

Chaos Theory and the Canon of Creativity

RORY REMER

ABSTRACT. A strong relationship exists between chaos theory and sociometric theory, yet many sociometrists are unfamiliar with the tenets and applications of the chaos theory. The author of the article explains 5 of the main constructs: (a) strange attractors and basins of attraction, (b) bifurcation and bifurcation cascade, (c) unpredictability, (d) fractal boundaries and dimensions, and (e) self-similarity/self-affinity. The author draws parallels between chaotic processes and the canon of creativity, as a unifying theme in sociometric theory, and provides illustrations. The implications for both theory and practice are explored.

WHETHER MANY PEOPLE REALIZE IT OR NOT, chaos has already hit the psychodrama community. Now wait a minute. No need to PANIC.¹ I mean that statement in the scientific, not the popular vernacular.

In at least one article published in *JGPPS* (Carlson-Sabelli, Sabelli, Patel, & Holm, 1992) and at least one presentation (Hart, 1995), chaos theory has served as the basis, if not the focus, of the material. Chaos theory as an extension of the general systems theory seems bound to have a significant impact on the scientific community. Not surprisingly, chaos theory interfaces well with sociometric theory.

My purpose in this article is threefold. I want to introduce chaos theory to those not already familiar with the basic concepts. I wish to tie those concepts to sociometric theory, specifically spontaneity theory, through the canon of creativity (Moreno, 1953/1993). Finally, I will examine the implications of the chaos perspective to the practice of psychodrama.

Chaos Theory and Its Importance

Just as the term *spontaneity* has a popular connotation, often misleading from the more scientific, specific, delimited sociometric perspective, so too does the usual concept of *chaos* differ from its more stringent, scientific application. Although the term *chaos theory* is certainly eye-catching and

intriguing, other names for the theory that provides the nomothetic net for the constructs involved are far more descriptive. Dynamical systems theory, ecological theory, and nonlinear, nonindependent systems theory are terms that better convey the far-reaching implications—although the last is certainly a mouthful.

By applying chaos theory, observers recognize and address the complexities of existence by examining and explaining patterns. It is a systems theory, a process theory, and an uncertainty theory. As such, chaos theory is more comprehensive, more utilitarian, and more integrative than other attempts to address the same phenomena—much as the relativity theory is a better theory than Newtonian mechanics. The overreaching applications of the theory to processes at all levels are impressive. Chaos theory has ramifications for physical, biological, social, psychological, and anthropological phenomena.

By implication, does this mean that chaos theory can or should entirely supplant the other theories? No. Just as in the relativity and Newtonian cases, chaos theory may subsume and even inform the others by providing a broader perspective, but other theories may be functional and necessary in a narrower, more delimited situation. To understand my point, readers must first be familiar with the basics of the theory.

Brief Overview of Chaos Theory

In addition to the definitions of terms, readers will find examples or analogies helpful in understanding and making connections between some of the mathematical abstractions and their use. Although they are not within the scope of this article, far more extensive explanations are available (e.g., see Gleick, 1987; Goerner, 1994, for two of the more understandable texts on the subject). In this article, I shall address 5 of the most basic constructs (a) strange attractors, (b) fractals, (c) self-similarity, (d) bifurcation, and (e) unpredictability.

Strange Attractors and Basins of Attraction

Strange attractors and their basins are similar to homeostatic points of general systems theory. The classic example of a strange attractor and its basin is an open bathtub drain when the water is being run fast enough to fill the tub. Should an object such as a ping pong ball (buoyant but too big to be sucked down the drain) be dropped into the tub, it will continue to circulate in a quasi-predictable manner—*predictable* in the sense that the ball will not be able to escape the tub and so its general location is well established (at least until the tub is filled to overflowing); *quasi* in the sense that how near to or how far from the drain hole (strange attractor) the ball will be at any time cannot be

readily foreseen, particularly for far future times. Strange attractors and basins of attraction capture the actuality—consistencies and vagaries—of human behavior patterns better than do homeostatic points.

