LESSONS FROM THE FIELD:
APPLYING COMPLEX ADAPTIVE SYSTEMS THEORY
TO ORGANIZATION CHANGE

By Maya Townsend, MSOD

How could anthills, fractals, and jazz possibly have anything to do with organization development? What do the new sciences—unconventional and cutting edge perspectives in physics, biology, and other fields—have to do with psychology, sociology, and business, disciplines traditionally associated with OD? Writers like Meg Wheatley (1999), Peter Senge (1990), and Edwin Olson & Glenda Eoyang (2001) are beginning to explore the connections between the emerging field of the new sciences and organizations. Applications of complex adaptive systems theory are evolving as practitioners experiment and learn. In this article, I share lessons from the field, tell actual stories of using complex adaptive systems theory to understand organization behavior, and challenge conventional notions of how organizations function.

The Client

Last year, I was asked to develop a self-directed work team within a nonprofit organization. To manage a 150% growth in staff between 1996 and 2001, the organization had instituted a self-directed work team structure. Six teams managed operations and provided leadership within their functional areas. I consulted to one team over a four-month period in 2001. Initially, the team members presented problems that included difficulty working together, lack of clarity about purpose, and lack of defined goals. We embarked on an action research project.

One afternoon, I found myself in my living room surrounded by team data: documents and artifacts, interview notes, and flipcharts of questions and dilemmas. I had worked the data through the lenses of various team theorists. Yet, the data wasn't making sense. Something was missing.

Anthills: Seeing Systems

The key to understanding the data came from the Invertebrate House of the National Zoo in Washington, DC. The zoo had developed an elaborate system of plastic tubes in which an ant colony resides. A visitor can follow the individual ants as they scurry through the tunnels. The display invites the visitor to consider that while the ants themselves are individuals, the ants together create a single organism. And, indeed, if you back away from the exhibit and let your eyes blur, you begin to see the pattern behind the movement, the general flow of activity, and the order of caverns created by the ants.

This is one of the gifts from the new sciences to organization development: the notion of order within chaos. Sanders (1998, p. 70) explains:

> The world may appear to be disorderly. But beneath the apparent disorder there is order. The term "order" does not refer to characteristics such as quiet, calm, or good but refers instead to self-organizing pattern, shape, or structure…. We need to ask ourselves, what is beneath the surface? What connections, relationships, and patterns of interaction are creating the structure beneath the visible activity (Sanders, 1998, p. 70)?

While classic OD has advocated using a holistic approach, the new sciences offer fresh insights into conducting system analysis. Olson's and Eoyang's (2001b) explain that there are "three conditions that determine the path and outcome of self-organizing in teams: significant differences, transforming exchange, and containers" (p. 38 - 29). Differences such as style, background, experience, and outlook provide the ingredients for dynamic interactions and creative growth. Transforming exchanges are the interactions between entities, people, systems, or other resources that create change. For example, an email between colleagues can transform a request for a meeting into an actual date and a meeting can transform a group of

people into a team. Containers are structures that provide spaces in which teams operate. Containers can be *physical*, such as meeting rooms and assembly lines, or *organizational*, such as separation of people into business units and cost centers. They can also be *behavioral*, such as team norms and rituals, or *conceptual,* such as shared values and assumptions about purpose (Olson & Eoyang, 2001b).

Olson & Eoyang (200b) propose that teams require a degree of appropriate constraint, neither too rigid nor too loose, in order to self-organize and thrive. For example, a team in which differences are minimized and discouraged may be constrained too rigidly to be effective. An organization in which members spend the majority of their time in meetings without coming to decisions may have overly loose constraints around transforming exchanges. Boundaries around the number of meetings and target outcomes might help those in the organization be more effective. A coalition of agencies devoted to a broad vision of reducing violence in the world may have a conceptual container that is too loose to sufficiently guide the agencies to meaningful action. The fit between the level of constraint and system's charge are important: systems that achieve an appropriate level constraint around differences, transforming exchanges, and containers in relation to their charge are more likely to self-organize and grow.

Using Olson's and Eoyang's (2001b) approach, it became clear that my client team was under-constrained (see *Figure 1: The team as a complex, self-organizing system*). They had inadequate containers: no purpose, no direction, no stable time or place to meet, and no common projects. In addition, they had inadequate exchanges; most were information dumps, rather than two-way conversations, and concrete, rather than exploratory or imaginative. Finally, they had a low tolerance for difference. They feared diverging from the organization's norms by creating a purpose, taking power by setting a direction, and causing conflict by experimenting with new methods. In sum, this approach suggested that the containers were not strong enough for team members to express differences and develop transforming exchanges.

