (time, ensemble, space, central-limit theorem, ergodicity,...)and/or any/all expectation-values, and any/all of their *statistical*-functions: means, medians, modes, variances (≡ fluctuations ≡ (so called; misnomer) “noises”),..., ***must***, when implemented numerically, (*on average*) *statistically* contain/illustrate/embody/be auditable by “NeWBe-Logarithmic-law”. ***Mandatory*** is ***deep understanding*** of ***meaning*** and ***implications*** of this ostensibly pure-mathematics (*on average*) *statistical* DIGITS’ (Simon) Newcombe[Am. J. Math. 4, 39(1***8*** 81)]-(Hermann) Weyl[Math. Ann. 77, 313(19***16***)]-Benford[Proc. Am. Phil. Soc. 78, 551(19***38***)] “NeWBe”-Logarithmic-law, [most especially with its Siegel (1998) INVERSION to (*only*) *Bose-Einstein* quantum-statistics, and EXPANSION to power-spectrum -“noise”power-spectrum Shlesinger-West-...-Montroll (Intl. J. Mod. Phys. (1989) ***INEVITABILITY*!!!**] of *the* Newcombe (arguably, inventor of the computer; an astronomer and surveyor; *not* a physicist) ***concomitance*** with Boltzmann, and then *the* Weyl [mathematical-physicist par excellence; Raum, Zeit und Materie, Dover, 4th Ed. (~1921)], for as well the very history of both ***concomitant*** Boltzmann statistical-physics/mechanics, and later, [first (~ 22-29 year later)Einstein (~1903- ~1910) phase-transition critical-phenomenon/critical-opalescence/slowing-down/critical-fluctuations and fluctuations], quantum-theory: (20 year later!) Planck (~1901)-(~24 year later) Einstein(~1905) “the quantum” origins, and (46 year later)Bose-Einstein (~1927) quantum-statistical-physics/mechanics, and even (~5 year later) Maxwell(~1885) classical-electromagnetism theory, whose errors/problems led to quantum-theory in the first place! [dates ref.: A. Pais, ***Subtle*** in the Lord, Oxford (1982)- p. 58 & 100; DIGITS’ “NeWBe (a.k.a. Murphy)-Logarithmic-law***S***  ***subtlety*** seems even much more profoundly lurking**!!!**].

About such profound lurking questions, in need of collective deep re-thinking, no immediate answers seem self-evident, only such nagging [ostensibly “new” but actually quite pre-(Planck, Einstein, Bose and Einstein,...)-quantum-theory and concomitant with Boltzmann statistical-mechanics, even (circa five years!) pre-(Maxwell)-classical-electromagnetic-theory, quite old, about ostensibly pure-mathematics, [yet proven by Hill [Proc. Am. Math. Soc. 123, 887(1995)] from root-cause ultimate-origin units-invariance = logarithm-base-invariance = ***scale***-***invariance***, a central symmetry dominating throughout all (except perhaps particle) of physics!], DIGITS’ (*on average*) *statistical* “NeWBe”-logarithmic-law (since 1***8***81, actually quite “*Old*Be”) inter-digit correlations] questions, ***lurking*** beneath the surface of : (1) quantum-theory and (2) statistical-mechanics, perhaps (3) physics history rethinking [after all, it doesn’t take a Planck nor an Einstein nor a Bose to INVERT it (even this author could do it; but the first (person and time) in some 120 years???), or ~~does~~ ***did*** it???], and indeed even of literally (4) any/all experiments, with their of necessity inherent *statistical averages*, throughout science(**!**), are indeed and have been for their entire existences, profound and deep and very troubling still, and perhaps unanswerably, ***lurking*!**

As well, any/all experiments, statistical-physics/mechanics, and/or quantum-physics/mechanics, but as well any/all other physical, chemical, ..., experiments, from Newton’s law of motion: [not  more correct or better still  inverse-mass mechanical-susceptibility [Siegel Symp. on Scaling,..., MRS Fall Mtg. (1990)], but more correctly  , or better still ] to any/all other experiments throughout not only physics, but throughout all of science**!!!**

