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**COLLECTIVES
AND
DISSIPATIVE SELF-ORGANIZING
SYSTEMS**

by

Christopher C. Glover

A thesis submitted in conformity with the requirements
for the degree of Master of Arts
Graduate Department of Education
University of Toronto

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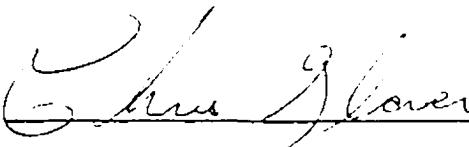


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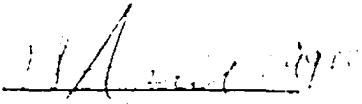
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To Tina and Ayisha

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Collectives and Dissipative Self-Organization

by Christopher C. Glcver

Master of Arts
Graduate Department of Education
University of Toronto
1995

Abstract

In this thesis I argue that collective organizations with their goal of establishing egalitarian workplaces, inadvertently established self-organizing ones. An extensive review of the literature reveals the principles upon which collectives are based, and the successes and failures that they have experienced. By adopting a theoretical perspective based upon dissipative self-organization (Prigogine, 1979; Jantsch 1980), I am able to describe collectives as pioneering experiments in self-organizing workplaces. The degree of organizational freedom in collectives makes them models from which we can learn a great deal. I also argue that curtailing this freedom - in the steadfast clinging to job rotation and consensus decision making - weakens collectives and is one factor that prevents their widespread acceptance.

Introduction

Organizations are moving from wave to wave of organizational change - Socio-technical Systems, Total Quality Management, Learning Organizations, Organizational Competencies - in a trend that flattens the control hierarchy to achieve greater productivity. Corporate executives are realizing that their organizations can accomplish much more at reduced cost if their workers contribute to the organization with their minds as well as their hands.

Organizational theorists herald this trend as the beginning of a shift in priorities of corporations away from a narrow focus on profits. Weisbord (1987) envisions organizations committed to "dignity, meaning and community". Senge (1990) breaks organizational theory into five disciplines, which together can create "communities of inquiry and experimentation". One of Senge's disciplines, "mental models", challenges employees to ask the questions that are not asked, to uncover the tacit assumptions that shape our behaviour. Although Senge writes extensively about organizations, one topic on which he does not raise questions is ownership.

Conventional corporations are owned and controlled by their principle shareholders. The majority shareholders control the reins of power. Capital ownership begs the question of whether the advances in organizational development are really steps toward "dignity, meaning and community", toward "communities of inquiry and experimentation" or whether they are only

means by which owners can get more work for less money from their employees.

In contrast to the aspirations of organizational theorists, most companies still retain a narrow focus on profits because that is the objective of their owners. In Ontario through the early 1990s, our industrial base has moved south to the cheaper labour and lax pollution controls in the U.S. and Mexico. Many of these industries abandoned long-standing white and blue collar employees.

Employees have all of their eggs - their time, training and labour - in one basket. If the company folds or moves, they lose their years of investment. By contrast, the owners, who make the decision to move, usually have a diverse investment portfolio to fall back on if one organization fails. This form of ownership entails an injustice that is generally unacknowledged. The lower people are on the totem, the greater their stake in the organization, but the less their control.

Organizations built on democratic models address this injustice. In democratic organizations, control and ownership are distributed among the various stakeholders: workers, investors, suppliers and customers. Co-operatives, for example, have shown for over 100 years that stakeholder ownership is a viable alternative to capital ownership. Co-operatives have the advantage of being dedicated to their workers and their communities.

Collectives, a small branch of this larger co-operative movement, have experimented for twenty-five years with an organizational system that is dedicated to fostering an egalitarian community of workers. Mainstream organizations are adopting practices that give workers a greater say in their workplaces. Work teams and participatory management practices have become commonplace. But if we are truly moving toward an era when organizations will be dedicated to "dignity, meaning and community" then the critical question of ownership must be addressed. In this future, collectives will be one of the models of organization that we can look to for guidance.

Rationale

If the history of collectives over the past twenty-five years is an accurate indication, then the collective is not a stable form of organization. Most of the free schools, legal firms, food stores and health clinics that originally embraced the collective mode of organization in the late 1960s have now disbanded. Often the history of these organizations was marked by turbulent interpersonal quarrels that led to the weakening or dismemberment of the collective (Rothschild-Whitt, 1979). In spite of this instability, some collectives have managed to survive for a decade or more, and more collectives continue to be created (Ristock, 1989). Case study reports show that members of collectives often have fulfilling work experiences that make them politically aware and

active (Rothschild & Whitt, 1986). Collectives also produce innovative programs and products that address pressing social needs. People continue to adopt the collective mode of organization because it embodies the value of equality, which our society espouses, but practices in only limited ways. Collectives provide an alternative organizational model that brings this value to our workplaces.

My goal in this thesis is, using a theoretical perspective based on self-organization, to deepen the understanding of collectives. The theory of dissipative self-organization, first developed by the chemist Ilya Prigogine in the 1960s, is based upon the theory of dissipative structures - systems which import free energy and matter from the environment around them and export the accruing entropy (useless energy)(Jantsch, 1980). It postulates that dissipative structures are not only acted upon by outside forces, but internally organize in order to cope with these outside forces. The principles developed from this theory that have been applied to social systems point out some directions that collectives could pursue to become more effective in embracing their vision and achieving their goals.

DO IT!

-Jerry Reuben

Definition

A collective is a worker controlled organization that strives to establish an egalitarian workplace. It strives toward this goal through three principles of action: decision-making by consensus, job sharing, and the nurturing of a sense of community. Ristock (1989) defines a collective as a "horizontal work arrangement. The work environment is one where there are no bosses or managers and where everyone is equally responsible for the organization" (Ristock, 1989, p. 1). Rothschild-Whitt (1979) defines collectives in terms of "their members' resolve to build organizations which are parallel to, but outside of, established institutions and which fulfil social needs (for education, food, medical aid and social support) without recourse to bureaucratic authority" (p. 510).

Collectives differ from both bureaucratic and co-operative organizations. Bureaucratic organizations are typically owned and controlled by the majority shareholder. The owner passes control of the organization to a board of directors which hires a chief executive or general manager who assumes responsibility along with other managers. Each link in the chain of command has a smaller domain over which it exercises control and decision making power. The corporate control hierarchy dominates not only private enterprises, but also public sector workplaces.

Co-operatives offer a democratic alternative to bureaucratic organizations. Co-operatives are usually owned by one stakeholder in the organization. Both consumer co-ops (owned by the customers) and producer co-ops (owned by the primary producers such as farmers) have existed since the mid-nineteenth century. Recently a multi-stakeholder model has been introduced in which the co-operative is owned and controlled by a combination of stakeholders including workers and customers (Jordan, 1989). Most co-ops make decisions by majority vote. Although there is a hierarchical division of labour, the members of the co-operative are at the top of the hierarchy. The control, decision making power and responsibility for the organization, rests with the majority of members.

Collectives are small worker co-ops. They are controlled and often owned by their worker-members, but they reject majoritarian decision making in favour of decision making by consensus. The control, decision making power and responsibility for the organization is shared equally by all members (see Table 1).

**TABLE 1 Organizational Characteristics of Bureaucracies,
Co-operatives and Collectives**

	Bureaucracy	Co-operative	Collective
Decision making Power	"Boss" makes the decision. Hierarchically distributed.	Decisions made by majority vote. Power rests with the majority of the members.	Decisions made by consensus. Power distributed as evenly as possible.
Responsibility	"Boss" is responsible for success or failure.	All members are responsible for success or failure.	All members are responsible for success or failure.
Visions, Values	Vision and values determined at the top and distributed downward.	Vision and values determined by the majority, but all get to speak in group meetings.	Vision and values determined by the collective. Each member's visions and values must be taken into account.
Employee Satisfaction	Use only effective, professional side of employees. Affective side filled only incidentally.	Use effective side, usually greater sense of community.	Affective and effective side utilized equally. Developing community among members part of mission.
Social Responsibilities	Responsible to owners.	Responsible to workers, community, environment.	Responsible to workers, community, environment. Also recognition of global responsibilities.

History

Co-operatives have flourished in five distinct waves: the 1840s, the 1860s, the 1880s, the 1920s-30s, and the 1970s (Rothschild & Whitt, 1986). Each of these waves has immediately followed historical periods of social change. The most recent, in the 1970s, was spawned by the social movements of the 1960s. The ideals of the 1960s led people to create alternative ways of working and living together. Collectives are one of the innovative offshoots of this movement. Although some attempts were made to create leaderless organizations in the early part of this century, they inevitably became hierarchical (Rothschild & Whitt, 1986). Weber and Michels questioned whether non-hierarchical movement organizations were viable (cited in Rothschild & Whitt, 1986). Michels believed that non-hierarchical organizations would inevitably become hierarchical in order to survive and called this principle "the iron law of oligarchy". By establishing egalitarian work places, collective members challenge the theoretical construct of the "iron law".

Collectives in their current form emerged from the resistance groups of the 1960s. Mansbridge (1973) reports that early members of collectives were seeking a "moral way" of relating to others through organizations that, do not make people feel powerless, by discouraging them from participating in decisions; that do not make people feel unequal, by allowing inequalities of influence; and that do not make people feel disrespected by forcing them to conform to norms and actions they do not believe in (p. 353).

These early collectives were often part of social movements. Their goal, beyond providing a product or service, was to demonstrate that worker control is a viable alternative to the hierarchical organizations that dominate our society.

After a surge in the creation of collectives through the seventies, the collective movement began to taper off. Many of the original free schools, food stores, legal offices and health clinics began to close. The collective movement has remained strong, however, in the social service sector. The collective model was adopted during the second wave of the women's movement (Ristock, 1989). It grew out of the women's consciousness raising discussion groups in the late 1960s and 1970s. The feminist movement has adopted the collective model for the shelters and social agencies it has created.

Review of the Literature

The literature on collectives is not extensive. It contains some case studies of collectives and of the role of collectives in social movements. For the most part collectives are dealt with as an adjunct of workplace democracy. Only three attempts have been made to study collectives as a system of organization (Riger, 1984; Ristock 1989; Rothschild-Whitt 1979). Riger (1984) has attempted to document several features that she believes are essential to the maintenance of a collective structure. Among these are that the collective is "financially dependent on its members for support", and "networks of friendship, expertise, and support are not overlapping" (Riger, 1984 p. 105)

Riger's proposition, however, is contradicted by the survival and success of many feminist social agencies in Canada, which are not financially dependent on their members, and which contain overlapping networks of friendship, expertise and support (Ristock, 1989).

Rothschild-Whitt's (1979) analysis of the collective system is the most comprehensive. In her study, Rothschild-Whitt uses several case studies to define the characteristics of collectives and to compare them with bureaucratic organizations. With her study, she was able to provide a tool for members of collectives to understand and improve their system. Much of this chapter draws on her work.

The Vision: An Egalitarian Workplace

Senge (1990) defines vision as "the overarching direction and meaning of an organization" (p. 213). The "vision" of collectives is to create egalitarian workplaces that pioneer new ways of relating in organizations.

Equality is a concept that is worth exploring further. Equality means "of the same measure, quantity, amount or number as another" (G&C Webster, 1980, p. 382). Note that equality implies the comparison of two or more things. Equality does not refer to the whole of what is being compared, but implies sameness along at least one parameter. An orange and a piece of paper may be equal in number, but are different along most other parameters of measurement. When applying the term equality to collectives, it does not

mean that everyone is the same, or that everyone's contribution is the same. The equality fostered within collectives is measured along two parameters: everyone and their contribution is *valued* equally, and everyone's interests are protected equally. To achieve equality, collectives have developed three operational principles: job rotation, consensual decision making and a nurturing of the sense of community.

