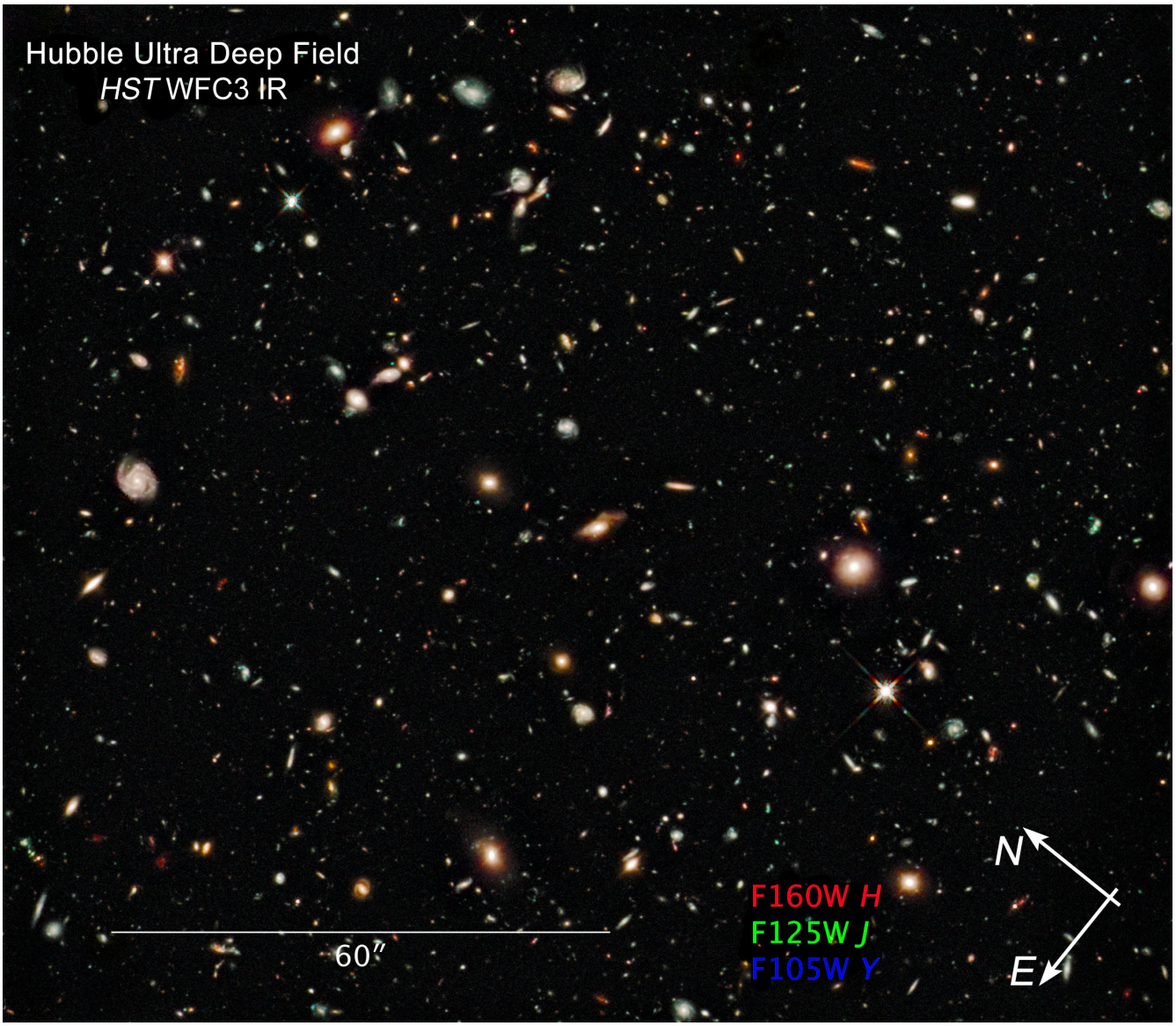
The Universe is Made of Lint



An epistemological approach to field unification

Jack J. Woehr
for the Forth Interest Group

June 25, 2011

Thanks to Kevin and SVFIG for inviting me to present to the group. You are the only folks aside from family members who are paying the slightest attention to what I say about these matters!

* **

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“Less is More.”