Re “Digits”’ (base-10) digital-any/every-thing: ***Caveat Emptor*!!!**

P. P. S.:

The inherent powerful “FUZZYICS” list-format tabular-format for organizing and automatically unifying ostensibly-disparate “specificity-of-complexity” (SoC)-tactics in ostensibly-disparate “fields-of-endeavor” (foes!) is literally ***impossible*** to compress into a short abstract. It reads ***vertically***, like Japanese Kanji or Chinese! That is its power! Any attempt to compress it into a horizontal abstract format results in gibberish! So, I have included several complete papers in their full tabular list-format vertical form, both for your reference, and to ask if there is any way you can accept anything in vertical tabular list-format form, where even line counting means absolutely nothing since each line is mostly blank space! It is a very powerful technique! And, it works! Most abstracts submitted, in ostensibly-disparate “fields-of-endeavor” (foes!) were done via “FUZZYICS” tabular list-format vertical form in exactly the same way!!! What is similar about these different subjects? Nothing, until “FUZZYICS” tabular list-format vertical analysis, then everything!!! This is optimality!!! Horizontal text seems to impede clear thinking, most especially about Frank-Kaneko-Nambu unification!!!

P. P. P. S.

I’ve yellowed in the most relevant abstracts and papers to your Systems-Biology there, but have included several related works and several applications. These could be combined into a lot fewer posters, but I would request that they are all distinct works, their abstracts and whole papers (if a proceedings is to be published?) be printed in program and proceedings (if one is to be published?) separately!

 As well, since I have no idea if you will be publishing the meeting proceedings, I’ve enclosed several full papers’ manuscripts, and could forward the others, if requested.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

 **SUPPLEMENTARY**

 **BACKGROUND PAPERS ON**

 **NEW MODES OF THINKING/**

 **“ONTOLOGIES”**

 **FOR DOING PHYSICS,..., BIOLOGY**

**(MOST ESPECIALLY“SYSTEMS-BIOLOGY”!):**

 **• Hierarchy-of-Thinking (HoT)**

 **&**

 **• “FUZZYICS”**

 **&**

 **(Fauconnier-Turner-“Hofstadter”)**

 **• “Blending”**

 **&**

 **• Ask: What?, Where?, (+) When?, Why??**

 **(and perhaps even WHY???)**

 **Before, During and After Traditional By-Rote**

 **Only: How? And How Much?**

**[Cohen & Stewart’s called for Bottom-Up “Induction” “Complic-ity” ∩/∪ Top-Down Deduction “Simple-xity” Both Together *AUTOMATICALLY* with *OPTIMALITY*]**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**0. Hierarchy-of-Thinking**

 **“HoT”**

 **PAPER**

 **in**

 **TABULAR-LIST-FORMAT**

“***Hierarchy-of-Thinking***”(**HoT**) of Siegel-(“Rough-Sets”)-Stikleather-“Davenport-Prusak” to ***AUTOMATICALLY UNIFY OPTIMALLY*** Cohen-Stewart Called for: Bottom-Up Induction “Compli-city” to Top-Down Deduction “Simple-xity” ***SIMULTANEOUSLY*** With ***AUTOMATIC OPTIMALITY*** Embodiment in Siegel “**FUZZYICS**” “Synergetics Paradigm & Dichotomy” (S.P.D.) “**INEVITABILITY\_-WEB**” ***PARSIMONY STRATEGY INEVITABILITY***: ***UTTER-SIMPLICITY***

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Stikleather-Siegel “hierarchy-of-thinking” (HoT) embedding of so-called “data-mining for knowledge-discovery” reveals the latter's *relatively very low level of sophistication and maturity* versus Siegel2 “**FUZZYICS**” fuzzy-physics rough-sets theory interpolation-function-*free* fuzzy-logic ***utter-simplicity***, a full decade pre-: Pawlak-Ziarko-Slowinski'sclaim, cognized as science via analogy and/versus metaphor by *cognitive-semantics* “*blending*” of Langacker/Wierzbica-Fauconnier-Turner-Kosko, implementing the Cohen-Stewart1 called for bottom-up induction “complic-ity” ***intersection/union*** with top-down “simple-xity” ***simultaneously***:

