

Communication in the context of natural disasters: a chaos theoretical approach

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Assumption I

- Chaos is a *metaphor* when applied to crisis communication
 - Metaphors are “*tools*, enabling their users to do certain things in the world by drawing people’s attention to what is thought to be important and relevant” (Tsoukas, 2005).
 - Chaos draws our attention toward complex and dynamic forms and away from an idealized linear, Newtonian thinking.

Two Key Factors

- Predictability
- Sensitive Dependence

Predictability

- Predictability is possible, but the system's order, logic, and scale does not conform to traditional causal and deterministic models.
- “science is like a two-partner game in which we have to guess the behavior of a reality unrelated to our beliefs, our ambitions, or our hopes” (Prigogine & Stengers, 1984, p. 5).

Sensitive Dependence

- Sensitive dependence on initial conditions makes accounting for system variance exceptionally difficult.



<http://wvs.toyleftpixel.com/photos/2007/08>

Assumption II

- Natural disasters have the capacity to create a cosmology episode (Weick, 1993).
 - Misinterpretation of feedback leads to a collapse in sensemaking.
 - “I have never been here before.”
 - “I have no idea where I am.”
 - “I don’t know who can help me.”

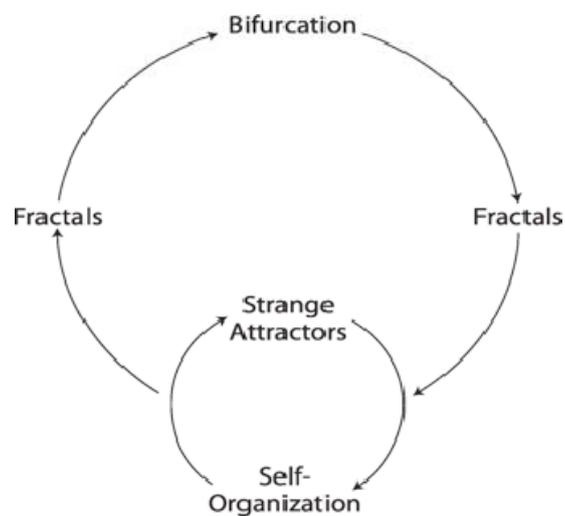


http://farm4.static.flickr.com/3663/3393945012_609ct1e7f9.jpg

Assumption III

- The Self-Organization process is the means by which communities both recover and become more resilient after natural disasters.
 - In self-organizing organizations structures and strategies are seen as inherently temporary because they “understand their organization as a process of continuous organizing” (Wheatley, 2007, p. 33).

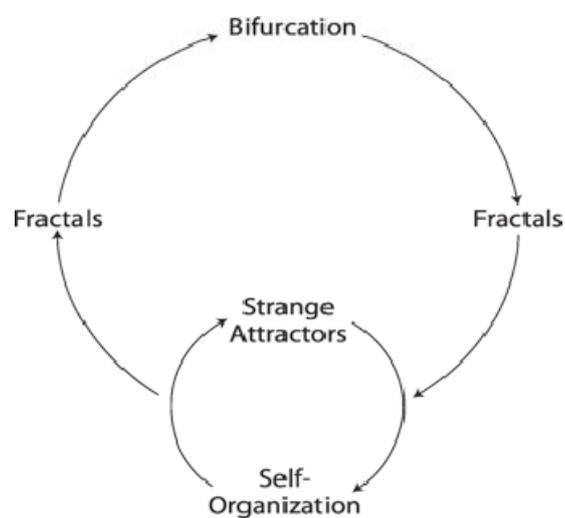
A Chaos Model



Model Components

- Fractal – “Data”
- Bifurcation – “Perceived Collapse in Order”
- Strange Attractors – “Unifying Values”
- Self-Organization – “Systemic Realignment”

Return to Fractals



Ideal Performance in a Natural Disaster

- The ideal response:
 - Recognition of warning signals (fractals)
 - Rapid allocation of resources (bifurcation)
 - Selfless dedication to safety and survival of all regardless of any demographic factor (strange attractor)
 - Improving resilience and safety for all based on learning from the event (self-organization)
 - Enhanced recognition of future warning signals (fractals)

Comparative Analysis of Floods on the Red River, North America

- Winnipeg, Canada
 - Floodway
- Fargo, USA
 - Flood Fight



<http://www.wday.com/media/story/ine/2009/07/16/winnipegdiversion.jpg&imgrefurl>



<http://northshorejournal.org/linkedimages/2009/03/fargo-dike-sandbagging-1sm.jpg>

Bifurcation

- Massive flooding in 1997, 2006, and 2009 several hundred miles throughout the Red River Valley.