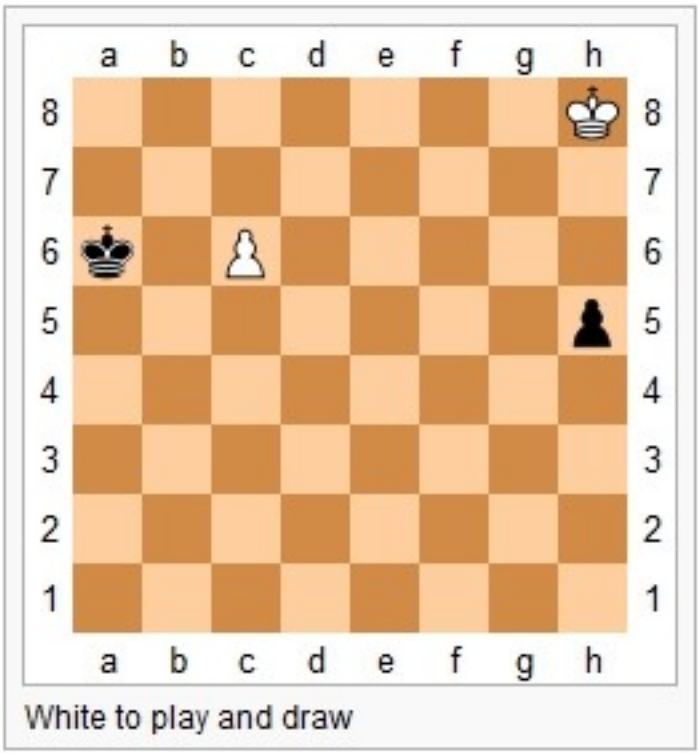
– Moses Walker of the Clam Daddys

http://theclamdaddys.com

Less is Moore

Also: See the interview with modern day apostle of simplicity Anselm Garbe in Appendix 2 of this document.

Richard Réti, 1921



(1. Kg7! h4 2. Kf6 Kb6 3. Ke5! Kxc6 4. Kf4)
wikipedia

"In Chess, we have a portrait of the intellectual struggle of Mankind."

– Richard Réti, *Modern Ideas in Chess*

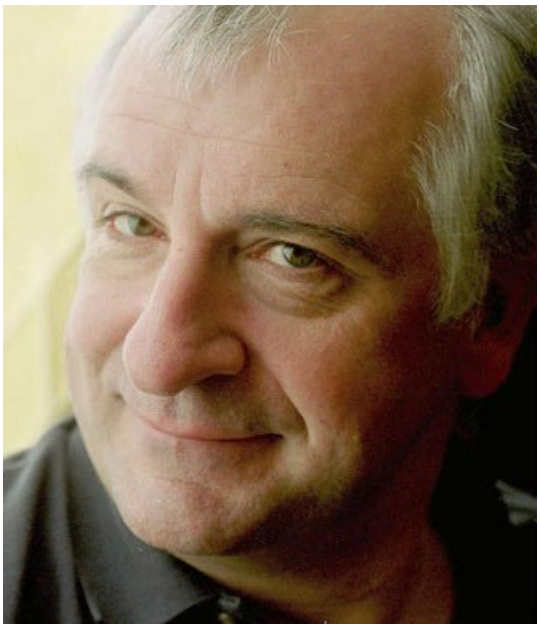
Réti was the preeminent chess epistemologist and likewise a leading exponent of simplicity.

What?

In high school in the 1960's, a chemistry teacher introduced us to quantum mechanics. In 1976, I read Capra's *The Tao of Physics*. In 1980 while working on early electric power windmills I studied the bursting speed of flywheels. About the same time, Voyager I revealed that the rings of Saturn open and close in spiral arms as they rotate. Hearing about Quantum Computing around 2002, I pondered Bell's Theorem and spooky entanglement. In 2008 I began blogging for Dr. Dobb's CodeTalk (now folded into the online DDJ publication) about Quantum Computing and was privileged to communicate with many QM researchers, including two Nobel prize winners.

In line with the zen simplicity inculcated in the Forth community, I propound a simple unification hypothesis unifying all physical forces and restoring local realism to our view of the subatomic layer of our existence. This paper is a brief introduction to my world, and welcome to it.

Understanding Statistical Mechanics



(Wikipedia)

"It is known that there are an infinite number of worlds, simply because there is an infinite amount of space for them to be in. However, not every one of them is inhabited. Therefore, there must be a finite number of inhabited worlds. Any finite number divided by infinity is as near to nothing as makes no odds, so the average population of all the planets in the Universe can be said to be zero. From this it follows that the population of the whole Universe is also zero, and that any people you may meet from time to time are merely the products of a deranged imagination."
- Douglas Adams (*The Restaurant at the End of the Universe*)

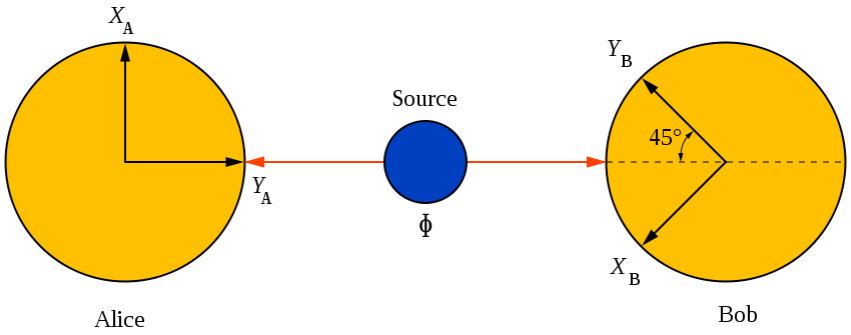
This and many other satirical Adams quotes are remarkable for their insight into the epistemological problems of statistical mechanics and cosmology. The witticism is a variation of the old “2.4 children” joke about population statistics. The point is that ...

No statistical model proves *anything* existential about any particular *individual* sample.

(Wikipedia)

Astrology can be defined as “the attempt to confer existential validity w/r/t particular individual samples upon conclusions arrived at statistically”.

