E-SUETERRY-C

October 25, 2010

CHAOS

There is an anecdote about the young Buckminster Fuller that hints at his future as inventor of the Geodesic Dome, the Dymaxion Car, and many other innovations of the previous century. It seems that little Bucky was puzzled one day in grade school, when his teacher drew a line on the blackboard and said it was a "straight line that extended to infinity." Bucky looked at the line. He raised his hand. He wanted to know if the teacher had ever been to infinity, and if one end of the line went there, where did the other end go? And how could the line go to infinity, when it was on the blackboard and the blackboard doesn't go to infinity? Approaching the blackboard, Bucky also pointed out the promontories and peninsulas of its jagged chalk outline that gave the lie to the word 'straight'. Exasperated by her pupil's irrefutable logic, the teacher finally amended her statement, saying "Well, it *represents* a straight line."

It wasn't long before Bucky learned Rule #1: Give 'em the answer they want to hear. Later in life, though, Buckminster Fuller would take delight in sharing his unique worldview with laypersons as well as colleagues, all over the planet. His perspicacious observations tended toward the literal, and they served to put scientists and thinkers back on track if they had chanced to veer off via the abstract truths of higher mathematics and quantum physics.

The young Bucky's discovery of the chalk line's jagged edges predated the blossoming of a new scientific discipline by about seventy years: Chaos Theory. In the 1970s theorists were becoming fascinated with the apparent randomness of certain phenomena, like plumes of smoke, and the weather. Their patterns could not be predicted--or could they? As computers became more powerful and faster, scientists could use more complex data in their experiments. It soon became evident that chaos was not what everybody thought it was..

I do read, and welcome, your comments!

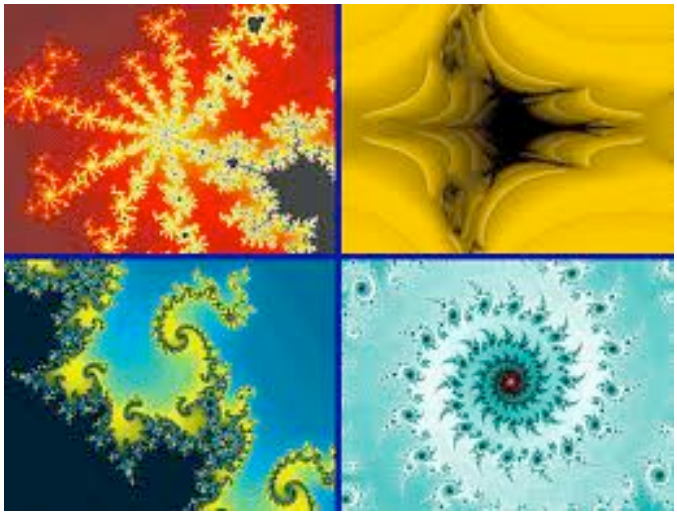
con't next page

CHAOS, con't

In the 1960s Mel Brooks and Buck Henry created a television series called 'Get Smart'. In this show, agents Maxwell Smart and 99 worked for an outfit called Control whose main function was to foil the evil plots concocted by its rival organization, Kaos. The idea of the word 'chaos' meaning 'disorder and confusion'-- and it's not a far stretch to 'bad' or 'evil'--arose a few hundred years before television, yet this connotation strays quite far from the word's original meaning.

Chaos was a Greek god. She was the very first one, she existed before Gaia, Zeus, Aphrodite, all of them. Her name meant 'the Void'; a state of non-being prior to Creation; a formless state. Many great thinkers of history--Hesiod, Heraclitus, Aristotle, Ovid, the Bible authors, the Medieval alchemists--yearned to be simpatico with the great goddess.

Without darkness, there is no light. Without disorder, there is no order. If we consider that the original meaning of Chaos is nothing if not a Western version of the Eastern 'Tao', we must admit that Order and Disorder are merely complementary aspects of the Way, whether it be called Chaos, Tao, Universe, God, or what-have-you. But as Lao Tzu told us, the Tao, or the Way, is unknowable. A mere human can never understand its essence, although those who are 'one with it' may be privy to its manifestations.



When Chaos came to represent disorder, she was demoted quite a bit. Instead of Queen of the Void, she was the disrupter who worked against godly orderliness. Still a classy dame after all those years, she hung around like Chanel No. 5, reminding scientists that there were many things they had yet to understand. Oh sure, they knew all about planetary orbits, they could tell you when the next eclipse was going to be, and when Halley's Comet would be dropping by. They could make charts of the tides, and the exact times of sunrises and sunsets. Those charts and timetables were not fact--they were predictions, based on the rules originally laid out by Isaac Newton in the 17th century.