Senge (1990) writes that "building shared vision must be seen as a central element of the daily work of leaders. It is ongoing and never-ending" (p. 214). Since there are no leaders in collectives, the work of building and maintaining the shared vision is the responsibility of all of the members. Collectives keep their vision in focus by minimizing rule use and making decisions based on substantive values (Rothschild-Whitt, 1979). Instead of looking to policy or protocol for guidance with major decisions, collectives refer to their vision. Confronting the vision of the organization regularly rejuvenates the members' commitment to it. In fact, one problem that collectives face is the overcommitment of their members, who burn themselves out, because they feel they cannot do enough to help the client group (Santa Barbara, 1982; Zwerdling, 1980).

Goals

The goals of collectives are to create egalitarian workplaces in order to:

- empower workers
- empower clients
- serve as an egalitarian model for the larger society, and ultimately to foster change in the society

The concept of power has two major branches. The first is "the possession of control, authority, or influence over others" (Webster's, 1980, p. 895). This type of power is the organizing principle of bureaucratic organizations. Each level on the control hierarchy has power over the levels below it and is subordinate to the levels above it. There is a second, quite different meaning of power: "the ability to act or produce an effect" (Webster's, 1980, p. 895). This is the type of power that is developed in collective organizations. The purpose of these organizations is to enhance the ability of the members and clients to act or produce an effect - to empower them. What the founding members of collectives believed, and what bureaucratic organizations are discovering, is that the power of one member of a group to exert "control, authority, or influence over others" diminishes the power of the group to "act or produce an effect". When one member is in control of a group, the effectiveness of the group is lessened.

In seeking to empower their members and clients, collectives are developing alternatives to control hierarchies. Many members of healthcare

collectives, for example, believe that the control healthcare professionals have over their patients, diminishes the ability of the patients to take responsibility for their own healthcare. Both the Jane Abortion Clinic in California and the Health Collective in Vancouver are dedicated to eliminating the mystification and hoarding of knowledge, and therefore of power, by healthcare professionals (Schlesinger & Bart, 1982; Ridington, 1982). Collective women's shelters as well strive to empower their clients and create alternatives to conventional services for women. The Family Crisis Shelter "developed a counterbureaucratic structure to empower the women involved in the shelter and also to resist the nationwide trend toward the co-optation of shelters into the mould of professionally staffed bureaucracies that provide conservative, non-feminist programs for battered women" (Rodriguez, 1988, p. 214).

Operating Principles

Three operating principles embody the vision and purposes of collectives:

- 1) decision-making by consensus
- 2) an egalitarian division of labour and
- 3) the nurturing of a sense of community among its members.

1) Consensual Decision-Making

Decision making is the process by which the organization exercises power. The consensual model ensures that each member plays a role in the decision making process. The goal is to make the process one of acting or producing an

effect, rather than one of exerting authority over others. To achieve this goal, the means by which people exercise power over others are minimized. Collectives have adopted a method of participatory rather than representational democracy. Instead of selecting members to represent their views in the decision making process, everyone takes part directly in decision making. Meetings are face-to-face and decisions are made by consensus. Majority decision-making is rejected because of the potential for the values and ideas of minority groups within the collective to be glossed over.

Consensus, according to Brandow and McDonnell (1981), is:

not 100% agreement, and it should not allow pressure to settle disagreements. It isn't necessary for every person to feel that this is the solution they want most or think is best. They may feel it is the best solution that can be reached at this time under these circumstances (p. 24).

Not all decisions within the collective require consensus. The Cheeseboard in Berkeley has three levels of decision making. Individuals are free to make decisions that affect their area of the operation. The majority of members can make minor decisions that affect the whole collective. Consensus is necessary only for major decisions, which are tabled at monthly meetings. Along with the power to take part in making decisions, members must accept the responsibility for implementing them. Those members who propose or strongly support a decision are responsible for carrying it out. "Achieving consensus at the Cheeseboard is an arena for the exercise of disciplined individual freedom" (Jackall, 1984, p. 123).

Differences in the ability to control discussions or sway others are minimized in collectives. If people don't take part in a decision because they are uncomfortable talking in front of a group, hostility can build up and weaken the collective. To prevent this from happening, some collectives follow the guideline that "every worker in the collective must voice an opinion at a meeting before a decision can be made" (Zwerdling, 1980, p. 87). As an alternative, larger collectives often divide into small groups at the beginning of meetings so that members who feel uncomfortable speaking in front of the large group have a chance to formulate their ideas and inform others of what they want to say (Mansbridge 1973). Building on their experience in consciousness raising groups, some women's collectives give everyone tokens at the beginning of meetings (Ristock, 1989). Each member is only allowed to speak once for every token she has. These methods ensure that everyone gets a chance to speak, and allow ideas and insights from quieter members to be presented for consideration by the group.

Consensus decision-making has two positive effects. Taking part in decision-making increases the individual commitment to decisions, and means that members are more likely to carry them out (Mansbridge 1973, p. 352). As well, the variety of input in the decision-making process allows collectives to come up with innovative and accurate responses to situations (Mansbridge, 1973, p. 352). This capacity for innovation is evident in some of the novel programs developed by collectives. The empowerment aims of Curbside

Alternative School, for example, led the staff to develop a unique theatre program for streetkids. The streetkids developed and presented plays about their experiences. This program in itself, however, would not have been successful without the development of a program culture which made the streetkids feel comfortable. The culture was honest, abrasive, irreverent and caring - a culture that would be very difficult to sustain in a bureaucratic organization (Glover, 1994). Other collectives provide innovative publishing as well as social and legal services. Several innovative editorial techniques emerged from the collective process at Women magazine, including group interviews, editorials with unique combinations of analysis and personal statements, issues on fantasies, experiences/reflections, loving friends and conflict (Blanchard, 1992).

Along with its strengths, consensus decision-making has several drawbacks. Consensual decision-making, "all collective workers will tell you, is difficult, frustrating, and above all, time consuming" (Zwerdling, 1980, p. 86). The face-to-face meetings necessary to reach consensus raise fears in some members: "fears of being made a fool of, or of personal attack, fears of conflict and of the patterns of confrontation and avoidance that these fears engender" (Mansbridge, 1982, p. 129). These fears can cause members to avoid controversial issues and strain relationships. To avoid these problems, collective members "must be open and honest about their feelings," not doing so "can stifle and then kill a collective" (Brandow & McDonnell, 1981, p. 24).

In the beginning, consensual decision making is a slow process, but it becomes faster as the group gets to know each other (Mansbridge, 1973). Experience in decision-making makes the process easier.

2) Egalitarian Division of Labour

Job rotation allows collective members to share the knowledge and skills necessary to perform the work of the organization. This sharing prevents one member from achieving a position of power by virtue of specialized knowledge. Taking part in all of the jobs of the collective gives members the knowledge they need to take part in decisions which affect the collective (Zwerdling, 1980, p. 86). Decision making power can't be distributed evenly if the necessary knowledge is held by only a few members. In bureaucratic organizations, the monopolization of knowledge gives authority figures the power to make decisions unilaterally and to control others. "Demystification reinforces egalitarian, democratic control, just as the subdivision of labour enhances managerial control over the workplace" (Rothschild, 1986, p. 114).

Ideally everyone would be able, and would be required, to do all of the jobs in the collective (Ristock, 1989, p. 3). At the Santa Barbara Legal Collective (1982) non-lawyers perform all of the duties which they are legally permitted to do, and are apprenticed to the Bar. As well, all members, lawyers and non-lawyers, take turns doing the menial work of the office. At Women magazine, the members "shared skills where someone had them or learned

skills where no one did" (Blanchard, 1992, p. 86). Rotating jobs allowed the women at the magazine to use their skills in a variety of tasks. "A gift for order was as useful in layout and design as it was in office organization; a talent for negotiation was as helpful for our own conflict resolution as it was for dealing with distributors; a visionary gift expressed itself in graphics as well as upcoming themes" (Blanchard, 1992, p. 87).

Other collectives adopt a pluralistic division of labour (Mansbridge 1973). Although people do different jobs and are responsible for different parts of the organization, the jobs are designed so that all of them are essential to the organization's success. In this way, equality of influence is maintained.

Through role rotation, teamwork or task sharing, and the diffusion or demystification of specialized knowledge, collectives seek to keep work roles as general and holistic as possible. "The goal is to eliminate all bases of individual power and authority, save those that individuals carry in their person" (Rothschild-Whitt, 1979, p. 524).

3) Community

In contrast to the impersonal relations that dominate hierarchies, collectives encourage the development of community among workers (Ristock, 1989). By sharing jobs, the impersonal relationships that are represented by job titles are eradicated.

Even the most formalized bureaucracy cannot eliminate all traces of human emotion and expression, but the point is that these are

regarded as inappropriate or misplaced in a bureaucracy. In the collectivist organization, they are cultivated and sought. They are part of the way that the organization accomplishes its business (Rothschild, 1986, p. 173).

Along with the social benefits that it entails, nurturing a sense of community in a collective personalizes relationships and encourages the development of a community of equals. The women's groups of the late 1960s found that taking the time for personal interaction, unrelated to the task, created a more unified group and gave the collective the "resources to handle task problems among members" (Mansbridge, 1973, p. 356).

By nourishing a sense of community, collectives answer a deep seeded need in all of us. Collectives try to create the collective identity while allowing the presence of an individual identity (Ristock, 1989). This approach contrasts with the North American norm of emphasizing the individual. "There is a universal need for an overarching set of values, a psychological sense of community" (Ristock, 1989, p. 19). The difficulty is to create a group that remains consistent with its own values. Collectives have been quite successful in this pursuit. Many feminist collectives that grew out of consciousness raising groups, continue to maintain their feminist ideology and collective, horizontal structure (Ristock, 1989).

Collectives are most effective when the workers represent a homogeneous group in terms of sharing the values, aims and goals of the collective. Rothschild-Whitt (1979) suggests, therefore, that collectives select members with similar aims, values and political leanings. Homogeneity is not always

difficult to achieve because often members of collectives hire people they already know. Also, collectives tend to attract members who are committed to the organization's mandate. Members of the Jane Abortion Clinic, although they represented a wide range of the political spectrum, were unified around the principle of women having control of their bodies (Schlesinger & Bart, 1982). Workers in collectives must be committed both to their work and to the collective system. Without a strong commitment, collectives "aren't likely to survive all the frustrations and pains of earning low salaries, labouring long hours, and constantly working out emotional conflicts" (Zwerdling, p. 87).

The strong sense of community in collectives can cause the formation of cliques. Cliques often form when a member has been hired who is unable to do the work, or does not fit in with the community of the collective. Firing is often a difficult process in collectives because there is no one in charge, and often no established process. With face-to-face meetings, and the close personal bonds, it is very difficult to confront someone in order to fire them. In the Jane Abortion Clinic, members found it difficult to fire members who were unable to counsel or perform competent abortions. To handle this problem, the rest of the members socially isolated these women and hoped that they would get the message (Schlesinger & Bart, 1982). To be fired from a collective may also be more painful than being fired from a bureaucracy. In a collective, the fired person cannot blame the system. "Not to be wanted by people we respect is

"very, very, hard" (Brandow & McDonnell, 1981, p. 62). In spite of the problems of cliques, collectives often do form a tightly-knit group with friendships that last long after the members have departed.

Characteristics

The values, practices and goals of collectives create a number of characteristics unique to this form of organization.

Flexible Structure

Collectives are flexible systems. One of the cornerstone practices of collectives is consensus decision making, yet some abandon this practice in favour of majoritarian decision making if achieving a consensus becomes too tedious. Collectives are best understood, not as structures embodying certain practices, but as flexible systems that are committed to an egalitarian vision and to the goals stemming from this vision. In collectives, there are no bosses directing everyone's roles and assigning duties. Depending on their current role, members are each responsible for a different part of the organization, but the structure is very flexible and members can step in when and where they are needed. One member of Curbside reports:

There was a formless structure, a seamless structure. It wasn't you go here now, you go here. It was all flowing and moving at the same time. It was really nice to be part of sometimes, this well-oiled machine that probably looked like hell on wheels (Glover, 1994, p. 15).