Olson's & Eoyang's (2001b) perspective revealed clarity among the chaos that initially came through the data. The team did indeed consist of four individuals with different concerns, multiple and complex relationships, and much information. Yet the data coalesced into several macro patterns—inadequate containers and exchanges and a low tolerance for difference. While these patterns were clear to me, I was not sure that team members would see them, or if they did, if they would have alternative interpretations. The next step in the process was to ask them during a data discussion.

| Theme	Condition of Self-Organizing	Degree of Constraint
Interactions in meetings are draining and don't provide value	Exchange – Only cursory, one-way comments, information dumps	Low – Lack of modeling important, two-way, mutually curious dialogue
Meetings don't work	Container – No reliable, quiet time and space for meetings	Low – Group values individual contributions over teamwork
Independent contributors, not a team	Container – No common goal or project	Low – Lack of purpose to support collaboration
Lack of direction	Differences – The rest of the organization has no direction	Low – Team members don't want to "power grab" or "step on toes"; organization values cohesion
Inaccessibility to others in organization	Exchange – Others take proposals at face value	Low – Forum not present to encourage debate / questioning
Reliance on one team member	Differences – Others would do things differently and possibly mess up	Low – Group values harmony and not stepping on each others' toes; this prevents experimentation
History of accomplishment	Container – Team values accomplishment and performance	Low – Team pattern of individual service & competence allows individuals to value own work over that of team

Figure 1: The team as a complex, self-organizing system

Cats in Boxes: The Power of Observation

My approach to data discussion was influenced by the idea of a cat in a box. This creature, known as Schroedinger's cat, is a classics physics problem. In the problem, the cat sits in a sealed box. At a set time, a mechanism will release either food or poisonous gas into the box. There is an equal probability that the cat will receive the food or the poison. What Schroedinger suggests is that until a person opens the box, the person does not know whether the cat is dead or alive. There is an equal probability of either state yet the cat's condition is not set until a person views the cat. It is the act of observation that solidifies the cat in its dead or living state. Wheatley (1999, 2nd ed., p. 61) explains: "We cannot know what is happening to something if we are not looking at it and, stranger yet, nothing *does* happen to it until we observe it."

Similarly, the act of looking at a client team and interpreting its behavior solidifies its behavior. However, my interpretation is one of many. Someone else viewing the team, say Tuckman (1965), might say that the team is in the forming stage. Bennis & Shepard (1956) might say that it is in the dependency stage (see *Figure 2: Ways of seeing the team* for more examples). The question, then, is this: what interpretations do the team and I anticipate will be the most likely to help the team become what it wants to become?

Figure 2: Ways of seeing the team
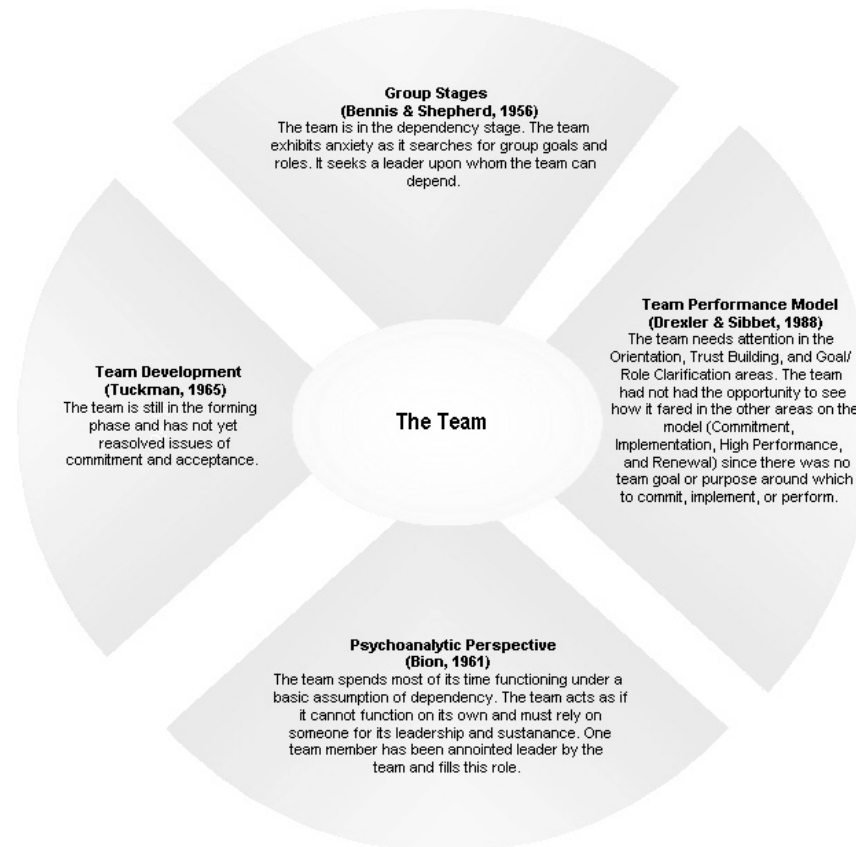
During our data discussion, we discussed the different ways in which we could tell the story of the team. As we explored, the team developed this story: The founders of the organization intended it to be an antidote to the over-structured organizations of the 1960s. In their quest to reduce hierarchy, the organization created a flat structure and team decision-making process. Within the flat structure was a lack of direction that impeded the team's ability to perform: team members had no purpose around which to define themselves and connect. Yet, team members had large ambitions. They wanted to lead the organization to develop its mission, create new programs, gain publicity, and shepherd the organization to new levels of

