There is Order in the CHAOS THEORY

It is exciting to be living in a time of transition and experiencing many significant changes firsthand. One such innovation is the chaos theory, which is still being defined. We are watching it being shaped. The chaos theory began in the 1960s with the realization that quite simple mathematical equations could become very complex, and that tiny differences in input could create a very different output. Then in 1975, Mitchell Feigenbaum at the Los Alamos National Laboratory discovered that in a tiny change producing a significantly different result, there was unexpected order. The word "chaos" is misleading since the theory shows that what seems like disorder in a system actually leads to order. The 1970s saw various disciplines, from chemistry to meteorology, studying the theory.

The chaos theory represents the idea that within the defined boundaries of a complex system, there can be random disorder. This chaos is described as:

> an intricate mixture of order and disorder, regularity and irregularity: patterns of behavior which are irregular but nonetheless recognizable as broad categories of behavior, or archetypes, within which there is endless individual variety (Parker and Stacey 11).

Business writer Margaret Wheatley describes that it is natural for a system, whether human or chemical, to attempt to quell a disturbance when it first appears. But if the disturbance survives, then the process begins again, going from stability to instability (Wheatley 96). This process eventually creates a new order within the system, which will, at some point, also face disturbances. Some of these disturbances will be stopped and some will go on to create further chaos. This theory was the basis of the Nobel Prize in Chemistry won by Ilya Prigogine in 1977, and relates to most disciplines.

There are significant aspects to such a theory. One relates to the terms "linear" and "non-linear" relationships. A linear relationship has one cause and one outcome, is considered a simple relationship and defines a simple system. In a non-linear relationship, one cause may have many different outcomes, or one outcome may have many causes; it is complex.

A second condition of chaos is that a non-linear system is more than the sum of its parts. A complex system can't be studied in parts or in isolation; a scientist can't break a system apart to understand its sections and then put it together again with a knowledge of

that system. A non-linear system requires a holistic approach in which the pattern of the behavior of the whole, not the individual parts, is significant.

The new theory is also an interdisciplinary one. One example is the Santa Fe Institute which was established in 1986 to study the links between the simple and the complex in life. "The idea behind the institute," according to President Ed Knapp, "was to break down the barriers between scientific disciplines, to encourage researchers in different fields to work together and to begin to understand what they have in common" (Flick 2A). Another intriguing aspect of this theory is that it deals with elements on a human scale. The other two post-Newtonian concepts in science dealt with either cosmic proportions as a result of Einstein's theory of relativity or the invisible, hardly comprehensible proportions of quantum physics. Science had seemingly ignored our lives, and anything too common, such as the study of clouds, was too mundane for real scientists. Chaos brought back a human perspective.

Most scientists acknowledge the theory of relativity and quantum physics as the two most significant discoveries of the 20th century. Many are adding chaos, or the more general term, complexity theory, to that elite group.

IMPLICATIONS OF THE CHAOS THEORY

If there is, in fact, order beneath the seeming chaos in systems, can this affect our economic system and our businesses? Conventional economics assumes that in a system of supply and demand, prices will level off at the point at which supply equals demands. "Recently, maverick economists, like Brian Arthur of the Santa Fe Institute, have argued that this is not at all the way the real economy works" (Casti 41). Conventional economics was basically influenced by classical physics which assumed there were structurally stable systems. New theories are suggesting that not all systems, such as economics, are stable. They attempt to provide a framework for these new systems that are described as "open" and complex, in comparison to the largely-studied "closed" and simple systems.

I recall when I first entered the financial industry from an educational background and tried to reach an understanding of economic theory. I assumed that if I read enough, I would find the long-term rules that applied to investing. But the more I read, the more I found that there were no rules that worked. There was no way to predict or have a real understanding of what would happen, other than the market would go up and, at some point, come down. Researchers are now proving, as most astute financial analysts already

know, that our economic system is complex with no single cause and effect. We have been in a chaotic world, pretending it was structured with understandable rules.

Economics is not the only complex situation with no certain outcome. A British study by David Parker and Ralph Stacey entitled, Chaos, Management and Economics: The Implications of Non-Linear Thinking shows that the new theory also impacts how our human organizations function. They use the term "bounded instability" in relation to this theory. Boundaries exist, within which there is order, disorder, then order and disorder in a continual process; this is chaos within a business. Knowing that it is all right to expect the unexpected, and to accept that as natural, can help us see business in a different perspective.

What makes this seemingly chaotic behavior livable is the fact that underneath the random activity is eventually a return to a new order. It is not the same order that was initially in place, but stability in a system does return after a period of disruption. Maybe we can begin to feel more comfortable in our business life, knowing that there is structure underlying whatever modifications we are currently experiencing. We should remember the "bounded instability" and apply it to our lives and our business. Yes, there is instability, but it has boundaries beyond which it will not go. This allows us to trust again. There are limitations and, according to the chaos theory, a new order will arise.

We are living in turbulent times forcing us to modify the old ways of thinking. An understanding of the role of science adds another dimension. Science discovered the technology that brought us from the agricultural world to the industrial age to the information age. Accepting the scientific basis of this current era furnishes us with a scientific possibility of trust, because the new theory suggests an underlying order to our seemingly chaotic lives.

From ***The Trust Factor: The Art of Doing Business in the 21st Century*** by Cheryl A. Chatfield. Santa Fe: Sunstone, 1997.

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