Collectives rejuvenate themselves through changes in staff and through the flexible use of processes. The infusion of new ideas and fresh energy that come with new staff are so important that some collectives have institutionalized the concept. At Rape Relief, a Vancouver collective that assists victims of rape, collective members originally had to leave the centre after two years (Ridington, 1982).

Although the vision and goals of collectives are fairly constant, the procedures and rules are quite flexible. Rules, along with direct supervision, are seen as ways of implementing top-down authority in hierarchical organizations. In contrast, collectives depend upon moral and personal appeals for social control (Rothschild & Whitt, 1986). The effectiveness of these appeals is enhanced by the selection of members who share basic values and world views. Rasing the organization on the vision and goals means that the members have a great deal of flexibility in developing procedures to achieve these goals. The flexibility allows new members to have an impact on the direction and structure of the organization. As one member of Women magazine stated, "'the collective process is only an abstraction; it is constantly in change'" (Blanchard, 1992, p. 87).

Rewards

To ensure that the contributions of all members are valued equally, in most collectives everyone receives the same pay. Pay differentials, if any, are strictly determined by the membership, usually on the basis of need. At the Santa Barbara Legal Collective, for example, all members were paid equally, except for one member who received more because he had a family (Santa Barbara, 1982). Other traditional incentives, such as the concept of career advancement, are not meaningful in collectives since there is no hierarchy of positions. Members work in collectives primarily for purposive incentives (value fulfilment), secondarily for solidary incentives such as friendship, and only tertiary for material incentives (Rothschild-Whitt, 1979). This reward structure requires a greater commitment from members and helps collectives select members who are committed to the vision and goals of the organization.

The egalitarian pay scale does require a great deal of sacrifice from members who could be making a much higher salary outside the collective. If secretaries and lawyers are getting paid the same amount, then the secretary's pay may be the same as it would be outside of the collective, whereas the lawyer's pay may be much lower. This disparity surfaces in the higher attrition rates among those making the greatest sacrifice (Rothschild, 1986).

Size

Consensus decision-making limits the size of collectives. Most collectives are small organizations with between five and fifteen members (Mansbridge, 1973, p. 352). With more than fifteen members, decision-making by consensus becomes an unworkable method. Unlike bureaucracies, collectives often place size limits on themselves (Rothschild, 1986). Instead of building large individual organizations, collectives form networks. Members of the Cheeseboard have helped to create several other collectives (Jackall & Levin, 1984). Collective members feel that being part of the bigger movement offers them opportunities for fulfilment. "Of course our energy was buoyed by our being part of an even larger women's movement," reports one member of Women magazine, "publishing a magazine that many women all over the country loved and responded to" (Blanchard, 1992, p. 95). The value fulfillment of being a member of a collective comes not just from the work of the collective, but from being part of a bigger movement.

Emotional Intensity

Collectives are typically stressful but rewarding places to work. The members' motivation and commitment often raise the emotional intensity of the collective. "Plants die from the vibes around here!" declares one collective member (Zwerdling, 1980, p. 85). The Santa Barbara Legal Collective's members (1982) report that the intensity builds because members are

overworked, but feel that they need to do more to help their client group, and because of the high level of responsibility and self-discipline that is required to run the collective. Mansbridge (1982) has also cited the stress of face-to-face meetings as a factor that increases the stress level of members of a collective. Referring to this emotional intensity, Rothschild-Whitt (1979) concludes that "interpersonal tension is probably endemic to the directly democratic situation" (p. 521).

External Relations

Because of their activist goals, collectives often become rallying points for social action movements. In striving to empower their clients, many collectives are reaching out to the larger community by setting up networks and through outreach programs. At the Health Collective, members gave talks to the general public on women's health and on the health industry. They also formed groups to research women's health issues and facilitate skill-sharing (Ridington, 1982).

In spite of this outreach, the contrast between the egalitarian values of collectives and the hierarchical values of the broader society can make it difficult for collectives to survive. Problems can arise on both organizational and individual levels. Because many provide social services, collectives are often dependent on outside organizations for funding. It can be difficult for a collective to legitimize itself to funders which are hierarchically organized. At

the Health Collective, "the worst effect of grants, was that the salaries occasionally attracted women whose main interest was not in feminism, but in the salary" (Ridington, 1982, p. 97). Occasionally funders can play a direct role in the running of the collective. A change in the provincial government led to a restructuring at Vancouver Transition House that included the hiring of a "resident supervisor" at a higher salary than the other members (Ridington, 1982).

This dependence on outside funding can also push the board and the staff in opposite directions. Hardisty states that:

Organizations with outside funding may find that the board focuses on fiscal accountability, while the staff are primarily concerned with client's needs. These different areas of responsibility may push the board in a more conservative direction while the staff becomes more radical (cited in Riger, 1984, p. 10%).

At Curbside school, the diverging views of the staff and the board led to three organizational crises (Glover 1994). The organization of the school was originally hierarchical. But through the work with the streetkids, it eventually began functioning as a collective. The board however, remained committed to a hierarchical organization. Eventually this disparity of views led to a series of crises between the staff and board that resulted in the resignation of many of the board members.

Working in an egalitarian collective within the larger framework of a hierarchically organized society can also place stress on the members of the collective. Even members with a firm commitment to collective values, may

not, because of their hierarchical upbringing and training, be able to translate these values into egalitarian behaviour. Even those who have developed the skills to function in a collective must be constantly shifting gears to behave one way within the collective and another way outside. In their attempt to create an alternative organizational model, collectives are swimming against the current. This is a source of tension that can lead to conflict and increases the emotional intensity of the collective. But in spite of this struggle, collectives are reasonably successful in achieving their goals.

Successes and Failures

Empowering the Clients

Clients of are often empowered through their contact with collective services. Alternative schools attempt to empower students by considering them not as clients, but as members with decision making rights and responsibilities (Rothschild-Whitt, 1979). Curbside School originally had a conventional focus of getting the streetkids to fit into the larger society, but this gradually gave way to a philosophy of empowerment. One member states:

At Curbside, the youth ultimately do everything. They write and perform and control their own projects. They find their own job placements. They are in real control, so that the change that's achieved is real change. (Glover, 1994, p. 12).

Clients of collectives often receive information that would not otherwise be available to them. The Santa Barbara Legal Collective educated clients about

legal matters. In some collectives, clients become members. At the Family Crisis Shelter, for example, all but two members are former residents of the shelter. The shelter has "deliberately maintained a staff of non-professional and predominantly blue-collar and minority women who have been the victims of male violence" (Rodriguez, 1988, p. 219).

Empowering the Members

Working in collectives is usually a positive growth experience for members. Because of the sense of community, and the work of empowering clients, members of collectives often feel a sense of fulfilment through their work (Schlesinger & Bart, 1982). Members also report an increased level of competence because of the training they receive in the different jobs of the collective (Schlesinger & Bart 1982; Mansbridge 1973). Apprenticing to do all of the jobs at an illegal abortion collective made the women involved feel an increased sense of competency (Schlesinger & Bart (1982).

Mansbridge (1973) and Ristock (1989) have found that participating in the decision-making of a collective can lead members to take a more active role in the political life of their community. Often this political involvement comes about because of changing beliefs. Working in a collective often has the effect of radicalizing the political leanings of members (Schlesinger & Bart, 1982; Glover 1994). Other collective members report the same transition:

Once people start having more control over their worklives, they become stronger. They see that they can influence their

environment, and that they don't have to settle for whatever someone else tells them or allows them to do. This new sense of strength can carry over into the rest of their lives, their relationships, and their neighbourhoods. People learn they *can* make a difference, and what they think is important (Brandow & McDonnell, 1981).

As well as the positive experiences, working in a collective has its drawbacks. Because of the high level of emotional intensity that is endemic to collectives, burnout of individuals, or of the whole collective, occurs more frequently than in other organizations (Schlesinger & Bart 1982). Some members are rejected within collectives. Some women in the Jane Abortion Clinic could not meet both the process and task demands and had negative experiences. Often incompetent workers were socially isolated, and it was hoped that they would get the message and leave (Schlesinger, 1982, p. 150).

One failure in the membership of collectives is that they tend to attract members almost exclusively from the middle class. Having such a narrow demographic appeal is frustrating for collectives which set out to empower those who are disempowered in society. Rothschild (1986) suggests that collectives appeal to middle class members because their basic needs are assured, therefore they are looking for higher-order fulfilment. The low pay scales in collectives exclude working class members who don't have wealthy families to fall back on. Many members also view their work in collectives as a temporary placement before they begin a career in a traditional workplace.

Providing an Alternative

One of the goals of collectives is to present an alternative to the bureaucratic organizational models that dominate our society. Although they have often been successful in providing services over a short period of time, they haven't been very successful in having their organizational model widely adopted, nor have they been successful in enduring for long periods of time. Enduring is, however, not necessarily a collective goal. The higher purpose is often to contribute to the social movements of which they are a part. Members of collectives often choose to dissolve their organization rather than compromise its original goals (Rothschild & Whitt, 1986).

Collectives are often not competitive in an open market. They usually can't compete with other models of organization if they are producing similar goods and services (Rothschild-Whitt, 1986). Often, collectives open a market niche or provide a service, only to have the niche taken over by mainstream organizations. Rape crisis centres, for example, were originally started by the women's movement in the mid 1970s with a perspective of social criticism. Eventually these services have been taken over by government bureaucracies, and the critical perspective has dissipated (Rothschild & Whitt, 1986). Collectives may, however, have greater longevity than conventional organizations. Over a period of five years, one third of collectives in the San Francisco Bay area had dissolved, compared with an 80% failure rate for most small businesses (Rothschild, 1986, p. 178).

Summary

Are collectives a wave, or the beginning of a large, permanent sector?

Collectives have been reasonably successful at achieving their goals of empowering members and clients. Over the past twenty-five years collectives have provided alternative education, social, publishing and legal services. They have provided fulfilling work experiences for their members, and their continued existence has disproved Michel's "iron law of oligarchy". They have shown that democratic, non-hierarchical systems of organization are a viable alternative. But they have not been widely accepted as models of organization.

In chapter two I introduce the theoretical model of dissipative self-organization. This model has been applied to other social organizations, but is particularly relevant to collectives because they embody many of the self-organizing principles that the theory advocates. Applying this model to collectives (in chapter 4) creates a new understanding of this organizational form and suggests some directions which collectives could pursue to increase their viability.

Background and Definitions

"Nothing is so practical as a good theory."

Lewin

In this century there has been a general retreat from control hierarchies, and a quiet rejection of the premises which kept them in place. The overthrow of colonial empires, monarchies and dictatorships has been paralleled on a smaller scale by the diminishing control of employers, priests and teachers. This trend received a giant push during the cataclysm of the 1960s when the youth of Europe, North America and China challenged the control systems that bound them. Jantsch (1980) characterized this change as a drive for self determination and self-organization. Although the institutions for the most part survived the onslaught of the 1960s, the world views of the people within them have been changed forever.

The premises which sustained these control hierarchies have also been challenged. The traditional Judeo-Christian view has been that nature around us, and humanity's inner nature are intrinsically evil. Civilization was seen as a thin veneer which must be carefully kept in place to prevent chaos from erupting and wreaking havoc. We had been afraid of our natural impulses and felt we must control the "beast within" to preserve the "thin veneer of civilization." This view demanded conscious control and suppression of our natural impulses and played a large role in the design of our schools and

workplaces. But gradually we have changed our view of ourselves from being either inherently good or evil, to a view in which we reflect the complexity of the natural world of which we are part. Gradually we are coming to understand and acknowledge our integral relationship with nature.