|  |
| --- |
|  **“HIERARCHY of THINKING”** (“**HoT”**) |
|  |
|  “**FUZZYICS**” **AUTOMATICALLY**  INTEGRATED  BOTTOM-UP “COMPLIC-ITY” **∩**/**∪** TOP-DOWN “SIMPLE-XITY”  ***OPTIMALITY*:** |
|  |
|  BOTTOM-UP (the “HoT”) QUASI-“INDUCTION” Cohen-Stewart“***COMPLIC-ITY***”: |

|  |  |  |
| --- | --- | --- |
|  “ ‘SPIRITUALITY’-  ACQUISITION  | (via/QUASI-“INDUCTION”) | “‘INSPIRATION’-MINING”  |
|  **↑** |  |  |
|  “ ‘INSPIRATION’-  ACQUISITION  | (via/QUASI-“INDUCTION”) |   “‘WISDOM’-MINING” |
|  **↑** |  |  |
|  “ ‘WISDOM’-  ACQUISITION | (via/QUASI-“INDUCTION”) |  **“**‘MEANING’-MINING” |
|  **↑** |  |  |
|  “ ‘MEANING’- ACQUISITION  | (via/QUASI-“INDUCTION”) |  “UNDERSTANDING-  MINING” |
|  **↑** |  |  |
|  “UNDERSTANDING-  ACQUISITION”  | (via/QUASI-“INDUCTION”) |  “KNOWLEDGE-  MINING”  |
|  **↑** |  |  |
|  “KNOWLEDGE-  ACQUISITION”  | (via/QUASI-“INDUCTION”) |  “INFOMATION-  MINING” |
|  **↑** |  |  |
|  “INFORMATION- ACQUISITION”  | (via/QUASI-“INDUCTION”) |  “DATA-MINING” |
|  **↑** |  |  |
|  (RAW)-DATA   |  |  |

|  |
| --- |
|  “versus” |
|  TOP-DOWN (the “HoT”) DEDUCTION Cohen-Stewart “***SIMPLE-XITY***”: |

|  |  |  |
| --- | --- | --- |
|  “ ‘SPIRITUALITY’- ‘MINING’”  | (via/DEDUCTION) |  “‘INSPIRATION’- ‘ACQUISITION’” |
|   |  |  |
|  “ ‘INSPIRATION’- ‘MINING’”  | (via/DEDUCTION) | “ ‘WISDOM’-‘ACQUISITION’” |
|   |  |  |
|  “ ‘WISDOM’-‘MINING’”  | (via/DEDUCTION) | **“‘**MEANING’-‘ACQUISITION’” |
|   |  |  |
|  “ ‘MEANING’-‘MINING’ “  | (via/DEDUCTION) |  “UNDERSTANDING- ‘ACQUISITION’” |
|   |  |  |
|  “UNDERSTANDING- ‘MINING’”  | (via/DEDUCTION) |  “KNOWLEDGE-  ‘ACQUISITION’” |
|   |  |  |
|  “KNOWLEDGE- ‘MINING’”  | (via/DEDUCTION) |  “INFOMATION- ‘ACQUISITION’” |
|   |  |  |
|  “INFORMATION- ‘MINING’”  | (via/DEDUCTION) |  “DATA-‘ACQUISITION’” |
|   |  |  |
|  (RAW)-DATA  |  |  |

|  |
| --- |
| which Siegel "**FUZZYICS**" ***automatically*** *integrates* ***optimally***, insuring “optimization of optimization- problems optimally” (OOPO), ***simultaneously*** with ***optimality***: |

|  |
| --- |
|  **AUTOMATICALLY**  INTEGRATED  BOTTOM-UP “COMPLIC-ITY” **∩**/**∪** TOP-DOWN “SIMPLE-XITY”  ***OPTIMALITY*:** |