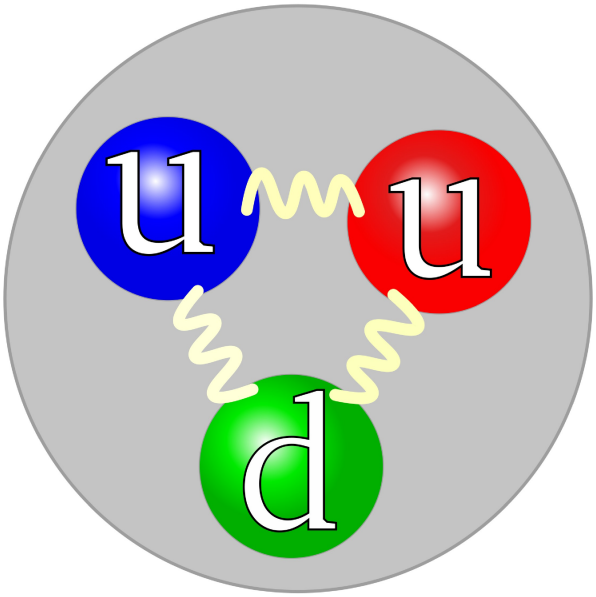
Quantum mechanics is a statistical model achieved by a quantized interpretation of observed behavior. The model cannot offer any insight into, nor any obstruction to a theory of local realism any more than a character in a TV show can perceive the LCD display on which s/he appears.



(Wikipedia)

THIS EFFECTIVELY REFUTES BELL'S THEOREM.

Do you believe in Quarks?

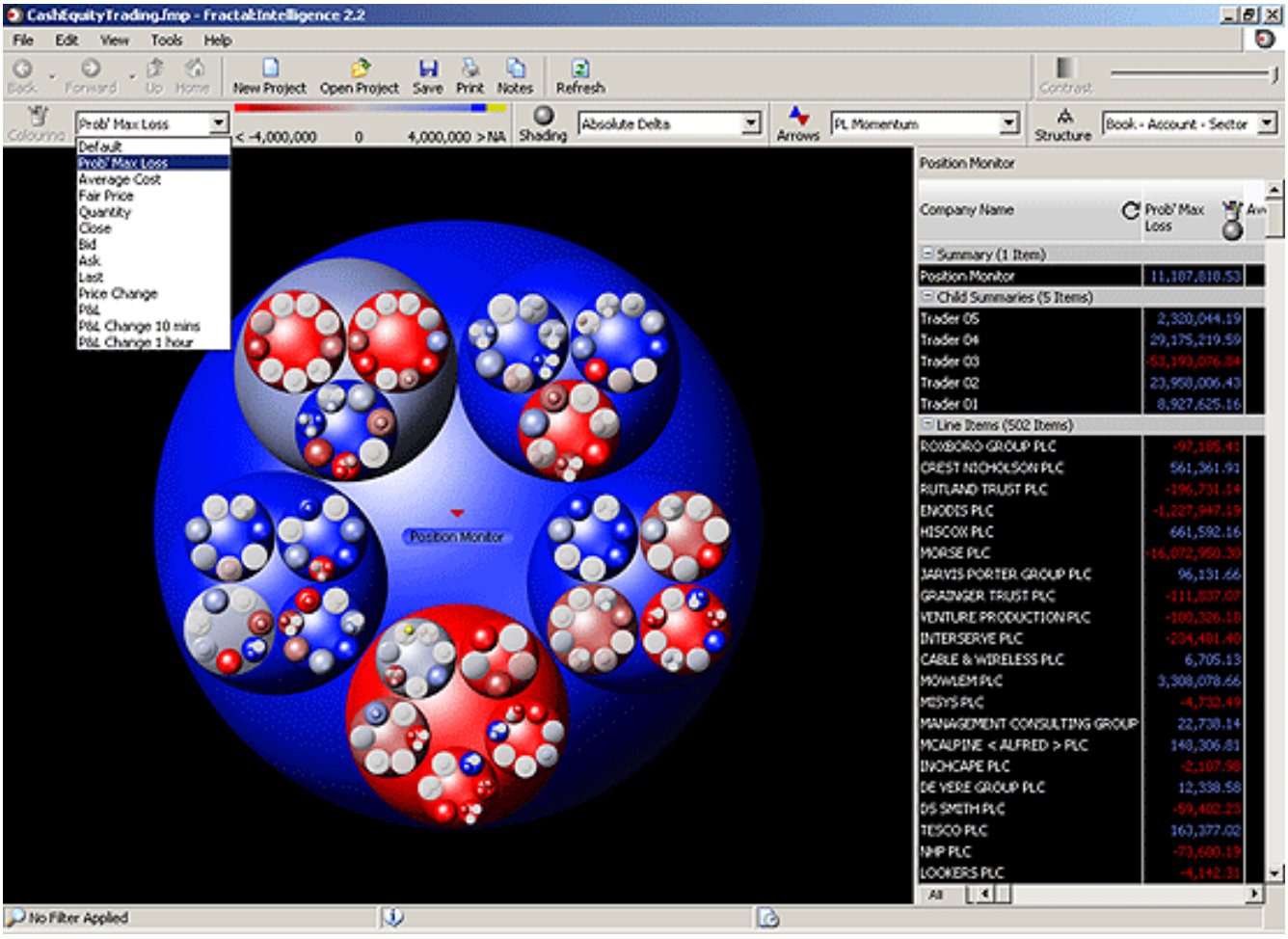


???