The social sciences have grown from and fuelled this trend. The dominant philosophies in education, healthcare and economic development have changed from theories of control to theories of facilitating natural processes. In the early part of this century, instead of attempting to "mould young minds", Montessori (1967) and other educators developed educational programs that facilitated the natural process of learning in children. She believed that the salvation of humanity lay with children who had been raised and educated free of the corrupting influences of teachers and parents who exert control over rather than provide guidance for children. In adult education, Tough (1982) has described adult learners as those making "intentional changes". This perspective leads to the belief that we undermine the changer's competence when we take over his or her process. In other words, adult learners learn best when they organize their own process. Another social science, healthcare, is undergoing a revolution with the concept of "health promotion", which enables people to take control of their own health. This change removes doctors from their "expert" controlling position and makes them facilitators of the patient's healthcare. Freire's (1970) community development strategy is also an example of self-organizing principles being

applied in the social sciences. While the colossal failure of the "green revolution" was being conceived and designed in the first world for implementation in the third world, Paulo Freire was helping villagers in South America come to their own understanding of the issues facing them and plan their own courses of action. The unifying ideas behind these developments in the social sciences are a rejection of control hierarchy, a belief in localizing control, and a growing trust in natural self-organizing processes.

Paralleling these developments in the social sciences, natural scientists have also been developing a theory of self-organization. In the natural sciences, the concept of self-organization has been widely disseminated through the work of the chemist Ilya Prigogine (1979). Prigogine was a pioneer in deducing a useful scientific theory of self-organization in natural systems. He introduced the three prerequisites for self-organization: an open system, far-from-equilibrium conditions and a non-linear system response. Prigogine's work in chemistry was preceded by self-organizing concepts in other natural sciences, such as Norbert Wiener's cybernetics, Sylvester and Cayley's mathematical eigenbehaviours and Maturana and Varela's autopoiesis (see table 2).

TABLE 2

Parallel Development of Self-Organizing Principles In
The Natural and Social Sciences

Natural Sciences	Social Sciences
Dissipative Self-organization	Intentional Changes
Field: Chemistry Proponent: Prigogine	Field: Education Proponent: Tough
Eigenbehaviours	Health Promotion
Field: Mathematics Proponent: Sylvester & Cayley	Field: Healthcare Proponent: Various Proponents
Cybernetics	Freierian Philosophy
Field: Computer Science Proponent: Norbert Wiener	Field: Education & Development Proponent: Paulo Freire
Autopoiesis	Participatory Research
Field: Biology Proponents: Maturana & Varela	Field: Social Science Research Proponent: Budd Hall

Along with this parallel development, there has been a cross-fertilization of ideas between the social and natural sciences. For a century, the social sciences have been developing their own concepts of self-organization and calling it self determination or the facilitation of natural processes. The social sciences are now looking to the natural science understanding of self-organization to extrapolate the principles of self-organization so they can clarify and deepen their understanding of social system processes. Management theorists have been particularly quick to reshape the dominant paradigm of their field using the principles derived from the natural sciences (Morgan, 1986; Senge, 1990; Wheatley, 1993). Applying the natural science

principles of self-organization allows management theorists to align organizations with the principles that govern natural systems.

In this chapter I present an historical overview of the theory of dissipative self-organization in natural systems. In this overview I define a number of terms that are essential to understanding collectives from the perspective of dissipative self-organization. Following this, in chapter three, I will examine how the theory of self-organization is creating a paradigm shift in management theory.

General Systems Theory

The theory of dissipative self-organization has grown from the General Systems Theory of von Bertalanffy (1967). This theory challenged two fundamental premises of science: reductionism and the study of closed systems. The science of **reductionism** reduced systems to their individual elements which were then studied. Reductionism led to the division of the universe into finer and finer pieces for scientific study, each piece with its own discipline: physics, chemistry, and biology are divided into dynamics, atomic physics, subatomic physics, etc.. The assumption of reductionist science is that an understanding of the components of a system will lead to an understanding of the system itself. Von Bertalanffy's (1967) contribution was in pointing out that "the whole is more than the sum of the parts". The system behaves in ways that cannot be understood by studying the individual elements.

Instead of breaking the universe down to its components, systems theory takes a holistic perspective. It looks at the properties that emerge when these components interact. Emergent properties produce emergent behaviours. Water molecules are the components of water. But if we study a single water molecule, then the behaviours of phase transitions (boiling or freezing) have no meaning. Phase transitions are emergent properties that result from the interaction of many molecules in a particular environment. It is the interaction of water molecules that give the behaviour of boiling or freezing. Other examples of emergent systems are the weather, made of water vapour, sun and wind; life, made of DNA molecules, protein molecules and myriad other molecules all obeying the laws of chemistry; and the mind, made of several billion neurons obeying the biological laws of the living cell (Waldrop, 1992).

The view of the universe from a systems perspective is one of systems within systems within systems all infinitely interlinked. Our bodies, for example, are made up of numerous biological systems which together constitute individuals. We, in turn, create and belong to social systems of families, cultural groups and nations. Each system is made up of components which are themselves systems; and each system is also part of a larger system.

Bertalanffy's (1967) other great contribution was showing the importance of viewing systems as open rather than closed to their environment. As he points out, after the discovery of the laws of thermodynamics in the nineteenth

century, science, and especially physics, focused on the study of closed systems. Closed systems are those which do not interact with their environment. The study of these systems led scientists to believe that the universe, galaxies, solar system, etc. were inevitably wearing down. This belief is stated formally in the second law of thermodynamics: "the so-called entropy of an isolated system can only increase until the system has reached its thermodynamic equilibrium" (Jantsch, 1980, p. 24). Entropy is the buildup of unusable energy in a system. In a car's engine, for example, entropy is the unusable heat energy that is created. The cooling system in a car dissipates the accruing entropy. Without the cooling system, the entropy would eventually build to a point where the engine could no longer function.

Entropy can also be understood as a function of probability. From this perspective, a closed system tends to move to a state of most probable distribution (von Bertalanffy, 1967). The tendency toward entropy accounts, for example, for lukewarm water resulting from the combination of hot and cold water in a container. The probability of having all fast moving molecules (high temperature) on one side of the container, and all slow moving molecules (low temperature) on the other is highly remote. The most likely distribution is that the fast and slow molecules will mix randomly. So the tendency toward maximum entropy, stipulated by the second law, can be understood as a tendency toward maximum disorder. Under the influence of this law, it was felt that the buildup of entropy and the collapse of systems was inevitable.

The second law of thermodynamics could account for the warm water resulting from the mixture of hot and cold, but could not account for the advent of the hot and cold water in the first place (Jantsch, 1980). Von Bertalanffy (1967) studied systems which are open to the environment and which maintain a continuous inflow and outflow. This study showed that a system did not necessarily move toward equilibrium, but could maintain a steady state or even move toward a higher level of organization. Not only physical and mechanical systems, but also living systems are open to their environment. Every living organism, is an open system which regulates its inflow and outflow through its metabolism. Von Bertalanffy stated that living systems maintain themselves and can evolve to more complex forms by importing free energy from the environment and dissipating the accruing entropy (von Bertalanffy, 1967).

Dissipative Self-Organization

Process Structures

The General Systems Theory of von Bertalanffy, moved the natural and social sciences away from a reductionist perspective and a focus on closed systems. Von Bertalanffy's emphasis, however, was on the structure of the systems he studied. The goals of structures, as Jantsch (1980) points out, are preservation and stabilization. General Systems Theory's application was suited more to technical than social systems. It showed how given structures could be stabilized and maintained indefinitely through negative feedback.

Negative feedback occurs when the environment limits the growth of a system or action. A household thermostat is a negative feedback mechanism. The thermostat regulates the operation of the furnace in order to keep the room temperature within designated limits (Sterling, 1992). Farmers understand the concept of negative feedback. They stop applying fertilizer when the gains as a proportion of cost diminish (Sterling, 1992). When General Systems Theory was first applied to workplace organizations, analysts attempted to control organizations and stabilize their structures through negative feedback mechanisms (Jantsch, 1980). These mechanisms had the unforeseen effect of dampening creativity and diminishing an organization's ability to respond to environmental changes.

An understanding of self-organization clarifies the role of positive feedback in the evolution of a system. **Positive feedback** occurs when the environment picks up a fluctuation from a system, magnifies it and feeds it back into the system. The high pitched screech that results when a speaker picks up the hum of a microphone and creates a feedback loop, is an example of positive feedback (Sterling, 1992). A system can evolve to a new higher level of order through positive feedback resulting from the interaction of its components. But positive feedback is not always creative. It can blow a system apart or prevent other creative forces from entering the system. Group discussion, for example, requires a balance between positive and negative feedback (M. Davison, personal communication, Nov. 4, 1994). If there is only

positive feedback, the first idea will define the parameters of the discussion, and prevent other ideas from being introduced.

The structural systems view of von Bertalanffy emphasized the role of negative feedback in maintaining systems. The self-organizing paradigm, however, accounts for both positive and negative feedback by emphasizing the process aspect rather than the structural aspect of systems. In **process thinking**, we are no longer looking at structures as objects fixed in time and space, but as systems with a throughflow of matter, energy and information. A simple example of a process structure would be a wave on the surface of the water. The wave coherently transfers energy, but no particle of water is part of the system for any length of time. Instead, the system is what organizes the flow of water. A clearer understanding of the system comes from viewing it as a process, not only as a structure. According to Jantsch (1980):

A system now appears as a set of coherent, evolving, interactive processes which temporarily manifest in globally stable structures that have nothing to do with the equilibrium and solidity of technical structures. Caterpillar and butterfly, for example, are two temporarily stabilized structures in the coherent evolution of one and the same system (p. 6).

In a work organization, staff change, owners change, even the location and product of the organization can change, but we would still define it as the same organization. What defines the organization is not its structure. The internal and external relationships that make up the system evolve and change over time, as do the members of the organization. What defines the organization is at a more fundamental level, the level of its "deep structure".

Although they are both process structures, neither a wave on the surface of the water, nor a caterpillar-butterfly are self-organizing systems. The wave responds directly to external forces. The energy transferred from the wind raises or diminishes the size of the wave. In changing from a caterpillar to a butterfly, this living system is fulfilling the plan laid down by its DNA. Self-organizing systems are not those which respond directly to external forces, or which directly follow an internal blueprint. **Self-organizing systems** are those which internally regulate the inflow and outflow from the environment and which are capable of creating novel structures in response to disturbances from the environment.

Belousov-Zhabotinsky Reaction

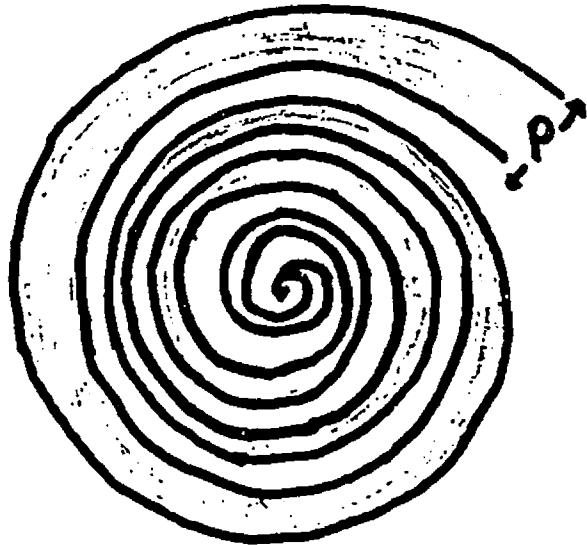
The Belousov-Zhabotinsky (B-Z) reaction is the chemical reaction in which the process of self-organization was first formally noticed. This is the most commonly cited self-organizing reaction in a natural system, and the one upon which Prigogine based his findings in 1967. It illustrates many of the principles of dissipative self-organization.