achievement. Team members recognized that they lacked common constraints: time, space, mission, goals, parameters, and so on.

For that moment, our collective act of observation created a snapshot of the team and suggested ways to intervene. We began to move forward with the intended primary intervention: a full-team retreat. Team members prioritized developing a purpose for the team, planning for the year ahead and determining how they could help each other, and improving on their meeting structure. These goals would help define containers for group interaction and provide opportunities for meaningful interactions among members. While I was pleased with the team's direction, I was concerned about the level of intervention.

Fractals: Deciding Where To Intervene

If you have seen a fern, you have seen a fractal. The triangular fern consists of triangular-shaped branches made up of small leaves in triangular shapes. The pattern is repeated, as one looks closer and closer at the plant. Wheatley (1999, p. 123) explains:

> Everywhere… there is self-similarity. The shape we see at one magnification will be similar to what we'll find at all others. No matter how deeply we look, peering down through magnifications of more than a billion, the same forms are evident. There is pattern within pattern within pattern. There is no end to them, no scale small enough that these intricate shapes cease to form. We could follow the creation of these shapes forever, and at ever finer levels, there would always be something more to see.

I had suspected that the unbounded-nature of the team was replicated in the organization itself. I believed that I was seeing one level of magnification in the organization, one view of a pattern. Was it, then, worthwhile to intervene at the team level? Olson & Eoyang (2001a, p. 5) suggest that, in complex adaptive systems, change does not need to start at the top as often thought in classic organization development. They write,

> In a self-organizing system, the leader has an important role to play, but creative and long-lasting change depends on the work of many individuals at many different levels and places in the organization (Olson & Eoyang, 2001a, p. 5).

Olson & Eoyang (2001a) propose that the actions of system agents, members of complex adaptive systems, change their systems by consciously experimenting with different patterns and behaviors. Since the team clearly stated their desire to continue, I would help them develop a purpose and experiment with behaviors. In doing so, we would influence the organization as a whole.

This may seem to raise an ethical issue: did I collude with the team in their desire to change the organization? I do not believe this to be the case. As Olson & Eoyang (2001a) explain, any change in a system's parts affects the whole, just as any change in the whole affects the parts. It would be impossible for my work with the team *not* to affect on the organization. The issue, then, was not one of collusion but of simply acknowledging the ripple effects of an intervention to the whole. I was ready to work with the team. I developed my style by thinking about jazz.

Jazz and the Consultant's Role

Classical composers write detailed "scripts" that specify the exact notes, tempo, intensity, and volume with which a piece is to be played. This music reflects one view on the world: constant and inevitable movement towards entropy and dissipation. In the world of jazz, individuals self-organize: they bring together differences, creativity, and energy and create a whole within permeable boundaries of style and harmonic scale. Jazz reflects the world of the new sciences, one in which differences create dis-equilibrium, which can then lead to growth. Wheatley (1999, p. 80) explains that "as long as the system stays open to the environment and matter and energy continue to be exchanged, the system will avoid equilibrium and remain, instead, in these 'evanescent structures' that exhibit 'exquisitely ordered behavior' (Coveney & Highfield, 1990, p. 164)." These notions of self-organization and energy helped me reconceive my notion of how to engage with my client.

Often, the consultant is considered to be a neutral facilitator, an empty vessel, or a traffic monitor in the complex and busy world of interpersonal interactions and organizational change. I worked from this model for much of my consulting career. I functioned, as Bellman (1990, p. 62) puts it, as "a kind of "WD-40" that allowed the industrial gears to turn more quickly, quietly, and in relation to each other." By the late 1990s, I was dissatisfied with this role. I saw my mission in work as helping develop and popularize systems that encourage collaboration, innovation, and justice. How, then, do I honor my mission while staying true to my discipline?