|  |  |  |
| --- | --- | --- |
|  “ ‘SPIRITUALITY’- ‘MINING’”  |  **🡨 🡪** |  “‘INSPIRATION’- ‘ACQUISITION’” |
|   |  |  |
|  “ ‘INSPIRATION’- ‘MINING’”  “ ‘WISDOM’-‘MINING’”  |  **🡨 🡪** **🡨 🡪**  | “ ‘WISDOM’-‘ACQUISITION’”“‘MEANING’-‘ACQUISITION’” |
|  |  |  |
|  “ ‘MEANING’-‘MINING’”  |  **🡨 🡪** |  “UNDERSTANDING- ‘ACQUISITION’” |
|  |  |  |
|  “UNDERSTANDING- ‘MINING’”  |  **🡨 🡪** |  “KNOWLEDGE- ‘ACQUISITION’” |
|   |  |  |
|  “KNOWLEDGE- ‘MINING’”  |  **🡨 🡪** |  “INFOMATION-  ‘ACQUISITION’” |
|   |  |  |
|  “INFORMATION- ‘MINING’”  |  **🡨 🡪** |  “DATA-‘ACQUISITION’” |
|   |  |  |
|  (RAW)-DATA  |  |  |
|  |  |  |

|  |
| --- |
| As such. modern “computer-‘science’ “/”information-technology” feeble attempts at “knowledge-acquisition via data-mining”, correctly identified as *only at best* “*information*-acquisition via data-mining”, is identified as (allowing one order-of-magnitude (oom) per one “mining” or “acquisition” or (vertical) arrow) some *at least* ***seven*** orders-of-magnitude ("10***7***") superior to so-called “innovative”, actually quite primitive, “(so-called) ‘knowledge’-(actually only ‘information’!)-acquisition via “data-mining”, but, given the two-way channel of “**FUZZYICS**” ***automatic*** Cohen-Stewart18 “complicity” / “simplexity” intersection/***union*** for *two*-way/*up-down* ***optimality***, some *at least* ***fourteen*** orders-of-magnitude ("10***14***"), some one and one half orders-of-magnitude *of* orders-of-magnitude (not counting their two-way synergy contribution) superiority! |

1. J. Cohen and I. Stewart, The Collapse of Chaos, Penguin (1992)

1. E. Siegel: Symposium on Fractals, Scaling,..., M.R.S. Fall Mtg., Boston (19*89*)-5-papers!-summary!; ibid. (1990)-2!; I. B. M. Conf. On Computers and Mathematics, Stanford (19*86*); J. Noncryst. Sol. 40, 453 (19*80*); Aristotle Birthday Symposium on Mechanics and Physics, Thessoloniki (1990); ...
2. T. Davenport and L. Prusak, Working Knowledge, Harvard Business School Press (1998)-after Siegel2!

**1. “FUZZYICS”**

 **PAPER**

 **in**

 **TABULAR-LIST-FORMAT**

 “FUZZYICS”’ SYNERGETICS PARADIGM & DICHOTOMY “INEVITABILITY\_-WEB” OUTLINE

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Siegel1 S.P.D. “**FUZZYICS**” ***automatically*** with ***optimality*** is, in list-format:

|  |
| --- |
|  |
| **SYNERGETICS PARADIGM & DICHOTOMY(SPD) “*COMMON-FUNCTIONING-PRINCIPLE*” *PARSIMONY*-of-DICHOTOMY (POD)-*STRATEGY* *DIMENSIONALITY-DOMINATION* (DD)-** ***INEVITABILITY*** |