The Belousov-Zhabotinsky reaction was discovered in 1958 and named after its Russian creators (Jantsch, 1980). It is a chaotic reaction that exhibits a rich variety of self-organizing behaviours. The reaction involves the oxidation of malonic acid by bromate. This reaction creates self-organizing patterns which take the form of spatial spirals, or temporal fluctuations. In the solution

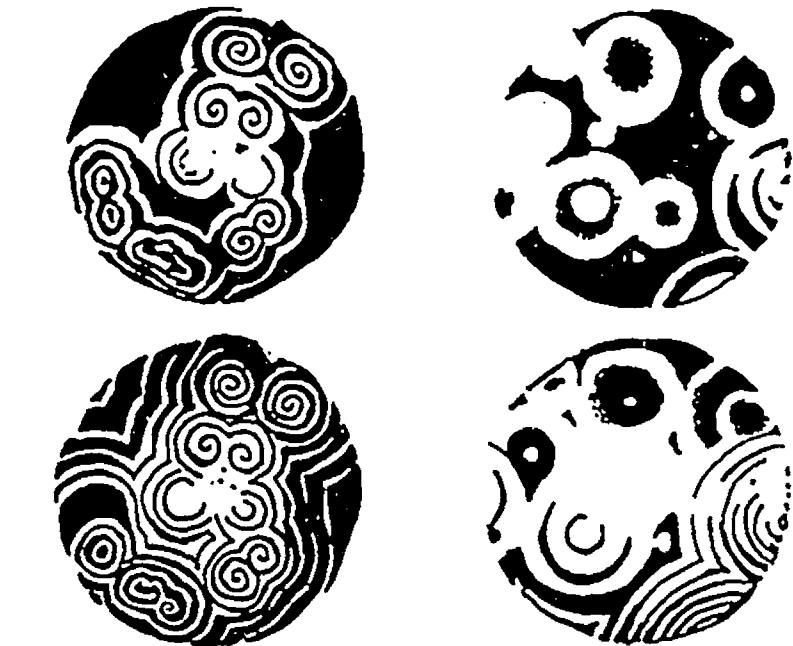
concentric spiral waves develop which lead to interference patterns and may lead to periodic bursts of chemical activity such as the welling-up of concentric chemical waves (Jantsch, 1980). The spiral patterns arise because of the nonequilibrium state of the process. The spirals are importing and exporting chemicals which create concentration gradients. These gradients are smoothed out by diffusion. At the same time, chemical reactions are going on which create new gradients that can maintain the spirals for several hours (see fig. 1).

FIGURE 1

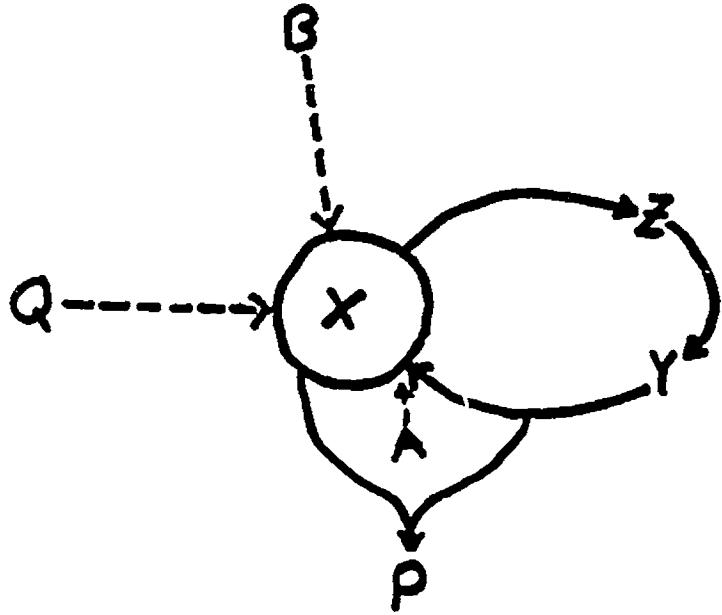
Belousov-Zhabotinsky Reaction



Spiral waves from the B-Z reaction.
"P" is dissipating into the environment.



Spiral waves that develop when the B-Z reaction carried out in a shallow dish (Jantsch 1980).



The B-Z reaction. X is an autocatalytic step (it reproduces itself). The system maintains itself by importing B and dissipating P and Q. Z and Y are intermediary steps in the process (Jantsch, 1980).

Far-From-Equilibrium

The self-organizing behaviours in the B-Z reaction occur when the reaction is in a far-from-equilibrium state. A system is at **equilibrium** when there is no net exchange between the system and its environment because the system and its environment share identical properties such as temperature, pressure or chemical concentration (Sterling, 1992). At equilibrium the system is not necessarily static, it can be dynamic, there can be fluxes across the system. A system at equilibrium maintains its regimen by counteracting any fluctuations that enter the system through negative feedback. At nonequilibrium the system and its environment have different properties, which cause continual fluxes (Nicolis & Prigogine, 1989). In the B-Z reaction, the different properties are the concentration gradients between the different chemicals in the reaction.

Nonequilibrium can be transient or permanent. An open system can maintain a state of nonequilibrium by continually importing free energy from the environment and exporting entropy. This "pumping" action keeps the system far-from-equilibrium (Menzinger, personal communication, June 12, 1994). When the flow of entropy across the boundaries is great enough to compensate for the entropy production within the system, spontaneous self-organization can occur. This principle is captured in the equation:

$$dS = d_iS + d_eS; d_iS > 0$$

In this equation, S represents "entropy", d represents "delta" or "change", i represents "internal" and e represents "external". The equation reads: the change in entropy is equal to the change in internal entropy plus the change in the flow of entropy across the system border. The internal entropy production (d_iS) represents the entropy created through the functioning of the system and must therefore be greater than or equal to zero. The d_eS is the entropy flow across boundaries. In order for the system to remain far-from-equilibrium, the d_eS must dissipate at least as much entropy as is built up through the internal functioning of the system. If the system does not dissipate more entropy than it creates, then the entropy level will rise and the system will move toward equilibrium. The dissipation of entropy allows the system to function in a far-from-equilibrium state. This condition for self-organization to occur has been applied to social organizations and will be discussed in chapter three.

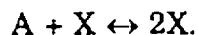
Chaos

The B-Z reaction exhibits a range of chaotic behavior. Chaotic behavior is behavior which is, in principle, deterministic. One event is related to previous events, but the relationship of these events is often so complicated that it is impossible to predict one event from another. A bird's eye view of the activity at Grand Central Station during rush hour would be an example of chaotic behavior (Freeman, in Sterling, 1992). Without an understanding of the underlying order in the system, the behavior of the people going this way and

that would appear to be random. But if we understand the underlying order, then the patterns of the movements begin to emerge. Self-organizing behavior is also called "order out of chaos"(Prigogine & Stengers, 1984). The creative role of chaos was largely unrecognized until the process of self-organization was understood. In a far-from-equilibrium state, a system can pass through a period of chaos before self-organizing into a new complex dynamic regime.

Nonlinear Processes and Limits to Growth

As with all self-organizing systems, the Belousov-Zhabotinsky reaction has a nonlinear step in the interactions between the elements. Except for a few simple physical systems such as sound and light, the vast majority of physical, chemical, biological and social systems are nonlinear. In self-organizing systems, the nonlinearity is present in the reaction scheme steps which are autocatalytic, such as



In this reaction, X stimulates its own production from A. This reaction is called autocatalytic because it catalyzes its own development. The reaction is nonlinear because as the amount of X in the system increases, the rate of the back reaction also increases.

A linear reaction would be one in which A and X continued to produce 2X into infinity. But in all nonlinear systems whenever there is a process occurring, there is also a counter process occurring. This counter process

imposes what systems theorists call the "limits to growth" of a system (Senge, 1990). The limits to growth of industrialization, for example, may be the environmental degradation it is causing. As Senge (1990) notes, pushing a system that is hitting its limits to growth will only make the situation worse. In the reaction above, pushing the system would mean adding more A to the reaction so that the forward reaction accelerates. This forward reaction, however, creates more X and accelerates the back reaction. Eventually the back reaction will outpace the forward reaction - the opposite of the intended effect. The solution, when a system hits its limits to growth, would be not to push the system but to remove the limits to growth. In the reaction above, this would mean pumping X out of the system, so that the forward reaction can continue. In the case of industrialization, removing the limits to growth may mean finding means of production that minimize environmental damage.

Social phenomena display many nonlinearities. The sudden surge and decline of fads is an example of nonlinear growth (Prigogine, 1982). The sudden demand for a cabbage patch doll, a hula hoop, or body piercing are examples of nonlinear growth. Another example is that a steady increase in traffic density provokes, at a critical value, a sudden decrease in the speed of vehicles. In all of these examples, the result is not linearly related to the cause.

Sensitive Dependence on Initial Conditions

A system at nonequilibrium, and especially a system exhibiting chaotic behavior displays a "sensitive dependence on initial conditions". In equilibrium systems, external and internal disturbances are muffled by counteractions set in motion by the system. Nonequilibrium systems are susceptible to change because small disturbances are not "necessarily obliterated by an instantaneously developed counteraction, but rather, can be accepted and even amplified by the system, thus becoming sources of innovation and diversification" (Nicolis & Prigogine, 1989, p. 56). The tiniest perturbation in a nonlinear system can create a positive feedback loop that can in turn drive the system to a state of chaos. This reaction to fluctuations is described by the principle of "sensitive dependence on initial conditions". It is also known as the "butterfly effect": "a butterfly stirring the air today in Peking can transform the storm systems next month in New York" (Gleick, 1987, p. 20).

This principle is captured in the ancient proverb,

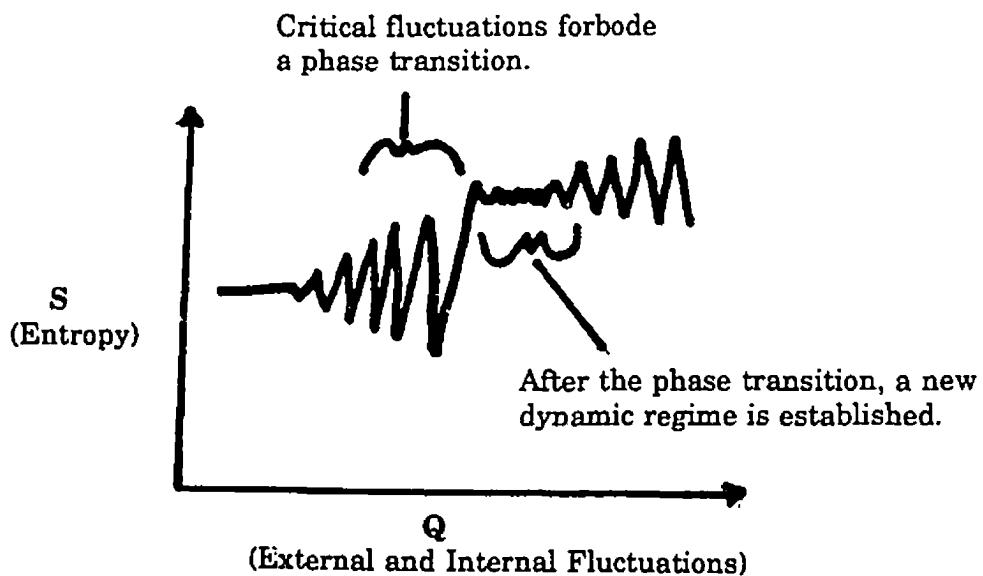
For want of a nail the shoe was lost, for want of a shoe, the horse was lost, for want of a horse, the rider was lost, for want of a rider the message was lost, for want of a message, the battle was lost, for want of a battle, the war was lost (Gleick, 1987, p. 23).