Fractals

Winnipeg

- Adjustments in a diversion system around the city established after major flooding in the 1970's



http://2.bp.blogspot.com/_Zev81on8bJc/Si0eLrUy0I/AAAAAAAGGTol

Fargo

- Temporary dikes rapidly constructed with enormous volunteer help days or hours ahead of rising water.



http://farm4.static.flickr.com/3024/3025825877_6fa7df93fa.jpg&imgrefurl

Strange Attractors

- **Winnipeg**

- Community Preservation
- Recreation for all
- Beautification



http://farm1.static.flickr.com/49/160052544_378f178f14.jpg?v=0

- **Fargo**

- Community Preservation
- Volunteerism
- Fiscal Responsibility



<http://www.realbuzzonline.com/wp-content/uploads/2009/03/flood-09.jpg>

Self-Organization

- **Winnipeg**

- After a devastating flood in 1950, Winnipeg residents committed resources to build a floodway, one of the largest earth moving projects in the world at the time.
- Cost \$1 billion, savings \$10 billion.

- **Fargo**

- Temporary dikes.
- Removal of increasing number of homes judged to be in low-lying areas.
- Avoiding major investment through repeated flood battles.
- Cost approximately \$140 million in 2009 alone.

Conclusions

- Strange attractors influence decisions regarding self-organization.
- Fractal perception can trigger diverse crisis response patterns.

Implications

- Crisis communication should be based in a sophisticated values assessment of the community.
- Attempts to influence self-organization must begin with an understanding of the strange attractors.
- Recurring bifurcation can create a counterproductive cycle of reasoning.

Seeking further Explanation Through Convergence Theory: Congruent Observations

- Convergence Theory: particularly well-suited for chaos and complexity in crisis decision-making because:
 - 1) . . . theory focuses specifically on communication.
 - 2) . . . it illuminates the nonlinear complex and nonlinear nature of reasoning based on community values (Kincaid, 1987, p. 209).

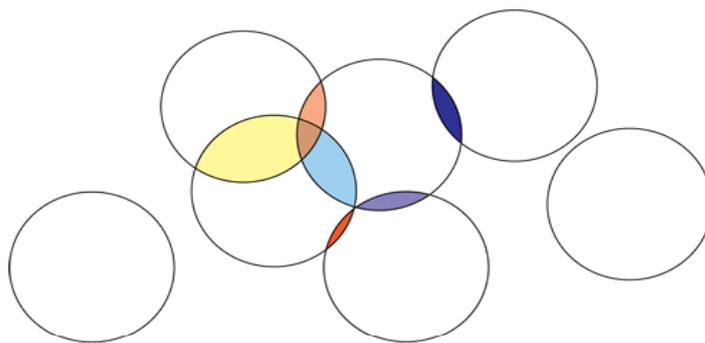
Convergence Theory

- Mutual understanding provides the basis for mutual agreement and collective action.
- Communication, then, is defined as a process in which information is created and shared by two or more individuals who converge over time toward a greater degree of mutual understanding, agreement, and collective action.
 - Kincaid, 1987, p. 210.

Convergence as Interacting Arguments in Framing the Crisis Experience

- Community leaders structure and frame the construction of reality.
- Convergence as Interacting Arguments: convergence occurs when “several distinct arguments lead to a single conclusion.”
- The “strength of converging arguments is “almost always recognized” because the “likelihood that several entirely erroneous arguments would reach the same result is very small.”
 - Perelman & Olbrechts-Tyteca, 1969, p. 471.

Figure 1.7
Convergence on a Systematic Level



Multiple bodies of knowledge with multiple points of convergence

Convergence in Fargo

- Make modes adjustments in vulnerable housing
- Better allocate flood fighting resources
- Avoid wasteful spending
- Avoid avoid government intervention

Initial Observations

- Pronounced preference for local media.
- Pronounced preference for local government agencies.
- Disdain for national/international media
- Frustration with national government agencies.
- Creation of local heroes.
- Unrealistic belief that recovery can be accomplished locally.

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