|  |  |  |
| --- | --- | --- |
|  |  ***ROOT-CAUSE***  ***ULTIMATE-ORIGIN*** |  |
|  |  **( 0.)** **DIMENSIONALITY/** **DEGREES-of-FREEDOM** **LEVEL-0. LOGIC:** |  |
| d-o-f = dst = **ODD**-INTEGER |  AUTMATHCAT<- - - - - -DIM-CAT- - - - - - - >  CROSSOVER via *INTERMEDIATE*  *CONTINUOUS*  *INTERPOLATING*  *FRACTIONAL* *FRACTAL-DIMENSIONALITY*  ***UN****CERTAINTY*  ***FLUCTUATIONS*** dst = **ODD**-Z **<** Dst **<** **EVEN**-Z = dst  |  **EVEN**-INTEGER = dst =d-o-f |
|  |  |  |
|  **cau ⇓ ses** |  **cau ⇓ ses** |  **cau ⇓ ses** |
|  |  |  |
|  |  **( I.)**  **EXTENT/*SCALE*/RADIUS** **LEVEL-I. LOGIC:** |  |
|  (relative) |  |  (relative) |
| [BOUNDARYFUL]=[LOCALITY]  |  AUTMATHCAT <- - - - - -DIM-CAT- - - - - - - >  CROSSOVER | (...GLOBALITY...)=(...BOUNDARYLESS...)  |
| {Kallen-Lehmann |  |  |
|  &/|| |  |  &/|| |
| representation-equivalence} |  |  |
|  |  |  |
|  |  **(II.)** **POWER-SPECTRUM** **LEVEL-II. LOGIC:** |  |
|  |  |  |
| [“l”/ω**0**-WHITE/  FLAT/FUNCTION*LESS*] |  AUTMATHCAT <- - - - - - -DIM-CAT- - - - - - - >  CROSSOVER |  (...”l”/ω**1.000...-** **HYPERBOLICITY**...) whose frequency-***integral*** defines at least ***necessary***-condition for so-called “complexity” as Noether’s-theorem ***SCALE***-4-current 4-***CON***vergence **/*CONSERVATION*:**(d/d) [[J**SCALE** = **0**] ()] = 1/ =(for arbitrary base)= “1”/  |
|  |  |  |
|  &/|| |  |  &/|| |
|  |  |  |
|  |  **(III.)** **CRITICAL-EXPONENT** **LEVEL-III. LOGIC:** |  |
|   n = **0**  |   AUTMATHCAT<- - - - - -DIM-CAT- - - - - - - >  CROSSOVER |   n = **1.000...** |
|  |  |  |
|  ⇑ ⇓ |  ⇑ ⇓ |  ⇑ ⇓ |
|  |  |  |
|  |  ***DIMENSIONALITY*** ***DEGREES-of-FREEDOM -***  ***INDEPENDENT*** ***ALSO*** ***ROOT-CAUSE***  ***ULTIMATE-ORIGIN*** |  |
|  |  **(IV.)** **NOETHER'S - THEOREM :** **CONTINUOUS-LIE-GROUP** ***S C A L E-INVARIANCE***   **SYMMETRY**  **LEVEL-IV. LOGIC:**  |  |
|  |  |  |
|  ***SCALE*** - INVARIANCE  SYMMETRY - **RESTORING** |  <-------CROSSOVER---------->  |  ***SCALE*** - INVARIANCE  SYMMETRY - **BREAKING** |
|  |  |  |
|  ⇑  causes ⇓ |  ⇑  causes ⇓ |  ⇑  causes ⇓ |
|  |  |  |
|  ∂μJμ***SCALE*** **= 0**  ***SCALE***-4-CURRENT 4-[*CON*VERGENCE]  4-[*CONSERVATION*]whose frequency-***derivative*** defines at least ***necessary***-condition for so-called “complexity” as Noether’s-theorem ***SCALE***-4-current 4-***CON***vergence**/ *CONSERVATION*:**(d/d) [[J**SCALE** = **0**] ()] = 1/ =(for arbitrary base)= “1”/ |  <-------CROSSOVER---------->  |  0 **≠** ∂μJμ***SCALE*** ***SCALE***-4-CURRENT 4-(... *DI*VERGENCE...) 4-(...*NON*-CONSERVATION...) |
|  |  |  |
|  & |  & |  & |
|  |  |  |
|  |  ***DIMENSIONALITY*** ***DEGREES-of-FREEDOM -***  ***INDEPENDENT*** ***ALSO*** ***ROOT-CAUSE***  ***ULTIMATE-ORIGIN*** |  |
|  |  **(V.)**  ***STAR***-**{*SET*}**  **OF**  ***OTHER*-*POSSIBLE*** |  |
|  |  |  |
|  |  **NOETHER'S - THEOREM:** **CONTINUOUS-LIE-GROUP** **SYMMETR*IES*-*SET*** **LEVEL-IV*.* LOGIC*(S)* :**  |  |
|  |  |  |
|  **. . .** - INVARIANCE***S***  SYMMETRY - **RESTORING*S*** **-*SET***  |  <-------CROSSOVER***S***--------->  |  **. . .**  - INVARIANCE***S*** SYMMETRY - **BREAKING*S***  **-*SET*** |
|  |  |  |
|  ⇑  causes ⇓ |  ⇑  causes ⇓ |  ⇑  causes ⇓ |
|  |  |  |
|  **{**∂μJμ**... = 0}-*SET***  **{** **. . .**-4-CURRENT***S*}-*SET***  **{**4-[CONVERGENCE***S***]**}-*SET***  **{**4-[CONSERVATION***S***]**}-*SET*** |  <-------CROSSOVER***S***--------->  |  **{**0 **≠** ∂μJμ**...}-*SET*** **{** **. . .**-4-CURRENT***S*}-*SET*** **{**4-(... DIVERGENCE***S***...)**}-*SET***  **{**4-(...NON-CONSERVATION***S***...)**}-*SET*** |
|  |  |  |