Phase Transitions

When a system in a far-from-equilibrium state is influenced by an internal or external disturbance, its sensitive dependence on initial conditions can drive the system very quickly toward critical fluctuations. These fluctuations can grow to a certain threshold known as a "bifurcation point" beyond which the old regime of the system is unable to cope. The system can then move from its current pattern to a new dynamic regime. This process of change is called a **phase transition** (Menzinger, personal communication, June 12, 1994).

FIGURE 2

Phase Transitions



In order for the phase transition to occur, the fluctuations within the system must grow to such a level that the system overcomes its homeostasis. **Homeostasis** is the tendency of a system to maintain its current dynamic

regime inspite of disturbances. When, for example, a heart muscle is subjected to unusual disturbances it can go through a phase transition into the chaotic pattern called fibrillation. The defibrillators used by emergency medical services give the heart an electric shock which can change the heart's behavior back to its normal pattern.

Summary of Self-organization

Self-organization is a process by which a system in a far-from-equilibrium state undergoes an abrupt phase transition to a much more elaborate and complex state or level. The system must be one which itself regulates the throughflow of information, matter and energy. The newly attained state tends to be stable, at least until it is again driven to another far-from-equilibrium crisis.

Conditions for Self-organization:

1. an open system;
2. far-from-equilibrium state; exhibiting turbulent or chaotic behavior;
3. a nonlinear feedback mechanism such as an autocatalytic reaction;
4. critical fluctuations that forbode a phase transition.

Self-organization is innovation, the creation of new information, structures, or systems in response to internal or external disturbances. Self-organizing systems are characterized by *hierarchy*. Every part is potentially of equal

importance. The current importance of each part is dependent on the relevance of the information that it can contribute to the system.

Implications: An Evolutionary Perspective

The concept of dissipative self-organization has profound implications for all areas of natural and social scientific study. If chemical, biological and social systems are able to self-organize into new and complex patterns, then dissipative self-organization can be viewed as one of the key mechanisms in evolution. Along with random mutation and Darwinian natural selection, self-organizing dynamics becomes the third process of evolution. It helps to explain, for example, the problematic link between cosmic and biological evolution. As creationists have argued, the probability of chemicals found in the earth's environment forming DNA or even complex proteins through random reactions is virtually impossible according to mathematical calculations. But if the reactions are not random, but follow a universal self-organizing principle, then the probability of DNA forming is far greater.

Dissipative self-organization is an evolutionary theory. The initial components and properties of the universe that were present at the big bang have evolved to create the myriad components and properties of the universe. Jantsch (1980) describes the evolution of the universe from the big bang to the present. He believes that the universe evolved from the simple elements of the big bang to more and more complex chemical structures, gradually creating

proteins, then DNA on earth. He traces the process through a number of stages which he calls spheres of evolution. The major spheres are cosmological, biological, sociobiological, and sociocultural.

In the cosmological soup self-organizing reactions would have created life, not random ones:

The compounds in the soup could have formed a coherent, self-reinforcing web of reactions. Furthermore, each molecule in the web would have catalyzed the formation of other molecules in the web - so that all the molecules in the web would have steadily grown more and more abundant relative to molecules that were not part of the web. Taken as a whole, in short, the web would have catalyzed its own formation. It would have been an "autocatalytic set" (Waldrop, 1992, p.123).

Tracing a line of evolution from the big bang to the modern day implies that the principles involved in the interactions of the big bang are homologous (come from the same origin) as the principles involved in all other spheres of existence (Jantsch, 1980). In other words, the principles of cosmological evolution are related to the principles of sociocultural evolution. But with each sphere of evolution, these principles become more complex.

The mechanism of this model of evolution differs significantly from the Darwinian model. Darwin understood evolution as the product of blind random fluctuations. These fluctuations are then culled by natural selection. The complexity model of evolution adds to the mechanisms Darwin described. Prigogine's self-organizing principle means that systems involved in evolutionary processes exercise partial self-determination over the process. Jantsch (1980) writes, "Evolution is the history of an unfolding complexity, not

the history of random processes" (p. 230). So as well as random fluctuations and external forces being the mechanisms of evolution, the internal self-organization of a system also plays a role in determining the direction of its evolution. "Evolution, of course, was a lot more than just random mutation and natural selection. It was also emergence and self-organization" (Waldrop, 1992, p. 257).

As evolution has occurred across the spheres, the phenomena in each of the spheres, as well as the mechanisms of evolution have also evolved into more and more complex forms. The application of principles across these spheres of evolution is, however, the crux of Jantsch's (1980) argument in *The Self-Organizing Universe*. He argues that the principles found in the theory of dissipative structures in chemistry can be applied to the social realm. In the sociocultural sphere, the principles of dissipative self-organization apply to the settling of new land, social change and revolution, individual creativity and the great currents in art, and individual personality development to cultural guiding images (Jantsch 1980).

In the application of principles across spheres, Jantsch (1980) is not offering solutions, but pointing out perspectives (p. 251). He believes that, "it is our task to act with evolution, not against it" (p. 262). The goal then is to understand the principles of evolution, and to do our planning (including designing our organizations) in conjunction with them.

Chapter 3: Self-Organization and Social Systems

Recently I have become aware of the shadowing tendency in humans. The tendency to fall in step when we are walking with someone, or to space our cars evenly when we are driving on an expressway. When we get on a bus or subway, or sit in a restaurant, we unconsciously stagger our positions so that the amount of body space between each of us is relatively even.

On the expressway, the best way to get someone to stop tailgating is to leave a comfortable margin between yourself and the car in front. In order to continue tailgating, the person behind must fight the tension to fall in step, or must go around you. When you become aware of this organizing process, you begin to see examples of it everywhere.

Personal Journal

Introduction

Workplaces in the nineties are beset by rapid technological innovation, expanding global communications, an overproduction capacity and fiercely competitive markets. Vaill (1990) characterizes our current turbulent economic times as "permanent whitewater". It is no longer enough for organizations to go through periods of change described by Lewin (1951) as "unfreezing - changing - refreezing". Organizations must now be capable of undergoing a permanent process of change (Weisbord, 1986). Organizational theorists are helping organizations to develop systems that allow them to adapt and thrive during these turbulent times. In their task, organizational planners are guided by the principles of dissipative self-organization. The application of the principles of dissipative self-organization to workplaces is prompting a

reconceptualization of what workplaces are and how they can best accomplish their tasks.

Three Paradigms

Three paradigms have governed the field of organizational theory in this century (Leifer, 1989). Each of them is based upon a different conceptualization of the nature of the environment in which the organizations were operating. These conceptualizations were guided by the contemporary scientific theory of the time. They are: 1) Newtonian 2) General Systems Theory 3) Dissipative Self-organization (Jantsch, 1980; Leifer, 1989).

1) Newtonian

At the turn of the century organizational theory was built upon a Newtonian view of the universe: The universe is simple, ordered and functions according to fundamental laws (Leifer, 1989). Newton's laws had created an image of the universe in which the planetary bodies had been set in motion at some time in the past and were maintaining the same dynamic regime. The image is one of a watch that has been created and set in motion by a now absentee watchmaker (Prigogine and Stengers, 1984). In other words, the universe is in a state of dynamic equilibrium. The fundamental laws of the universe are simple and universal. The same force of gravity which makes an apple fall to the ground also keeps the earth orbiting around the sun. These fundamental laws create a linear, determinate view of the universe. If we

know the conditions affecting an object at a particular moment in time, we can determine what will happen to it later on. Alternatively, if we understand the components, we understand the system. The Newtonian view led to a reductionist, closed system approach which dominated science into the twentieth century.

Frederick Taylor's scientific management was the most successful at bringing this paradigm to organizations (Weisbord, 1986). His approach was to study and uncover the underlying order in an organization, or a job, then to deduce the one best way of approaching the task at hand. In this way, the increasing order in the workplace would reflect the well-ordered, equilibrium universe (Leifer, 1989). It was management's task to progressively discover the underlying order of the environment so that they could bring this new understanding to a create a greater order in the workplace (Leifer, 1989).

2) General Systems Theory

The reductionist approach of the Newtonian model gave way to a General Systems approach in the middle of this century. Von Bertalanffy's (1967) General Systems Theory was still based on an underlying assumption of equilibrium in the universe, but it changed the reductionist focus on the components of a system to a wider focus on the organization as a whole and to the relations between the organization and the environment (Leifer, 1989).

The focus of this paradigm was the overall structure of the system. Systems analysts looked for ways to support the stability of the structure.

They created organizations with buffer zones to minimize the disruption of disorderliness in input and output transactions, and they attempted to anticipate future environmental changes in order to adapt to them (Leifer, 1989). Through these actions, systems analysts were able to create a system that minimizes the influence of the uncontrollable environment so that rational choices can take place.

3) Dissipative Self-organization

The dissipative model challenges the Newtonian assumption of determinateness and order, and the General Systems emphasis on structure. This theory changes the image of the universe from one of a watch in which all of the pieces maintain the same dynamic regime, to one in which the orbits of the planetary bodies are slowly evolving; and, at the edge of the universe, new galaxies and solar systems are self-organizing into new and novel structures. The challenge now, states Leifer (1989), is to design organizations that fit into a universe characterized by randomness, indeterminacy, and ambiguity. For organizational planners, fluctuations within or outside of the system are not necessarily anomalies to be corrected, but the nature of open systems, and potentially the catalyst of new dynamic orders. The goal is no longer to always maintain equilibrium, but at times to open the system up to fluctuations. Fluctuations are increases in the complexity and the degree of uncertainty. In our present economy they are coming from a rapidly changing workforce, rapid communications and global competition.

Four Components

The self-organizing model proposes four components of change processes in organizations: symmetry breaking, experimenting, self reference and resonance (Jantsch, 1980; Smith & Gemmill, 1991; Leifer, 1989).

1) Symmetry Breaking

Symmetry breaking occurs when the environment reaches a stage of turbulence or chaos that forces the system to abandon its old dynamic order and develop a new one. Destabilizing fluctuations can originate inside or outside of the system. Sources of external fluctuations in social systems include technological advances, market changes, consumer demands, interest groups, production overcapacity and social movements. Sources of internal fluctuations include interpersonal dynamics, new ideas or conflicting paradigms brought into the group by new members.

Symmetry breaking occurs when these fluctuations grow to a critical level and push the system to a state far-from-equilibrium in which it is extremely sensitive to internal or external fluctuations - a bifurcation point. The fluctuations are then great enough to overcome the homeostatic tendency of the system. In this state, a "trigger event" (Leifer, 1989), or, more colloquially, "the straw that broke the camel's back", causes the old paradigm to collapse, creating the freedom that is needed to allow the new structure to

emerge. Symmetry breaking refers to the act of breaking ties with the old structure in order to allow a new structure to emerge.

In social structures, symmetry breaking occurs when fluctuations build to the point at which members perceive, consciously or otherwise, that their current structure is detrimental because of growing paradox and misalignment (Smith & Gemmill, 1991). In groups, symmetry breaking occurs when the group lets go of its shared paradigm. "In the forms of play, conflict, or outright rebellion, members will surface paradox and contradiction" (Smith & Gemmill, 1991, p. 705). Symmetry breaking can also take the form of a revolt against the current leadership. In whatever form it takes, symmetry breaking creates a positive feedback loop with the fluctuation that is destabilizing the system. The responses of the people in the system amplify the growing disorder.

The changes described in this process are large transformational changes. Organizational literature divides processes of change into two categories, small changes and transformations (Leifer, 1989). As the fluctuations in the environment become greater, the system initially attempts to adapt by making incremental changes. Eventually these incremental changes are no longer effective and the growing fluctuations push the system to a bifurcation point. Although there is a tendency to retreat to the old paradigm when turbulence in the system builds, if a system continues to attempt to dampen the fluctuations with incremental changes, it will become increasingly misaligned with its environment (Leifer, 1989). It is this far-from-

equilibrium state that creates the conditions for self-organization. The increasing turbulence caused by the fluctuations and the system's growing inability to cope because of its current structure, lead to a bifurcation point at which the system's tendencies to homeostasis can be overcome, and the system can evolve to a new dynamic regime.