(Wikipedia)

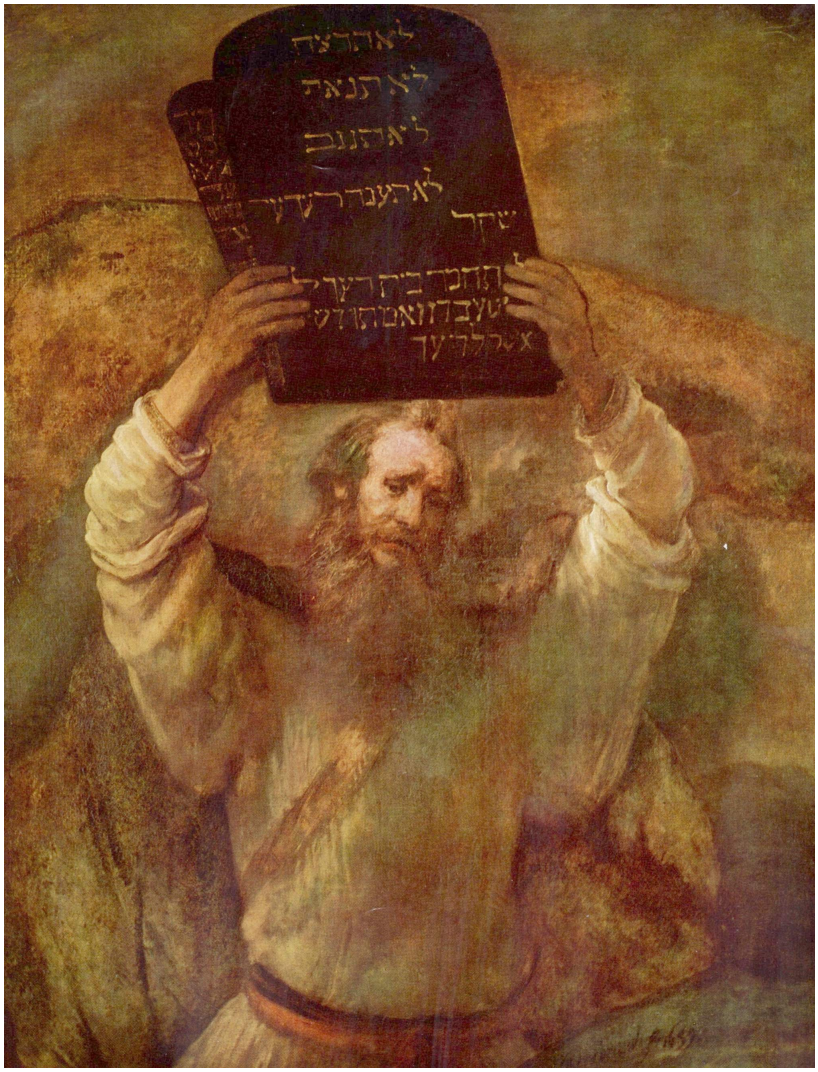
Quarks are mathematically valid derivatives of the QM statistical model and are more tangent to existential reality than the model from which they are derived.

Hedge fund trading is a gambling game based precisely upon the iterative incremental irreality of mathematically valid derivatives of statistical models. Each derivative is further removed from whatever links to reality its underlying model possesses.



(Engineering Software Lab - Hedge Fund Trading Dashboard)