It just didn't seem right that the movements of the planets, the sun and the moon could be predicted with such accuracy, yet nobody could tell you if it was going to rain on Saturday! A meteorologist named Edward Lorenz began studying this very problem. In 1960 he worked out a weather simulation program on a huge, ungainly Royal McBee computer that was stuffed into his office at MIT. In the process of analyzing the data that came through, Lorenz made an astounding discovery: the seeming unpredictability of weather was a myth--sort of. What we called 'chaos' was actually a deterministic series, but there was a catch--the series could only be determined perfectly if the initial conditions were understood in their entirety. The problem was how to understand those conditions. Conditions like, say, the air temperature and atmospheric pressure present when a certain butterfly in a certain location flaps its wings on a certain day at a certain time, having just drunk its fill of daisy pollen--or not. Hence the title of Lorenz's 1969 presentation to the American Association for the Advancement of Science: "*Does the Flap of a Butterfly's Wings in Brazil Set Off a Tornado in Texas?*"

In any chain of events, a minuscule change at the beginning that causes a drastic change later is now known as the 'Butterfly Effect.' When duplicating the Butterfly Effect in the lab for experimentation purposes, small deviations are deliberately introduced near the beginning of a calculation. These deviations reproduce exponentially in the system, each time creating a different scenario. On the other hand, if you can duplicate the initial conditions exactly, you can actually recreate a so-called 'chaotic' pattern, proving that what we perceive as disorder actually does have an order if you go deep enough.

James Gleick, in his 1987 book *Chaos: Making a New Science*, comments "sensitive dependence on initial conditions was not an altogether new notion." The following bit of folklore illustrates this:

For want of a nail the shoe was lost
For want of a shoe, the horse was lost
For want of a horse, the rider was lost
For want of a rider, the battle was lost
For want of a battle, the kingdom was lost

Our ancestors didn't need Chaos Theory to tell them "life is what happens to you when you're busy making other plans." In modern times, you may not have a horse to shoe, but it's probably a good idea to check the air pressure in your tires before you go on a long trip.

con't next page

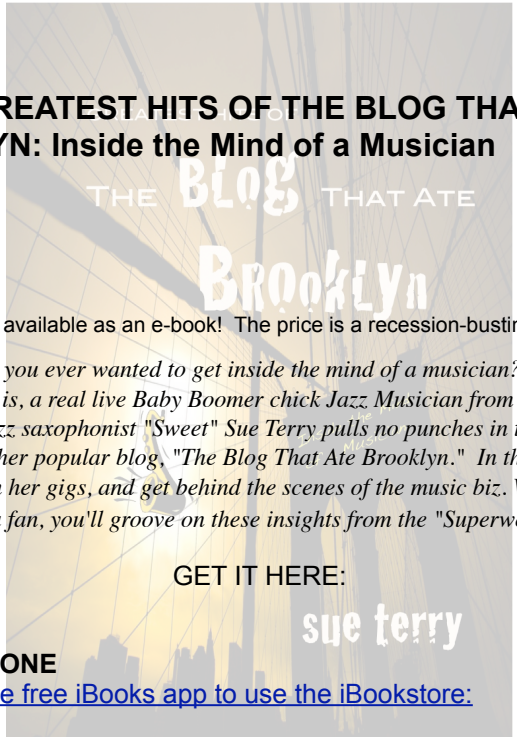
All the stars of Chaos Theory are in Gleick's book, from Lorenz to Mandelbrot (who died on Oct. 14, 2010), the father of 'fractals.' Mandelbrot came up with fractals while engaged in the problem of measuring the coastline of Britain. He realized that the closer you got, the more detail there was. And the more detail, the more coastline there was. His answer to the question 'how long is the coastline of Britain' would have pleased Buckminster Fuller--"it depends on how closely you look."

Scientists are able to measure the patterns of planets, comets and tides because these are linear phenomena--their trajectories flow relatively smoothly along planes that are easily plotted on a graph. In contrast, movements of fluids, gases and stock markets are non-linear; they are not sequential, or straightforward. If we zoom out far enough though, we can see the order in chaos, in retrospect as it were. But we're not so advanced at doing the opposite--making chaos predictable. (Attention, stock analysts! I've got good news and bad news: the good news is, just because something is non-linear doesn't mean it's random! The bad news is, it might as well be.)

Chaos Theory, then, shows us there is order where we always thought there was none. I find that rather comforting. It's as if some Cosmic VIP said, Yes, Virginia, there is an Order to the Universe. Can we not, in light of this revelation, aspire to heights of personal clarity that would allow us to perceive this order (if not 24/7, then how about once in a while)? For those whose glass is half-full, 'tis a consummation devoutly to be wished.

Sue is guest soloist with the Hartford Symphony on Saturday, Nov. 20, 2010 in their Jazz & Strings Series, performing Art Pepper's Winter Moon album as well as her own compositions.

HOW TO READ **"GREATEST HITS OF THE BLOG THAT ATE BROOKLYN: Inside the Mind of a Musician**



This title is now available as an e-book! The price is a recession-busting $4.99.

Have you ever wanted to get inside the mind of a musician? Step right up, folks! Here she is, a real live Baby Boomer chick Jazz Musician from Brooklyn! Professional jazz saxophonist "Sweet" Sue Terry pulls no punches in this new book compiled from her popular blog, "The Blog That Ate Brooklyn." In this book, you'll ride shotgun on her gigs, and get behind the scenes of the music biz. Whether you're a musician or a fan, you'll groove on these insights from the "Superwoman of Jazz."

GET IT HERE:

KINDLE

iPAD or iPHONE
Download the free iBooks app to use the iBookstore:

COMPUTER
Download the free Adobe Digital Editions to read any digital book on your computer!
Then go to Lulu.com to get the e-book.

Do you know someone who would enjoy this e-zine? Please do print out copies, or forward the link to your friends: www.sueterry.net/news.html New subscribers may join right on the website.