2) Experimenting

The experimenting component consists of new patterns of behaviour and information processing. These increase the variety of responses that the system can make to the growing turbulence. The experimenting behaviour allows the system to develop sufficient diversity and complexity to meet the diversity and complexity of the environment (Smith & Comer, 1994). In social groups, experimenting is energizing, it moves the group toward behaviour at its boundaries (Smith & Gemmill, 1991). It gives the group the "requisite variety" to meet the demands posed by the turbulent environment (Smith & Comer, 1994).

3) Self Reference

As stated in chapter 2, dissipative self-organizing systems are process structures. When a system engages in symmetry breaking, it does not discard all of its learning and structures. If systems did this, Bronowski argues, devolution would be as likely as evolution, and the existence of sophisticated

systems would be highly improbable (Smith & Gemmill, 1991). The evolution of life from simple organisms to complex animals would never have occurred because at each step, the devolution to a simpler form would have been as likely as the evolution to a more complex form. Therefore, the system must retain a frame of reference. If the components change and the relationships between are altered, the system still retains its identity. "Even in the most intense transformative processes, some "deep" structures must remain" (Smith & Gemmill, 1991, p. 709). It must be self-referencing, that is it must look to itself for structure. The new structure must be in alignment with these "deep structures". It is this "deep structure" that gives an identity to a workplace organization even though its staff, location and products can change over time.

4) Resonance

When the new regimes of order take hold and gain momentum a process like resonance occurs (Smith & Gemmill, 1991). In physical systems, resonance occurs when the vibration of one system hits the resonant frequency of another system and causes it to vibrate as well. The most famous example of resonance is the Tacoma Narrows bridge, in which the wind blowing up the narrows hit the resonant frequency of the bridge and caused it to vibrate and eventually self-destruct. Momentum is gained because of an affinity between the driving force and the system itself. A system "knows" which structure is internally and externally resonant.

In social systems, resonance is both a creative and a destructive force.

In groups, resonance is seen as a form of mutuality: the availability of physical resources, and also the fulfillment of interpersonal needs of sustenance and growth (Alderfer, 1976 in Smith & Comer, 1994). Resonance does not mean that people think alike (which can limit the experimenting behaviour) but that there is effective communication between members of the group. Effective communication resulting in mutuality requires risk-taking behaviour, which members are only likely to feel comfortable with when there is some degree of bonding and trust among group members (Smith & Comer, 1994).

The new structure gains critical support and becomes established. It is more in harmony with and responsive to its environment (Smith & Gemmill, 1991). The new emerging order can cope with increasing amounts of uncertainty and complexity. It is sensitive to the turbulence in its environment and is able to use this turbulence to its advantage.

Boundaries

For a social organization to survive in times of "permanent white water", it must maintain a nonequilibrium state. Equilibrium makes a system sluggish and slow to adapt to turbulence. Like an inflexible fastener, a system close to equilibrium resists turbulence, then breaks suddenly. A nonequilibrium system is more flexible and adaptable.

In order to maintain nonequilibrium, a system must operate close to its boundaries. System boundaries are the physical, temporal or informational boundaries which distinguish the system from other systems. In social systems, retreating from system boundaries refers to the tendency to move away from turbulence generated by the environment or by members of the system. The retreat is an attempt to buffer the group or individuals from this turbulence and thus maintain a state of equilibrium.

Working close to the system boundaries refers to acting in such a way that the internal or external turbulence is allowed to influence the structure of the system. The first generation systems analysts attempted to build buffers into the system so that the members of the system could retreat from the system boundaries in order to give them the time and space to rationally plan a course of action. The dissipative systems model has reversed this trend. From this new understanding of systems, the goal is no longer to withdraw, but to achieve more direct and realistic contact at the system boundaries.

The actions indicated by a self-organizing model may seem counterintuitive (Smith & Gemmill, 1991; Leifer, 1989). The tendency in an organization is to resist turbulence in order to maintain a state of equilibrium. The role of a dissipative structure, beyond a certain state of disequilibrium, however, is to open itself to the turbulence and allow the turbulence to affect its transformation. Remaining close to its environmental boundaries opens a system to the fluctuations in the environment.

The systems within the system must also remain close to their environmental boundaries. In a group this would mean maintaining information flow through dialogue and not retreating from controversial issues. In social groups, equilibrium is maintained through the group's shared paradigm and the social defences that maintain it (Smith & Gemmill, 1991). Social defences maintain equilibrium by minimizing the admission of disruptive information. When information is introduced that the paradigm doesn't accept, "rationalization, projection and scapegoating predominate" (Smith & Gemmill, 1991, p. 703). These defensive behaviours diminish the effectiveness of the group. Instead of "role enactment" the group as a whole, or members of the group participate in "role projection" (Smith & Gemmill, 1991). A group or individual "enacts" their role when they face the real work of the situation without distorting it. "On the other hand, when an individual or group fails to enact a role by not facing either the intellectual or emotional realities in evidence, the energy that should have gone toward role enactment is misdirected in such ways as projection, scapegoating or stereotyping" (Smith & Gemmill, 1991, p. 706). Role enactment requires continuous confrontation with the forces that drive a system toward equilibrium. Retreating from system boundaries, as in the case of role projection, temporarily protects individuals and groups from turbulence, but if the turbulence grows to a point beyond which it cannot be avoided, then the need for the system's transformation will be greater and more painful.

Hierarchy vs Heterarchy

In the B-Z reaction, as in any self-organizing system, no single component of the system controls or co-ordinates the self-organizing process. Self-organizing systems are characterized by *heterarchy*. Every part is of potentially the same importance. The current importance of each part is dependent on the relevance of the information that it can contribute to the system. This understanding of systems challenges the concept of a control hierarchy. Malik and Probst (1984) argue that social organizations are "self-changing, self-evolving and self-organizing systems that can be organized and guided only to a limited extent through conscious, planned intervention" (p. 108). They back their argument by pointing out that, from an evolutionary perspective, organizational behavior came about long before organizational management. Those organizations which operate as control hierarchies are limited because of their monocentric knowledge base, and because negative feedback control mechanisms dampen the potential for creative responses.

A heterarchy is more functionally efficient in a turbulent environment because of its polycentric control base. "A polycentric system is able to process much more information and to perform mutual adjustment of a larger number of relations than the other type of system" (Malik & Probst, 1986, p. 110). A centralized planner, on the other hand, does not have as much information about the system and cannot respond as quickly to changes. Spontaneous

orders make better use of the available information and allow desired regularities to develop (Probst, 1986).

An example of a self-organizing social system with a polycentric knowledge base is the free enterprise economy (Hayek 1967, cited in Ulrich, 1986). The total available knowledge in the economy is distributed throughout the system elements. Centrally controlling the economy cannot succeed because the individual controlling agencies do not have the necessary knowledge at their disposal. Ulrich (1984) argues that these principles apply to other lower order systems. He argues that "the conceptual and control measures need not be developed and prescribed by superior authority, but instead are to be developed and realized by those personally participating in the development process" (Ulrich, 1984, p. 87). Malik and Probst (1986) describe the benefits of heterarchy in a nonequilibrium environment:

If a system is to survive and be efficient in a complex environment which is constantly changing in unforeseeable ways, it is necessary constantly to adjust and adapt such a large number of factors that this can be carried out only by polycentric, self-organizing systems (p. 110).

Control Systems

Control systems utilize rules and management supervision to control worker behaviour. Both of these control mechanisms are better at restricting behaviour than promoting it. Malik and Probst (1986) distinguish between consciously made rules and those rules which emerge as a necessary

consequence of performing a task. The consciously planned rules are effective negative feedback mechanisms, but can hamper an organization's response to novel situations. Those rules which develop during the performance of a task are the more useful and adaptive regulators of behaviour. Consciously planned rules work best in areas where activity is safe or where its consequences and risks can be judged (Malik & Probst, 1986). They do not serve as a useful guide for activities which entail unknown risks and consequences.

The traditional view of a manager's role was built upon a belief that supervision determined what work was being done and how it was being done. But as Ulrich (1984) points out, in any workplace, "the work process itself rather than a superior determines the behavior of employees involved in the work" (p. 84). A self-organizing perspective implies a different understanding of management's role:

management must refrain from "activistic" intervention in the inner functionings of the firm and limit itself to cultivating favourable conditions and supporting, as a catalyst, the natural development of certain desirable results and qualities. Precisely an abstention from the pseudo-rational ordering of details gives us the possibility of attaining results which cannot be attained in any other way (Malik & Probst, 1984, p. 113).

Traditionally, managers installed negative feedback mechanisms, determined success criteria, set goals and made decisions. The management thinkers who have adopted the self-organizing perspective view the new role of managers as one of sense-making and minimal intervention to establish control. Malik (1986) writes:

A primary task of higher management is therefore of a conceptual nature, i.e., it entails the development and establishment of systemic patterns which at a future point in time will effect the desired behavior by the whole system to be controlled (p. 85).

Ulrich (1986) defines the new role as one of sense-making:

Management can now be understood as a sense-making process through which human meaning is imparted to circumstances and events. In this light, the controlling function consists above all in assessing existing or expected circumstances, rating them as either "good" or "bad" and deriving therefore the desired actions that would lead to a "good" state of affairs (p. 89).

But is it necessary to have management with a controlling function? It seems

that Malik and Ulrich have redefined the role of management to more

efficiently exercise control given the new understanding of systems. I would question, however, whether there is a need for control. If systems, including social systems are truly self-organizing, then they should be self-managing.

Von Foerster (1986) states that from a self-organizing perspective, "every worker must be a manager" (p.10). The organization's vision that emerges from a common sense-making exercise should guide the actions and direction of the organization, and the norms which emerge through the enactment of the vision should be the rules of the organization. The other role for managers would be to assist in the continuous long-range development of the entire system (Ulrich, 1986). This is a function which can be forgotten if all teams and team members are extremely busy with the tasks at hand.

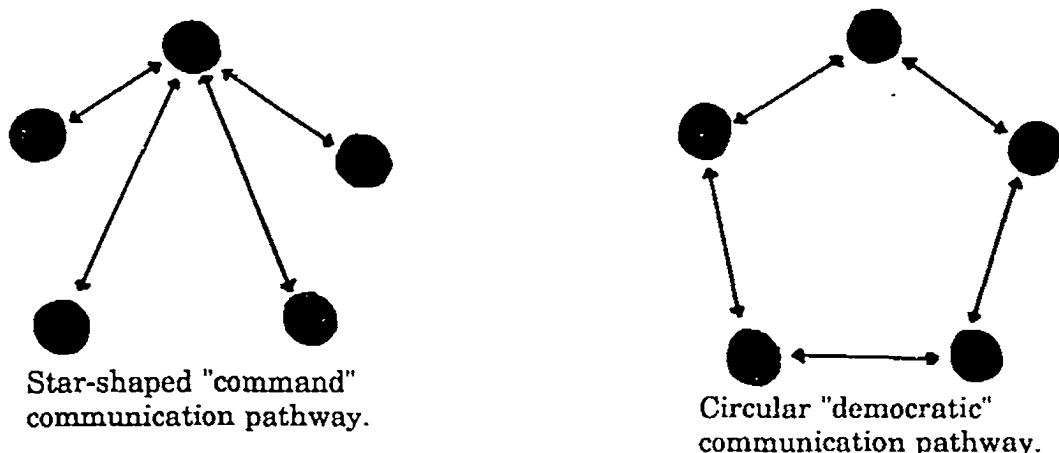
Small Groups

The self-organizing perspective indicates that the best building block for social systems are small groups which present opportunities for direct communication (Ulrich, 1986). Larger organizations would consist of numerous teams, which "together would constitute a hierarchical, interlinked ad hoc structure incorporating numerous feed-back loops" (Ulrich, 1986).