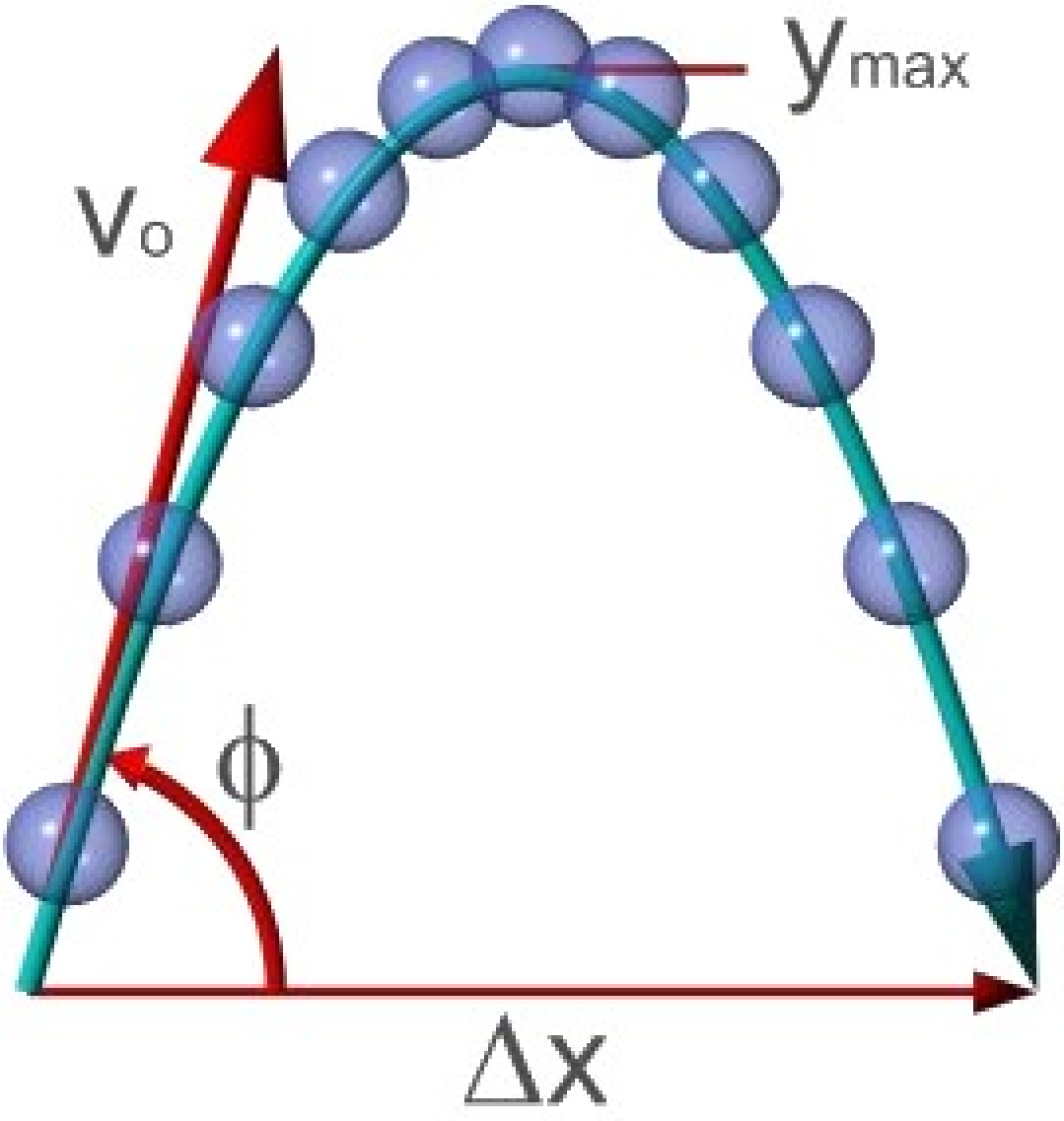
Primum Mobilitis



(Wikipedia)

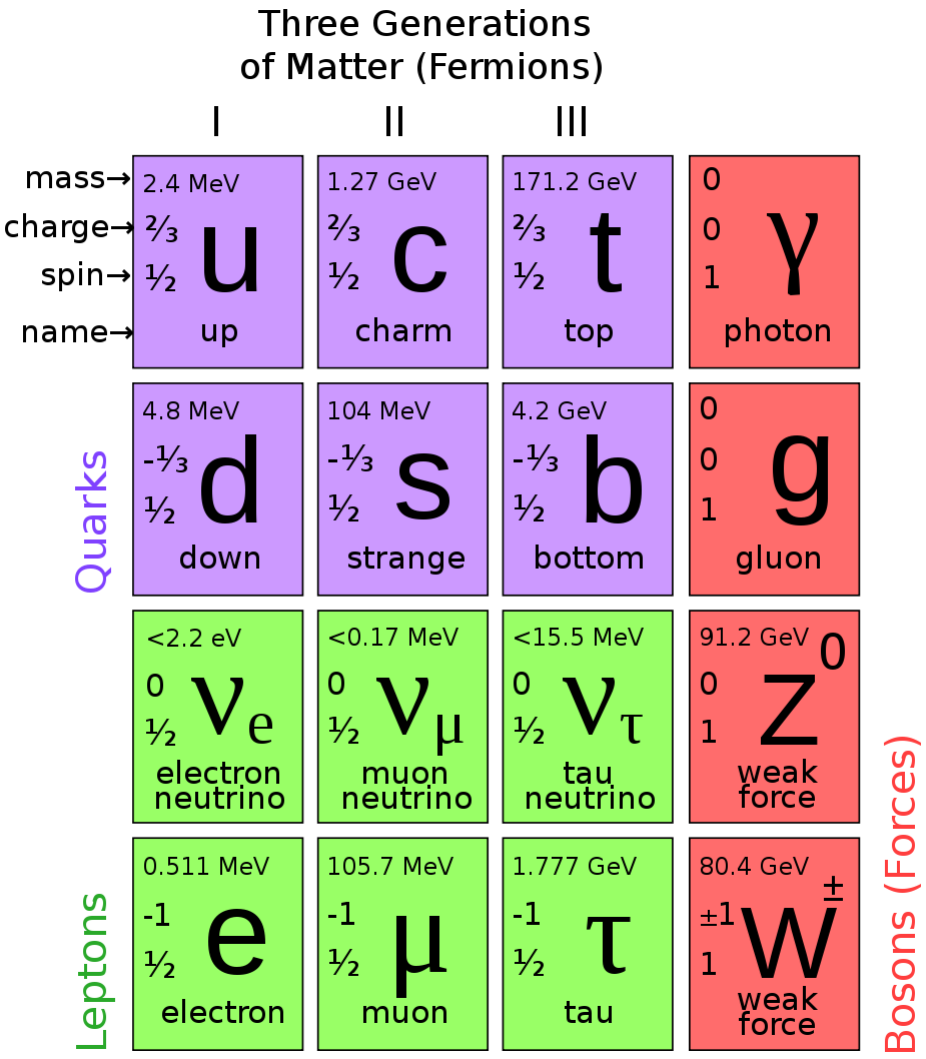
Long after western science became divorced from religion and no longer needed to posit a cosmic Engineer, it retained nonetheless a inclination to believe that the physical processes are engineered so as to proceed in a forward direction to some vaguely beneficial goal.