This question raises no dilemma in the world of complex adaptive systems (see *Figure 3: Two views into the consultant's role*). In a complex adaptive system, difference is encouraged. All who engage with the system are agents and have the ability to make change. Consultants help raise energy in the organization, bring information to consciousness, and reveal system patterns. Through their presence, they express difference, engage in transforming exchanges, and build containers for meaningful and productive work.

Organization facilitator role	System agent role
Facilitate the organization's process	Become a stakeholder in the organization
Serve as a neutral presence in the system's dynamics	Act as a system agent and seek to influence change
Differences between self and others less important than differences between members of the organization	Own and acknowledge differences between self and others
Help the system do better what it wants to do	Help mobilize energy, bring information to consciousness, and reveal system patterns

Figure 3: Two views into the consultant's role

I decided to experiment with new behaviors with my client team and try on the role of a complex adaptive system consultant. I contracted with the team at the beginning of the retreat about my proposed leadership stance. During the engagement, I put more of my self into my work: I developed an agenda, explained my perspective, and offered opinions. I was more assertive and less invisible. I observed, shared impressions, questioned, initiated activities, monitored process, and suggested alternative ways of approaching a problem. I built opportunities into the retreat design for team members to experiment with leading the team. I watched the team's dynamics and, if I felt the team was relying on me to an extent that interfered with their learning, I called their attention to the behavior.

In debrief, team members expressed satisfaction with my role. They preferred it when I was in the process with them, challenging, engaging, and encouraging. They were less comfortable when I took on the neutral role; their feedback was that they were frustrated with what was perceived as a lack of engagement. As for my own debrief, I am satisfied with the role I played with the team. I felt as if I modeled leadership, a quality lacking on the team, and helped team members begin to act as leaders in their retreat. By the end of our engagement, the team members were leading portions of the meeting, facilitating discussions, and stepping out from the comfort of collectivity to express individuality and difference. In this case, the choice of consultant role was effective.

Summary of Learnings

In many ways, complex adaptive systems theory provides organization development consultants with new, interesting, and effective ways of interacting with client organizations:

1. Seeing systems as wholes and discerning the patterns behind the chaos (Sanders, 1998).
2. Looking for patterns by using Olson's & Eoyang's (2001a, 2001b) framework of differences, transforming exchanges, and containers.
3. Owning the power of observation and interpretation by acknowledging the paradox that systems are in constant flux and change and are defined partially by our data gathering and assessment (Wheatley, 1999).
4. Freeing ourselves from the constraints of the neutral facilitator role, owning our difference and opinion, and serving as a system agent in our work with clients (Wheatley, 1999; Bellman, 1990).

References

Bellman, G. M. (1990). *The consultant's calling: Bringing who you are to what you do.* San Francisco: Jossey-Bass Publishers.

Bennis, W. G. & Shepard, H. (1956). A theory of group development. *Human relations*, 9 (4).

Bion, W. R. (1961). *Experiences in groups.* London: Tavistock.

Drexler, A. B., Sibbet, D., & Forrester, R. H. (1988). The team performance™ model. In W. B. Reddy & K. Jamison (Eds.), *Team building: Blueprints for productivity and satisfaction* (pp. 45 – 61)*.* Virginia: NTL Institute for Applied Behavioral Science.

Olson, E. E. & Eoyang, G. H. (2001a). *Facilitating organization change: Lessons from complexity science.* San Francisco: Jossey-Bass/Pfeiffer.

Olson, E. E. & Eoyang, G. H. (2001b). Using complexity science to facilitate self-organizing processes in teams. *OD practitioner*, 33 (3).

Sanders, T. I. (1998). *Strategic thinking and the new science.* New York: Free Press.

Senge, P. M., Kleiner, A., Roberts, C., Ross, R. B., & Smith, B. J. (Eds.). (1994). *The fifth discipline fieldbook: Strategies and tools for building a learning organization.* New York: Doubleday.

Tuckman, B. W. (1965). Developmental sequences in small groups. *Psychological bulletin*, 54.

Wheatley, M. J. (1999). *Leadership and the new science: Discovering order in a chaotic world* (2nd ed.)*.* San Francisco: Berrett-Koehler.

About the Presenter

Maya Townsend, MSOD, helps clients gain a holistic picture of current realities, envision ideal futures, and mobilize energy for change through her company, *Partnering Resources*. She brings expertise in complex adaptive systems, strategic change, team performance, assessment, and facilitation to her work with corporate, government, and nonprofit organizations. Maya is co-author (with Edwin Olson) of *Adaptive Leadership: Designing Processes that Work in Complex Organizations* (forthcoming from Jossey-Bass/Pfeiffer). Maya holds a Master's of Science in Organization Development from American University / NTL Institute and is a member of NTL Institute.