|  |
| --- |
| [fluctuation-dissipation theorem-equivalent] noise ≅ generalized-susceptibility [χ(ω) = d(OUTPUT)/d(INPUT) = d(EFFECT or RESULT)/d(CAUSE)] power-spectrum qualitative-type functional-form and quantitative critical-exponent "automatic-mathematical-catastrophe" (AUTMATHCAT) "dimensionality-catastrophe" (DIM-CAT) crossover second-order phase-transition critical-phenomenon.  |
|  |
| [the Kallen-Lehmann representation-equivalence, reviewed succinctly by Bjorken & Drell, are that extant measures of asymptotic-limit antipodes of the PARSIMONY-of-Dichotomy (relative) [LOCALITY] = [BOUNDARYFUL] versus (relative) (...BOUNDARYLESS...) = (...GLOBALITY...): propagators ≅ Green's-functions ≅ diffusivity ≅ ... are equivalent to extant measures of asymptotic-limit antipodes of the PARSIMONY-of-Dichotomy (relative) ["l"/ω0-WHITE/FLAT/FUNCTIONLESS] versus (relative) (..."1"/ω**1.000...**...-FLICKER **HYPERBOLICITY**...): {fluctuation-dissipation theorem-equivalent} noise ≅ generalized-susceptibility power-spectrum as complex-functions of complex-variable ω=ω'+i ω" in first even-integer critical-dimensionality complex-plane C in their pure-mathematics analyticity ].  |

1. E. Siegel, Symp. on Fractals, Scaling,..., MRS Fall Mtg., Boston (1989) - 5 papers!; Symp. on Scaling,..., ibid. (1990); Symp. on Transport in Geometrically-Confined/Constraints, ibid. (1990)

**2. ASK WHAT?... BEFORE...**

 **ABSTRACT**

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

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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 classic*al*): (always seminal; ***The Master*!!!**) Brillouin [Wave-Propagation in Periodic-Structure, Dover(19***21***); 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): Tsytovich-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[] “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 (19***29***)] 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!”)

**3a. BLENDING**

 **ABSTRACT**

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

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“***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*” ∩/∪ top-down deduction “*Simple-xity*” ***simultaneously***! “FUZZYICS” SPD “common-functioning-principle” (“CFP”) ***Parsimony***-of-Dichotomy (PoD)-***Strategy*** ***Dimensionality***-**D*omination*** (DD)-***Inevitability*** ∩/∪ 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”/ ∩/∪ *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) = log10(1+1/d) ***physics***: ***INVERSION*** to d(P) = 1/[10P**−**1] “*Bose-Einstein*-like” *“spin(e)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) ≅ “1”/[**~~−~~**~~1+ [1~~+P+…]] ≅ “1”/P+… ≅ “1”/ω**1.000…**-***Hyperbolicity*** ***inevitability*** indicative of density-of-states *linearity* indicative of Wigner-Dyson low-argument-skewed Gaussian-***Orthogonal***-ensemble (G.O.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*** ***in***equalities: J***translational*** (= ***momentum*** (?)) (or ***scale*?**) ***≠*** 0 to xn(D>2) + yn(D>2) ***≠***  z(n(D>2) with no possible solutions by definition! FIN Q.E.D.In then-unified "Natural Philosophy" (phyics = mathematics), why should Fermat repeat his own “physics” **F**P to prove his own “mathematics” **F**LT when their ***identical*** “***≠*** ”’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.