Fractal Boundaries and Dimensions

Fractal boundaries and dimensions convey in a systematic (and possibly quantitative) way that reality is rarely as clear and clean cut as we picture it. Shorelines can serve as good examples. From a far distance (e.g., outer space), shorelines may look like continuous, curved lines consisting of long, relatively smooth segments. Walking the shoreline gives one a quite different impression, as does examining an object under a magnifying glass. At each level, what becomes apparent is that all the seemingly long, smooth segments are actually made up of many shorter convoluted pieces. Measuring the overall length of the shoreline will vary with the “fineness” and/or applicability of the measuring instrument. A yardstick or a micrometer often produces grossly disparate outcomes (e.g., measuring the distance with a yardstick around every indentation of every rock and pebble is not done very accurately, if that is even possible).

Fractals convey two very important concepts. First, what you see depends largely on your perspective (e.g., Remer, 1983). Second, accuracy of measurement often depends on the definition of the process—even though results may be internally consistent employing the same method of assessment, they can vary greatly, even by an order of magnitude, using different approaches.

Fractal boundaries and dimensions capture the fuzziness, the gray areas of behavior patterns. In doing so, they also emphasize the impossibility of separate systems ever meshing perfectly (much like trying to glue two pieces of a broken cup together so the weld is not visible).

Self-Similarity and Self-Affinity

Paradoxically, at least from a fractal perspective, the more different the boundaries seem, the more they resemble each other when viewed from the appropriate levels. Similarities, not only of boundaries but of patterns in general, have proved fascinating, valuable, and enlightening (Hofstadter, 1979). The constructs of self-similarity and self-affinity capture this phenomenon. Patterns tend to repeat themselves, not exactly, not perfectly, but still enough to be recognizable. Again, the shoreline provides a good example. Walking along the top of a cliff, the shore along a particular stretch of beach may appear much as the longer shoreline would look from a balloon; a rock that seems smooth from the top of the cliff looks more irregular when seen from a closer perspective. On the other hand, in every situation, as many points of nonsimilarity can be found as points of similarity.

Behavior patterns have tendencies to repeat themselves, though not exactly. Over time, situations, and generations, consistencies can be found. So can inconsistencies.

Bifurcation and Bifurcation Cascade

Bifurcation simply means splitting in two, thus adding complexity to a system, which, from a chaotic view, means adding strange attractors. After a period of time, many natural processes tend to bifurcate. Then, after another period of stability, another bifurcation takes place. As long as the bifurcations stay within limits or happen at long enough intervals so that the system's resources can accommodate the new conditions slowly, stability can be maintained. If either of these conditions is violated, bifurcation cascade occurs. The system goes out of control; that is, it becomes chaotic. Although such a state may seem catastrophic, it need not be. At that crisis point, the system must reorganize into a different, though perhaps similar, pattern, essentially creating a new strange attractor. Thus, these confused states can serve as opportunities for creative, functional change.

A single-celled animal (e.g., an amoeba) is a good example. If the division rate of the amoeba exceeds the capacity of its environment to adjust, overpopulation (bifurcation cascade) causes the system to become chaotic. One possible solution to restabilize the system is some form of cooperation between cells. A complex biological organism results.

Bifurcation and bifurcation cascade encompass many of the notions that general systems theory addresses through positive and negative feedback loops. Conceptualizing these processes in discrete stages, however, provides a somewhat better grasp of the contributing factors and their interaction (i.e., how a new strange attractor might be the result of a system torn asunder by the interplay of numerous conflicting forces).

Unpredictability

One aspect of unpredictability, defined from a chaotic perspective, is similar in sense to that conveyed by Heisenberg's uncertainty principle—that is, everything about a system cannot be known to absolute certainty. This aspect of unpredictability has been mentioned in conjunction with the discussion of strange attractors—what I called quasi-predictability. Another, more commonly known aspect has been called “the butterfly effect” (Gleick, 1987). (A butterfly beating its wings in China might cause a hurricane in the Bahamas.) Small differences in the initial conditions of a process can produce large differences in outcomes, and the reverse of this is true.

This second aspect subsumes the concepts of equi-potentiality and equi-

finality from general systems theory. Where the aspect goes far beyond these ideas and differs drastically is in conveying the humbling-daunting-realistic perspective of how little control we actually have in nonlinear, nonindependent systems.

The Relationship of Chaos to Sociometric Theories

Many parallels can be seen between the concepts of chaos theory and those of sociometric theory. Nowhere, however, will we find these to be more evident than in Moreno's canon of creativity.

