Correlation and Causation

by Clark M. Thomas

The relationship between correlation and causation is not just an issue for physics. It is at the core of all science and philosophy. The standard filter used to distinguish bogus ideas from verifiable science has become this dichotomy. Standard science uses the test of seemingly verifiable causation, not imagined correlation. Bad science is said to be happy with random correlation, and possibly a dose of fantasy. However, things are not this simple when seen from the proper perspective.

When we look around ourselves, and when we use scientific tools to magnify what we can measure, we imagine what we see and perceive as all there is. We also imagine that what we cannot see, very large and very small, is either a linear or quantum field extension of the verifiable, or else meaningless. Again, things are not that simple.

In ancient Greece, India and China – science, religion, and philosophy were functionally unified. Lacking modern instruments, the early thinkers used logic and their own senses, along with some religious imagination, to build their anthropocentric conceptual worlds. In modern times science and math have broken away from the methodologies of classical philosophy and religion – positivistically separating seemingly verifiable physics from what is perceived to be meaningless metaphysics.

The march of modern science has been impressive, at least as far as the worlds we can apparently measure. Philosophy has in comparison appeared to stagnate. Typical religion stays culturally historical, political, metaphysical, and psychological.

All approaches to learning our place in the cosmos are valuable in the search for wisdom – but all are unable by themselves to embrace the big picture of Reality, which is the cosmos itself. By itself, positivistic exclusion of unverifiable data is unable to include all there is. The lesser, however

elegant, cannot fully embrace the greater. Many experimental successes in dimensions close to our own are not congruent with the paucity of coherent ideas beyond what we can verify. In other words, wading in the shallows at the edge of a great sea does not tell us much about the great sea itself. Deduction and induction are equally flawed.

It is the purpose of this essay to help clarify what if anything can be known. Big Science proudly occupies center stage, purportedly dismissing metaphysics from physics. Interestingly, ancient priests claimed to be scientists of their worlds – while they conveniently buttressed their metaphysics with seemingly valid claims that supported the divine rule of local potentates. Modern scientists try to appear to be agnostic purists, worshiping only the scientific method. However, their "potentates" are too often politically motivated funding sources. The old is new.

Another paradigm is to think of scientific inquiry as dialectically pouring possibilities into the large hole atop a "testing funnel," then having "the truth" emerge from the small hole below. Experimental truth starts as a thesis or theses; the testing inside this funnel is called antithesis; and the dialectical advance toward truth is called a synthesis. Syntheses become higher-level probabilities, and the rest are discarded – until a subsequent inquiry comes up with a more precise result. This is the standard scientific method for a limited universe.

Everything seems to be fine and dandy inside the world of modern science and technology. Nevertheless, modern science and technology have also given us nuclear weapons, chemical weapons, world wars and genocide, human-caused global warming, overpopulation, and other questionable scientific advances. Is there a better way to envision the seen and the unseen? Is there a better way to envision our place in the cosmos without sinking into pure metaphysics?

All great things are composed of primary small things. Together, these unseen small things dialectically compose the greater things. The smallest ones become the many expressions of emerged collective nature different from the sum of the primary ones. Out of this dialectic have emerged very useful scientific formulas to express/correlate reality in dimensions where we can measure it. The problem occurs when we can

never measure elementary components of great things, nor can we embrace the very greatest things themselves. Our experimental comfort zone does not insulate us from what we cannot verify.

This *measurement paradox* is best expressed by the "castles in the clouds" metaphor: As long as we stay within our castles the world looks rational. When we look down and realize that our lowest floors have no measurable foundation, that's when we know we are floating from one unknown to another unknown. A floating castle at least has a roof. Unfortunately, even standing on our roofs does not allow us to see very far. Our precision science is thereby trapped in a box defined by our hubris. Is there an escape to wisdom?

Let me explain this almost too-simple-to-appreciate metaphor with something that mathematicians will appreciate: Between infinity and zero can be an infinite number of mathematical dimensions. In physical/energy reality, we are talking about a number of dimensions far less than infinity. Still, a vast number of possibilities makes it impossible to independently verify objective probabilities for details within individual dimensions. Thus, we see published weird ideas of parallel universes in string theory; and the even weirder idea of our universe being a hologram.

We can appreciate dimensions not too far from our intimate 10^0 meters world, ranging all the way up to 8.8 x 10^26 meters, which is about the size of our visible universe. Nuclear physicists enjoy the nano world, and even smaller dimensions, as their true playground. We can measure neutrinos down to about 10^-24 meters, which is very small indeed, considering that atoms are 10^-14 m.

There is a Planck size limit of 10^-35 m, which is the theoretical limit of measurement, beyond which measurement becomes practically impossible, and thereby meaningless. It has been assumed that all is quantum chaos dimensionally below what we measure. Nevertheless, just because something is dimensionally smaller than 10^-35 m, does not prove it is not worth seriously thinking about in the world of theoretical physics.

Going from experimentally unverifiable to conceptually fertile is not opposed to the goal of moving experimental science forward in dimensions

we understand. We just need to also understand that *the philosophical idea of verifiability*, and thus meaningfulness (versus *the idea of unverifiability*, and thus meaninglessness) is itself unprovable, and therefore meaningless! Even pure mathematical systems were shown by Kurt Gödel in the early 20th century to be unprovable within themselves.

There are other ways to confuse competing concepts. One of these is the use of vocabulary: A familiar paradigm is the idea of a multi-verse (or multiverse). String theory was inspired by gravity sheets from General Relativity, and came up with the enhanced idea of gravitons jumping from multiverse sheet to sheet, drawing down objects to the sheet, or brane, above. In this way string theory gravity is seen as a force of attraction, which I call the tractor beam force. Einstein's GR idea had gravity as the product of smooth universal geometry, not of geometry and particles.

With the deficient experimental protocols we have *correlative vocabulary dictating causative theory.* There are other ways to move from correlation, such as where the smooth algebra of GR tracks the apparent force of gravity, to an equally valid causative alternative: If we think of the multiverse in four dimensions, not as a myriad of supersymmetrical universal branes, all sorts of coherent ideas can flower:

An idea that Newton considered for years, and which held sway for many decades until cast aside late in the 19th century, involves gravity as a *push/shadow* phenomenon. The original version is not valid, but a 21st century version has much promise, and can be correlated with GR math just as much as GR correlates geometry. The new push/shadow model is consistent with modern quantum vacuum field theory, as well as increasing astronomical evidence to support it. Out of this reworked model for gravity we are able to see what Dark Energy truly is.

Gravitons (*not* in the string theory sense) can, for example, be modeled as vibrating, sub-Planck, looped chains in a 4D universe. They would be composed of connected and *fundamental Yin/Yang particles,* each at about the 10^-39 m dimension – having simultaneous cause and effect, and energy and matter. Out of those granular loops extend many perpendicular granular strings of Y/Y particles expressing both primary and secondary electromagnetism – similar to information-unit qubits in quantum

computers, having +, -, and +/- polarities. The length of each energetically liberated string determines frequency and energy, which allows for us to measure them as both waves and particles.

This *new physics paradigm* allows for better causative models for: (1) why "c" is the exact speed of light in a vacuum; (2) how different electromagnetic frequencies are generated; (3) how the Strong and Weak forces operate; (4) how Dark Matter is created and aggregated; and (5) what exactly is Dark Energy.

All of these 21st century ideas can coherently operate as extensions of classical physics, and help clarify just what is the quantum universe. This new physics of the very small links phenomena all the way to the distant regions of the multiverse. In between dimensional extremes is the restricted realm of experimental physics, nothing of which contradicts these new ideas.