**3b. BLENDING**

 **LONGER ABSTACT**

“***Blending***”-Cognition Cognitive-Semantics *Between* Pure-Mathematics to Physics Implementation *in* “FUZZYICS” SPD *Automatic Optimality Simultaneous* Implementation of “*Complic-ity*” ∩/∪ “*Simple-xity*”: Inspirations From the Physics of Magnetism

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“***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*” ∩/∪ top-down deduction “*Simple-xity*” ***simultaneously***! “FUZZYICS” SPD “common-functioning-principle” (“CFP”) ***Parsimony***-of-Dichotomy (PoD)-***Strategy*** ***Dimensionality***-**D*omination*** (DD)-***Inevitability*** ∩/∪ 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”/ ∩/∪ *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) = log10(1+1/d) ***physics***: ***INVERSION*** to d(P) = 1/[10P**−**1] “*Bose-Einstein*-like” *“spin(e)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) ≅ “1”/[**~~−~~**~~1+ [1~~+P+…]] ≅ “1”/P+… ≅ “1”/ω**1.000…**-***Hyperbolicity*** ***inevitability*** indicative of density-of-states *linearity* indicative of Wigner-Dyson low-argument-skewed Gaussian-***Orthogonal***-ensemble (G.O.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*** ***in***equalities: J***translational*** (= ***momentum*** (?)) (or ***scale*?**) ***≠*** 0 to xn(D>2) + yn(D>2) ***≠***  z(n(D>2) with no possible solutions by definition! FIN Q.E.D.In then-unified "Natural Philosophy" (phyics = mathematics), why should Fermat repeat his own “physics” **F**P to prove his own “mathematics” **F**LT when their ***identical*** “***≠*** ”’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.

**3c. BLENDING**

 **LONGEST MOST COMPLETE**

 **ABSTRACT**

“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*.

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Cognitive-semantics Fauconnier-Turner[1] “blending-cognition, with very-early pure-mathematics application and implementation to define complex-numbers, is *automatically optimality* performed via Siegel[2] Synergetics Paradigm & Dichotomy (SPD) “FUZZYICS” *automatic optimality* implementation of Cohen-Stewart[3] 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”, “versus”/intersection/ union/ *automatic optimality simultaneity* with top-down deduction “Simple-xity”: data🡨information🡨knowledge🡨understanding 🡨meaning🡨wisdom 🡨 ”inspiration”🡨”spirituality”. Siegel[2] 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 “NeWBe-Logarithmic-Law” P(d) = log10(**+**1+1/d): unique-argument (**+**1+1/d)-only supersymmetry (SUSY)-*breaking*, INVERSION to d(P) = 1/[10P(d)**−**1] “Bose-Einstein-like” “spin(e)less-BoZo’s” (SB) quantum-statistics with (1+1/d)-skewed-argument and first significant-digit d = 0 logarithmic-singularity/simple-pole divergence SB-Condensation, and EXPANSION to d(P) = 1/[10P(d)**−**1] ≅ “1”/[**~~−~~**~~1+[1~~+P+…]] ≅ “1”/P+… ≅ “1”/P -**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 *un*repairable for any/all integer-x, y, z, whichsame *non*-conservation 4-current 4-divergence *in*equality making any/all such Diophantine-equations into an ***in***equalities, thus having no solutions ab initio by definition!

[1] Cognitive- Science. 22(2), 133 (1998) [2] Symp. On Fractals, Scaling,… , MRS Fall Mtg., Boston (1989)-5-papers!; AMS Mtg., Santa Barbara (1990) [3] The Collapse of Chaos, Penguin (1994)-last-chapter!

 **ABSTRACTS & PAPERS:**

 **PHYSICS via “FUZZYICS”**