Brief Review of the Canon of Creativity

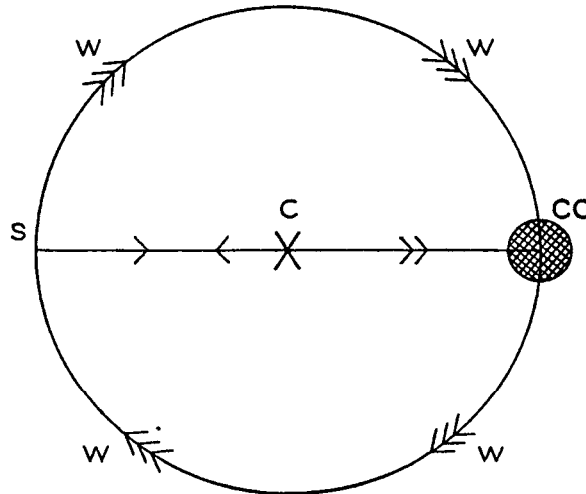
Because most readers are familiar with Moreno's (1953/1993) canon of creativity, I will not belabor the point. The canon is depicted in the accompanying figure (see Figure 1), reproduced here from the classic work *Who Shall Survive?* Briefly, Moreno saw the creative process as an interaction of established patterns (conserves) with the demands of a situation producing a spontaneous act. Through the use of the warm-up, the process of spontaneity is engaged. With the conserve as a base or starting point, actions satisfying the criteria for spontaneity (see Note 1) lead to the creation of a new, modified, more functional conserve, from which the process can then be repeated.

The Relationship of Chaos to the Canon of Creativity

The whole creative process can be viewed as "chaotic." Existing conserves are the strange attractors. Within the basins of the conserves, spontaneous patterns of behavior are usually observed. The patterns are usually similar, but never identical (i.e., they are self-affine). For example, each time a book (Moreno's classic example of a conserve) is read, the meaning or impact is at least slightly different from what it was before, although usually in a quasi-predictable way.

Why is the emphasis on *usually*? Because for a process to lead to a creative outcome, it must, by definition, be spontaneous. Spontaneity is an orderly process (i.e., quasi-predictable) and so is more "evolutionary" than "revolutionary." At other times, change can result from truly "chaotic" circumstances (i.e., bifurcation cascade), which is drastic reorganization that is more "revolutionary." From a sociometric perspective, these shifts are the result of impulsive actions that violate the generally accepted parameters of a situation. If the system/pattern is to be stabilized again, a new conserve/strange attractor must be established, so the process can again fall within the spontaneous realm. The "revolutionary" end of the continuum is encountered when the warm-up to the creative process is inadequate.

WHO SHALL SURVIVE?
CANON OF CREATIVITY
SPONTANEITY-CREATIVITY-CONSERVE



FIELD OF ROTATING OPERATIONS BETWEEN SPONTANEITY-CREATIVITY-CULTURAL CONSERVE (S-C-CC)

S—Spontaneity. C—Creativity, CC—Cultural (or any) Conserve (for instance, a biological conserve, *i.e.*, an animal organism, or a cultural conserve, *i.e.*, a book a motion picture, or a robot, *i.e.*, a calculating machine); W—Warming up is the “operational” expression of spontaneity. The circle represents the field of operations between S, C, and CC.

Operation I: Spontaneity arouses Creativity, C. S→C.

Operation II: Creativity is receptive to spontaneity, S←C.

Operation III: From their interaction Cultural Conserve, CC, result. S→>>CC.

Operation IV: Conserve (CC) would accumulate indefinitely and remain “in cold storage.” They need to be reborn; the catalyzer Spontaneity revitalizes them.

CC—>>>S—>>>CC.

S does not operate in a vacuum, it moves either towards Creativity or towards Conserve.

Total Operation
Spontaneity-creativity-warming up—act < actor
conserve

Figure 1. The Canon of Creativity (Moreno, 1953/1993).

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Again, let us use reading a book as an example. When rereading a book, one already has some ideas about what it says (the established conserve). Still, because those ideas and/or the reader have evolved from coming in contact with other ideas (conserves), the rereading produces a slightly new conserve from the reader's perspective.