Likewise, despite Mach and Einstein, it's really quite hard to visualize any complex spacial orientation without subconsciously inserting some Newtonian fixed standpoint.



(Wikipedia)

While QM offers no guarantee that there exists ground, there is a reflexive belief that ground has been reached in some fashion. This belief appears to me similar to the previous cases of primum mobilitis we have examined.



(Wikipedia)

Here the primum mobile is the Standard Model.

Appended to this document is an essay submitted to the Gravity Research Foundation Awards for Essays on Gravitation which today I will summarize for you verbally as briefly as can be: *the Universe is made of lint*.

The essay offers a fractal geometrical explanation of the observational anomalies in quantum entanglement in a fashion alternative to the methodology implicit in Bell's inequality. The alternative explanation is rooted in an infinitely subconstituent model of the universe.

In such a model, forces are unifiable as pure results of collision. My essay contained this passage:

> **Try, for instance, to define "collision" in such a model. If everything is infinitely recursively subconstituent, what collides with what?**

There exists an answer to that question, an answer not contained in the GRF essay. I am very excited by the answer, because it suggests that the infinite subconsituency model is local realistically causally predictive of a particular "funny" behavior observed in quantum Hall fluids.

Collision and Braiding

In the infinitely recursively subconsituent model of the universe, collision turns out to be subconstituents recursively *braiding* from within the limits of our perception to beyond the limits of our perception. We can't answer the question of what collides with what *at ground*. Questions about *ground* have no meaning in this model, without prejudice to the acceptable conjecture that somewhere ground can be reached. A model is a model, and the constraints of this one are that we are dealing with complexity by treating the recursive nature of the subconstituency of phenomena as mathematically infinite.

Thus collision is, for the sake of visualization, like spiral arms of colliding nebulae grinding, interlocking, and resultantly braiding. The actual collision is never perceived: it's infinitely far away “down” the recursive subconstituency chain. All we can see is the braiding on the way “down” to the “real” collision.

This braiding is indeed observed (mathematically) in quantum Hall fluids and is the basis of the proposed “topological” engineering model of quantum computing.

I suggest that this braiding has its origin in the infinitely subconstituent nature of the universe. The universe is indeed made of lint.

Jack J. Woehr

Fairmount, Colorado June, 2011.

Appendix 1. Paper for Gravity Research Foundation 2011

A Unified Field Hypothesis and its Impact on Gravitation

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Essay written for the Gravity Research Foundation 2011 Awards for Essays on Gravitation
submitted February 21, 2011

Summary

A simple hypothesis is offered which unifies the enumerated forces of the Standard Model. The attractiveness of this unified field hypothesis is that it promises to clear the way to resolution of a number of persistent questions, among them the questions of the nature of gravity and the mechanism of transmission of the gravitational force. The Bell's Theorem objection to the local realistic model is addressed. The methodology of the Laser Interferometer Gravitational-Wave Observatory (LIGO) is critiqued in light of the hypothesis. The possibility of true antigravitational force is raised.

In light of his conversations with Einstein, Bohr opined that quantum physics might mean that mankind had reached a limit to the usefulness of visualization in exploring the physical world. Since Bell's Theorem (1964), the concept of the non-observability of local realism has been transformed into the dogma of the non-existence of local realism.

A simple hypothesis exists that reestablishes local realism without suggesting that such realism is identical in every aspect to quotidian reality and without doing violence to the statistical approach embodied in quantum physics. This hypothesis resolves in one stroke a number of puzzles and paradoxes in current theory. The impact on gravitational studies is profound, for example suggesting a novel critique of the methodology of the international Laser Interferometer Gravitational-Wave Observatory.

> **"The extent to which renunciation of the visualisation of atomic phenomena is imposed upon us by the impossibility of their subdivision is strikingly illustrated by the following example to which Einstein very early called attention and often has reverted. If a semi-reflecting mirror is placed in the way of a photon, leaving two possibilities for its direction of propagation, the photon may either be recorded on one, and only one, of two photographic plates situated at great distances in the two directions in question, or else we may, by replacing the plates by mirrors, observe effects exhibiting an interference between the two reflected wave-trains. In any attempt of a pictorial representation of the behaviour of the photon we would, thus, meet with the difficulty: to be obliged to say, on the one hand, that the photon always chooses *one* of the two ways and, on the other hand, that it behaves as if it had passed *both* ways."**
>
> "Discussions with Einstein on Epistemological Problems in Atomic Physics", Niels Bohr, 1949

The hypothesis is as follows.