Reading a new book may produce an entirely different experience. The warm-up to the reading will be based on the reader's previous conserves, the reader's ideas. The new book, however, may present a drastic departure from those conserves. In such a case, the conserves will conflict. The strange attractors, representing two very different systems producing conflicting patterns, will engender turmoil (bifurcation cascade). Because of the fractal nature of the boundaries of these patterns, they can never be totally reconciled (accommodated²) as separate entities. Only through the creation of a new pattern in which assimilation is achieved through the emergence of a new strange attractor and different basin of attraction can stability be reestablished. This process explains why and how new books are written, even on old subjects.

Other Parallels

Everywhere—social atom, sociometry, roles, and so on—the resemblance abounds. Although many other parallels exist between chaos and sociometric theories and are worth delineating for their heuristic and practical implications, the space required would take a book. Most of the examples can be viewed as applications or extensions of the canon of creativity. Two, however, merit brief explication here: roles and psychodramatic enactments.

Roles. Roles can be viewed as the result of the confluence of different types of conserves—the biological, social, familial, cultural. They are themselves conserves of a quite useful, though at times complicated and confusing, type. As constructs designed to help understand, explain, and change behavior patterns, roles are uniquely amenable to the application of chaos theory concepts.

First, role repertoires evidence self-affine patterns. Similar roles from different contexts (positions) tend to be alike in their patterns of implementation. In fact, a person in a new context (e.g., a foreign culture) often acts or reacts according to the role conserves he or she has developed.

Second, roles, particularly social roles, show the same self-affine patterns across different peoples, especially when the cultural contexts are akin. People act very much alike in many ways; they also act very differently. The similarities and differences often depend on the viewer's perspective.

Third, roles are strange attractors. Although they are subject to some variability, they tend to be stable within certain bounds unless some critical point

is reached. To test this statement, just try to act very differently from your usual, expected pattern the next time you are at a family gathering.

Psychodramatic Enactments. Because psychodramatic enactments are designed to explore, to help understand, and to promote change in behavior patterns, the implications of chaos theory for enactments are also quite useful.

One way to characterize an enactment is to look at it as exploring a basin of attraction—that is, a pattern of interaction or behavior or both. The strange attractor itself may or may not be immediately evident.

During an enactment, from the conserve of the protagonist, a pattern is displayed (i.e., the scene is set). Then auxiliaries, role taking initially, are brought in to illustrate the pattern more clearly. When the enactment proper is set in motion, the auxiliaries, through role expansion, now role playing, introduce their own conserves (strange attractors/basins of attraction) and energy (spontaneity), acting like new strange attractors in the system. The pattern being enacted may be enhanced or it may be disturbed, in either case engendering pressure at the fractal boundaries of the basins (the catharsis of abreaction). If bifurcation cascade results, the upheaval will be dramatic (i.e., what many novitiates label a classic catharsis will occur). If the disturbance is a lower order of magnitude, the catharsis may be correspondingly less obvious. Once the point of chaos has been reached, the system will have to reorganize to reach new stability (the catharsis of integration). Through the use of surplus reality and other techniques, a new pattern, perhaps similar, yet different from that observed previously, will perforce emerge (i.e., a new strange attractor and basin will have been established).

Two other aspects of enactment smack of chaos terminology. First, the protagonist is asked where the pattern in question has been encountered before (at least in classic dramas). Also, during integration, resolution generalization is sought by having the protagonist come to closure in a number of the contexts generated during the drama. Thus, we are in the business of seeking and promoting self-affine situations. Second, the use of roles/aspects of psychodrama—protagonist, director, auxiliary, audience, and stage—allow the creation of a “meta” basin of attraction. In this context, the quasi-predictability of the self-affine patterns of dramas can be used to keep the chaos of the enactment within larger, manageable boundaries. Enactment is chaos in action.

Implications and Conclusions

The implications of chaos theory for the sociometric approach are myriad. They have an impact on two domains, theory and practice. The two are related synergistically.

Implications for Theory

By far, the greatest implication of chaos theory for sociometric theory in all of its constituents—sociometry, social atom theory, role theory, psychodramatic theory, and spontaneity theory—is its reinforcement of the basic Morenean perspective. From the beginning, patterns have been the sociometric focal point, particularly patterns of social interaction. It should remain so.