The physical universe is infinitely subconstituent. That is, every phenomenon is constructed of myriad constituent phenomena, each of which are likewise composed of myriad constituent phenomena. Everything is composed of **stuff in motion**, itself composed recursively of stuff in motion as far down and as far up in scale as we care to or are able to observe.

Meteorologists track hurricanes, not the constantly changing membership of individual air molecules subconstituent to the quantized phenomenon we arbitrarily define as a hurricane. Furthermore, much that meteorologically gives rise to the hurricane-ness of the hurricane is external to that region surrounding the low-pressure eye which is the primary locus of the notion of "hurricane". This suggests that the cognitive necessity of treating an infinitely subconstituent system as a notional entity is at the root of the apparent paradoxes of quantum systems, of which both meteorology and quantum physics are examples.

Applying this model up or down in scale means that scientific laws describing the action of familiar forces such as gravity can only be statistical abstractions of composite interactions up and down the chain of infinite subconstituency.

Consider the two-slit experiment. The De Broglie–Bohm theory proposes that the photon passes through one slit while the wave function passes through the other. In an infinitely subconstituent model, the photon is an omission rather than a presence, analogous to the low-pressure eye of a storm front passing through the slits. This local realism would explain not only the peculiar interference of an individual photon with itself, that is, its interference with the out-of-phase storm front of which the photon was a density-less node, but also the masslessness of the detectable node (the photon) which is the eye of a disturbance in an ambiance of which the observer is also a part.

We could dust off the old theory of the Aether with the proviso that we do not *float* in the aether, but

are the aether, that matter is a density of infinitely subconstituent phenomena in sea of less dense infinitely subconstituent phenomena, with deeply subconstituent phenomena accreting to similarly scaled constituents of the density or departing association as randomly as air molecules joining or leaving membership in the arbitrarily defined set of constituent molecules of a hurricane.

The four standard forces, gravity, the strong force, the weak force, and electromagnetism, are convenient statistical abstractions of nothing more complex than patterns of motion and collision of infinite subconstituents. The paradox here, one might say, is that there is nothing more complex than patterns of motion and collision of infinite subconstituents. Try, for instance, to define "collision" in such a model. If everything is infinitely recursively subconstituent, what collides with what? What is space, and what imparted the original motion to the infinite subconsitituents of the complex interactive soup that moves within it?

Obviously, the local reality described here is not our quotidian reality ruled statistically by huge agglomerations of subconstituent real behavior, but it is local and it is recognizably real (and ruled statistically by huge agglomerations of its own subconstituent reality) .

The hypothesis meets a barrier to local realism in Bell's Theorem. It can be suggested that Bell's inequality does not apply to an infinitely subconstituent model. If quantized phenomena are in infinitely recursive complex and contradictory subconstituent motion, then in a quantum system, any observations made by collision of subconstituent phenomena on a similar scale to coerce a binary answer to an arbitrary statistical question quite naturally follow cosine theta as the cross section of the composite motion is rotated with respect to the observer. Imagine measuring the direction of spin of a hurricane by passing it near a somewhat larger hurricane to detect the deflection of the larger.

Consider the implications for the theory of gravity.

If gravitational force is actually a statistical approximation of collision-based entanglement of subconstituents, then disturbance to a gravitational field must always propagate slower than light propagates, since in this model light is a ripple traversing mass rather than a transportation of mass as gravity has to be.

In this model, gravitometric experiments like LIGO that are synched to electromagnetic observation of stellar events might end up waiting a long time for any expected gravity waves. With respect to LIGO there is also a question of whether, even if gravity waves impinge, the mechanism used by LIGO can detect them as distinct from local seismic events. The seismic filter applied by the LIGO system might preclude detection of what a waterman calls "long rollers" that lift the whole boat evenly.

Rather than becoming a useless appendage to the human intellect, visualization is of the utmost usefulness in mapping the motion and interactions which give rise to the four forces. If these forces are statistical abstractions, then other forces less obvious but still mathematically useful can be defined. The infinite subconstituency model seems to suggest that antigravitational forces can be defined, if a geometric pattern of subconstituent motion can be modeled whose collisions induce repulsion rather than attraction, analogous to a stone skipping on the surface of the water.

Jack J. Woehr, February, 2011

Appendix 2. Dr. Dobb's CodeTalk interview with Anselm Garbe on the virtues of simplicity

Conversation with Anselm R. Garbe of suckless.org

August 06, 2009

Primus inter pares of the radical simplicity mongers at suckless.org , Anselm R. Garbe, 29, got his first computer at age 11 when the Wall fell and allowed PC's into his native German Democratic Republic. He now lives in Guildford, UK and works for a mobile software company, mainly doing C/C++ development. We chatted about simplicity in software development. Don't miss Anselm's list of principles of simplicity at the end of the present article!

jw: Are you "Mr Suckless" or is it really a consortium of like-minded individuals?

arg: I think it's more about like-minded individuals inspiring and learning from each other.

jw: You registered the domain name?

arg: Yup. Some people like uriel find the domain name lame, which it is in some respects, but on the other hand it contains a clear message.

jw: How long have you been programming?

arg: At the age of 13 or so I wanted to know how computer programs are created and learned Pascal.

jw: Which Pascal did you use? Turbo ?

arg: Yes, TP5 by that time, but I didn't stay with it very long. Sometime in 93 I switched to C/C++, particularly focussing UI development on win16/32. My first Slackware distro, which is the only remaining CDROM software I've kept over all that time, is dated 1994. I kept going with win NT 3.51, later 4.0 and OS/2 as well.

jw: Some people never latch onto simplicity, not in music, not in writing, not in programming. How did you latch onto simplicity?

arg: I realized that very late. I was quite feature driven until my first open source creation called wmi . I liked OO, C++, XML and all that stuff and never realized how contrary it was to simple software design. I think it's just the last 5 years I more and more concluded that simplicity is power.

jw: What sort of experiences pushed you to that conclusion?

arg: If you start a new software project and it isn't usable from nearly day 1, something is wrong. I realized that most software projects I did before that time never became usable before spending weeks or months on efforts and I looked for reasons. One reason was OO, which forces people to spend long period of times with design, and the designed class structure isn't working initially, and revised during the implementation again and again, because one didn't think of certain corner cases carefully enough.

I did all the same mistakes as any other programmer and I remembered the time when I was young and got simple programs running in a matter of hours and wondered why. Perhaps it was that phase in the evolution of a programmer where he or she says "great class design and the use of great new modern technology makes a great product".

And there are those who are proud of "how many lines of code have you written in your life?" -- I remember one student I studied with who responded to that question "Over 100,000 lines" when asked in one program, which was a Java program, and he was *proud* of it.

It was that high complexity challenge, understanding something that can't be understood completely. Later on, I think when I started with wmii , my colleages were surprised that it's possible to write something useful with very few effort, and still using a low-level language like C. They were usually Java evangelists who thought that something usable but simple can only be created on top of a full-featured SDK, one that provides all datat structures and algorithms mankind came up with so far, simply because doing it on your own would make it more complex.

But this is simply wrong! Imagine the simple list paradigm in a C struct, that's much simpler than using a List implementation from the JDK.

jw: Can all programming needs be addressed that simply? For instance, what happens to you at work on the mobile devices when you strive for simplicity?

arg: It helps me a lot, because mobiles are usually quite limited compared to desktop computers, less memory, slower cpu, less data space. Nowadays mobiles might be faster than a usual Pentium 2 desktop, but still, the same principle has always been true. The hardware has so much evolved during the last 20 years, but the software is still as slow as 20 years ago, why is that?

The same can be observed on mobiles, the software is becoming more complex, more layers on top of other layers and the overall user experience is the responsiveness of a mobile 15 years ago.

jw: What drives the complexity?

arg: I think complexity is driven by two things, perhaps even 3 nowadays.

First is legacy -- the aim to support old stuff that nearly no one uses anymore (MS has suffered from this all along).

Second the tendency to new technologies,.15 years ago the world switched to OO, 10 years ago to XML and SOAP, nowadays to JavaScript. Usually these new technologies are build on top of older technologies, every 5-10 years another layer appears on top of it.

Perhaps the third reason is marketing, many of these technologies are advertised and decision makers who usually have no clue about the technology, who think that, because it's new, it's a new business opportunity. An example is the heavy switch to Java, which I believe is the Cobol of the future.

jw: You are a particularly vocal exponent of the suckless philosophy ... how did you become so vocal about what you believe?

arg: I think I became so vocal, because I believe that a lot went wrong in the IT industry recently and I hope to be recognised in order to rethink the common practice, and perhaps to think about the time when Moore's law stops being a valid assumption.

At least then, our approach will succeed. I mean that the software we are developing in the context of suckless.org becomes faster from year to year, simply because Moore's law is still valid.

I have developed some principles over time. Let me try to summarise them:

1. Apply the Unix philosophy whenever possible -- do only one thing, and do it well.
2. If you design a user interface, make each function only accessible using one interaction

approach (don't confuse users with doing the same in different ways).

3. Whenever you add a feature, try to remove 2 features.
4. Keep track of your lines of code, the more lines you end up with, the more likely your software is complex, contains bugs, and isn't simple.
5. Never do big changes to your software, always use the evolutionary approach and take a lot of time to think about what you are going to change.
6. Only use the revolutionary approach if your existing software is too complex to be fixed and needs to be dropped into the [trash, rubbish] bin, but even then, use the evolutionary approach.
7. If your software isn't usable from day 1, your design is broken.
8. Data structures are more important than the actual code.
9. Always use the simplest data structure, even if you think the performance will suffer. If performance is an issue, address it later using the evolutionary approach.
10. Citing Ken Thompson: if in doubt, use the brute force approach.
11. Never implement or design "future extensions".
12. Use the simplest programming language (C).
13. Avoid OO whenever possible. Contrary to common belief, most problems are better solved in non-OO ways.
14. Rewrite from scratch instead of trying to fix.