Looking at points of concentration or conflict in patterns as strange attractors with basins of attraction may help clarify and extend many sociometric concepts such as “role,” “conserve,” “leader,” and “director.”

The recognition of social interaction patterns and of their influence, origins, and fluctuations over time (i.e., sociometry) has been the important contribution of Morenean theory. On an intuitive level, the quasi-predictability of these configurations was recognized; on an explicit level, it has not been adequately addressed. Perhaps the application of fractal geometry to the problem may afford insights that up to now were only sensed. In fact, with the need for adequate means to measure the impact of psychodramatic/sociometric intervention, some of the methods suggested by fractal geometry and related mathematical approaches may subsume some of Moreno’s initial attempts at quantification (Moreno, 1953/1993). Such an event would have as much a practical implication as a theoretical one.

Practical Implications

Practical implications also abound. The possibility of an adequate measure of the impact and the strength of sociometric interventions holds great promise. With the reflection of the “amount” of chaos present being the fractal dimension of a pattern, showing that interventions alter the amount may provide support for their efficacy. The primary difficulty comes from developing a method to graph the patterns over time.

The focus on patterns in general demand we look at and use varying perspectives. With sociometry, we are reminded to view the group configuration, using different criteria. With psychodrama, we know that (a) the director must be both “in the drama” and “distanced” from it at times to get a more complete picture or that (b) role reversal and mirroring can be effective tools for examining and changing patterns.

The aspect of unpredictability reminds us to explore not only the similarity of patterns but also the differences. We are also reminded that spontaneity demands role flexibility, and vice versa.

The concepts of strange attractors and their basins provide direction and guidance to directors and group and individual therapists using psychodramatic techniques. We are cued to the vagaries and complexities of human

behaviors and interactions; at the same time, we are assured by their relative consistency. The concepts help not only us but also, when explained, our clients, who require a conceptual framework for dealing with the world.

Similarly, the concept of bifurcation cascade serves as a warning not to make our interventions too complex. For example, a paramount consideration should be the establishment of explicit boundaries for a drama. The director, in particular, is charged with this function. The goal is to produce a safe meta-basin in which spontaneity is engendered and employed.

Finally, chaos theory ecumenically prods us to become aware of, to recognize, to explore, and to come to grips with our limits and our powerlessness. We have techniques, but they rarely work exactly as we expect and sometimes do not work at all.

Chaos theory fortifies our belief in the prime directive of psychodrama: Be aware of and trust in the process. It is all we have, but it is exceedingly powerful.

NOTES

1. PANIC is an acronym standing for the defining characteristics of spontaneity: *P* = parameters, *A* = adequacy, *N* = novelty, *I* = immediacy, and *C* = creative. Pun intended. Please do PANIC.

2. The terminology and concepts presented here link directly to schemata theory (Piaget 1976; Piaget & Inhelder, 1969).

REFERENCES

- Carlson-Sabelli, L., Sabelli, H. C., Patel, M., & Holm, K. (1992). The union of opposites in sociometry. *Journal of Sociometry, Group Psychotherapy and Psychodrama*, 44, 147–172.
- Gleick, J. (1987). *Chaos: Making a new science*. New York: Viking Penguin.
- Goerner, S. J. (1994). *Chaos and the evolving ecological universe*. Langhorne, PA: Gordon and Breach Science Publishers.
- Hart, J. W. (1995, April). *Sense of community—community sociometry: A half century overview*. Paper presented at the meeting of the American Society of Group Psychotherapy and Psychodrama, Rockville, MD.
- Hofstadter, D. R. (1979). *Godel, Escher, Bach: An eternal golden braid*. New York: Vintage Books.
- Moreno, J. L. (1953/1993). *Who shall survive? Foundations of sociometry, group psychotherapy and sociodrama*. (Student edition.) Roanoke, VA: Royal Publishing.
- Piaget, J. (1976). Biology and cognition. In B. Inhelder & H. Chipman (Eds.), *Piaget and his school* (pp. 45–52). New York: Springer-Verlag.
- Piaget, J., & Inhelder, B. (1969). *The psychology of the child*. New York: Basic Books.
- Remer, R. (1983). You see what you look for. *Personal and Guidance Journal*, 61, 585–586.