Proof

Are social systems which embody the principles of self-organization more effective? Although the application of these principles is quite new, preliminary research seems to indicate that in turbulent situations, self-organizing systems are more effective in meeting their goals than control hierarchies. Alex Bavelas of MIT designed a study which tested the effectiveness of information processing in "democratic" and "command" structures (von Foerster, 1986). For the experiment, five people were placed in isolation booths from which they could only communicate with others by messages passed through tubes. The five were asked to solve a problem for which each of them had part of the solution. The communication tubes were configured into a circular "democratic" and a star-shaped "command" structure.

FIGURE 3 Communication Pathways in the MIT Experiment



In a problem in which the parts of the solution were easy to describe (representing a noiseless, nonturbulent, environment), the command group finished more quickly, but the members felt their group to be slow and inefficient, for which they blamed some "idiot" in the system. Ninety-four percent of the participants identified the person at the apex of the star as the leader. The members of the democratic group, while slower, felt that they performed quickly and efficiently. They stated that leadership was distributed among all five members of the group.

For problems in which the parts of the solution were not easy to describe and demanded the creation of new terms (representing a noisy, turbulent, environment), the democratic group worked as well as in the first case, although slightly slower. The command group, however, disintegrated. Members became angry with each other and stormed out of the experiment.

This experiment shows the effectiveness of polycentric decision making processes in groups that are working in turbulent conditions. It also shows the

efficiency of control structures in non-turbulent situations which do not require novel responses. The control structure is functional, but its inflexibility causes it to break when too much pressure is applied.

Further evidence for the effectiveness of social groups which embody self-organizing principles is found in a recent experiment by Smith and Comer (1994). The experiment, conducted with seminar groups of graduate students, tested the proposition that task effectiveness should increase to the degree that a group in turbulent conditions possesses self-organizing features. Symmetry breaking, experimenting behaviour, self reference and resonance were the four self-organizing properties that were measured. In a Tavistock-like intervention, a consultant observed experimental groups and intervened by helping the group to surface basic assumptions and identifying defensive behaviour. These interventions kept the group operating close to their boundaries and thus maintained a state of disequilibrium. Task effectiveness in the test groups correlated significantly with the degree to which groups developed the properties and features of the self-organizing paradigm.

Among the dynamics observed in the group were what Hirschorn has termed "normal psychological injuries" (cited in Smith & Comer, 1994). These are injuries that arise from people facing conflicting views, competition for resources, and great complexity and paradox in work situations. Hirschorn (1988) suggests that what is needed to develop mutuality in a group is "some

way of continually repairing and healing the relationships within the group" (Smith & Comer, 1994, p. 559).

The MIT and the Smith and Comer studies verify the application of self-organizing principles to social systems. The Smith and Comer study showed that the self-organizing features of "experimentation, symmetry breaking, self-reference and resonance made a significant difference in the effective functioning of the research groups, and, consistent with the logic of self-organization, were not so important within the more placid conditions" (p. 576). The MIT study shows that democratic information processing is more effective than control systems in turbulent environments.

Conclusion

The principles derived from the theory of dissipative self-organization can illuminate many aspects of social organizations. With these principles in mind, it becomes apparent that the application of earlier organizational theories in some ways hampered the effectiveness of the organization. The close control mechanisms of scientific management, for example, are only effective in a non-turbulent environment. In turbulent environments, these control mechanisms hinder the development of creative responses to changing circumstances. The buffers built into organizations by General Systems Theory analysts also hindered creative responses by widening the boundaries between the system and its environment.

The actions indicated by the dissipative self-organization model contrast strongly with these earlier organizational theories. In our current turbulent economic environment the self-organizing perspective indicates that organizations should work close to system boundaries, experiment with a variety of responses, align the organization with deep structures, and work toward mutuality to achieve resonance. Dissipative self-organization makes a clear argument in favour of heterarchy over control hierarchies. In the distribution of power, the flow of resources, and information flow, dissipative self-organization indicates that heterarchy is more effective in turbulent environments than hierarchy.

The theory of dissipative self-organization also calls into question our unremitting faith in rational planning. Spontaneous orders can deal with greater complexity than planned ones. The more complex the system, the more dependent we are on its self-organizing forces. It shows that we cannot possibly control the actions of a group of people and hope to mimic the effectiveness that would occur if we allowed them to define their own actions. The theory of dissipative self-organization tells us what the social sciences have also discovered: people need the freedom to self-organize in order to achieve their goals.

There is a limit to this freedom, however. Groups need to be facilitated as well. The facilitation can come from a common vision. Coming up with that common vision is a process that may need facilitation. But once that vision is

set, a group of committed individuals needs the freedom to decide how to organize themselves. Their efforts will only be hampered by the attempt of someone to direct and control them.

One weekend I joined a group of friends on a canoe trip on the French River. There were 12 of us in six canoes. Because the blackflies were bad on shore, we would join our canoes in the middle of the river, snack, talk, rest, then set out again. Throughout the weekend the group chose lunch sites, campsites, rest spots with brief discussion. No one led and no one followed, instead, everyone would adopt different roles as the need arose and their skills allowed. At one point where the River was about a kilometre wide, I looked across the water at the other canoes. Each of the canoes was evenly spaced, and all 12 of us were paddling in sync. Without consciously intending to do so, we had created and were a part of a complex formation.

Personal Journal

Introduction

By embracing the value of equality in the workplace, members of collectives have unintentionally created self-organizing systems. Through consensus decision making, an egalitarian division of labour and by building a sense of community, collective organizations create a heterarchy with a polycentric information base which is the prerequisite for dissipative self-organization. It is not that only collectives are self-organizing. All organizations are somewhat self-organizing. Collectives, however, are organizations with a greater degree of freedom to allow self-organizing processes to occur.

Operating in an evolutionary spirit, modelling our organizations on natural systems should make them more effective. Collectives prove this through the growth experiences and commitment of members, the empowerment of clients and the innovative programs. But they haven't attained the efficiency or dominance of capitally owned organizations. Why?

The self-organizing perspective suggests that collectives, or any organization in a turbulent environment, will function most effectively to the degree that they operate as a dissipative structure. The validity of this premise is borne out in studies such as Smith and Comer (1994) and Leifer (1989). Collectives may experience problems where they are not truly self-organizing, where hierarchically trained members or hierarchically structured institutions interfere with the self-organizing processes of the collective.

In this chapter I will analyze collectives as self-organizing systems. The focus will be on the four components of self-organizing social systems: openness, experimenting, self-reference and resonance. This perspective offers many new insights into collective structure and suggests that collectives, which dwindled in numbers in the 1980s, may be a relevant form of organization for the 1990s.

1. Symmetry Breaking

Collectives are well-suited to symmetry breaking, the process in which a system abandons its old dynamic order and develops a new one. Collectives foster an atmosphere of openness to change. Their flexible structures prepare members to decommit themselves from existing processes and values, and build a healthy suspicion of implanted structures - essential elements in an organization built on the dissipative model. Leifer (1989) describes this characteristic of self-organizing systems:

One of the characteristics of dissipative systems involves cultivating enthusiasm for improvisation and minimal constraints, which prepare and indoctrinate people for easy, low resistance response to trigger events (p. 907).

Symmetry breaking in a collective is less traumatic than in a bureaucracy because the members often possess a "transitional perspective" (Rothschild-Whitt, 1979). Collectives which open niches in social work often accomplish their task, then have the work taken over by mainstream organizations. From the self-organizing perspective, the dissolution of a single collective should not necessarily be viewed as a failure. The collective system can be thriving even if some collectives are disbanding. The self-organizing perspective trains us to look at the dynamic systems, not the fixed structures. Individuals can come together for a project, complete it, disband, then create a new formation for a new project. If the individuals remain committed to the collective ideals through these transitions, then the collective system is still thriving. If, however, these members are co-opted back into capitally owned businesses,

then the collective system is diminished. The willingness to let go of old projects and structures that are no longer viable, however, is one of the strengths of collectives.

2. Experimenting

In order to work well, collectives must be able to generate a variety of responses to internal and external turbulence. Collectives are particularly well-suited to this type of experimenting behaviour. Collectives have been wrestling with greater uncertainty and complexity than control hierarchies since their inception in the 1960s. They have incorporated creative solution finding techniques by opening the decision-making process to all members. The heterarchical structure allows members more freedom for experimental behavior because they can set their own boundaries and do not have to work within the boundaries established by an authority. This freedom means that any member at any time has the right to express an idea and to have the idea considered by the collective. The heterarchy in this way helps to keep the system in a nonequilibrium state.

Working from a self-organizing perspective (what Jantsch (1980) describes as "planning in an evolutionary spirit") means that an organization does not focus in on itself, but deliberately sets its sights on the complexity beyond its own boundaries:

Planning in an evolutionary spirit does not result in the reduction of uncertainty and complexity, but in their increase. Uncertainty

increases because the spectrum of options is deliberately widened; imagination comes into play. Complexity increases because the immediate domain of the organization in question, or the individual, is transcended and relations within the larger system of society, culture, or the world at large move into the foreground (Jantsch, 1980, p. 267).

Because they are social movement organizations, collectives have a wider domain of interest and must cope with a greater deal of complexity than other organizations. Collectives are not just small isolated organizations, but are part of their social movement's network.

Control hierarchies, on the other hand, of necessity reduce novelty throughout the system and slow evolutionary change. The highest levels of an organization, which should be most open to novelty, are, in a control hierarchy, the most conservative:

There is a decrease in the frequency of innovation, of the "creative vibrations" as we climb the levels of a sociocultural hierarchy. But this is precisely the precondition for the establishment of a control hierarchy, which can operate only if the controlling levels oscillate in lower frequencies than the controlled levels. With the oscillation of the higher levels of innovation and novelty a control hierarchy seems even inevitable. It's the urge to power as well as the lack of understanding of the dynamics of living systems which leads to the curtailment of evolutionary forces not only in the dictatorships of the East, but also in the enlightened democracies of the West.

(Jantsch, 1980, p. 249)

There are, however, several forces within collectives that push them toward equilibrium. One of these is the small staff. With such a small number of people, it is easy for the staff to fall into established patterns of behavior that can become quite rigid and resistant to change. Some collectives have

recognized the need to continually renew the organization (in self-organizing terms, maintain nonequilibrium) and have implemented staff rotation policies. A Vancouver rape crisis centre originally allowed members to stay within the collective for only two years (Ridington, 1982). Alternative schools have also recognized the need to bring in new staff members every few years to rejuvenate the school (Levin, 1992). The new staff shake up the equilibrium by bringing new energy and ideas to the group. The new members challenge assumptions and change the group's expectations.

Without new staff maintaining the nonequilibrium, collectives can tend to fizzle unless there is some other source of fluctuations. One other source can be developments in the larger social movement to which the collective belongs. The movement, whether it is the collective movement itself, or the feminist movement to which feminist collectives belong, generates new critical analysis, ideas and directions that challenge the individual collectives to continue to evolve. Members of the Cheeseboard, for example, were often involved in establishing new collectives in other fields of work. This work of the members provided new energy and ideas for the core group. "It's not just about cutting cheese," stated one member (Zwerdling, 1980, p. 102). The need for new staff and for new ideas highlights the need for collectives to be part of a larger social movement. Collectives need a sympathetic labour pool from which to draw new members, and an evolving movement from which to draw new ideas.

One problem faced by collectives is that they tend to attract only members from the middle class, and so they may not have the requisite variety necessary to create truly dynamic organizations. People from the middle and wealthier classes have the wealth of their families to fall back on should the collective fail. Most working poor people, however, tend to look for the security of a "job". Brown (1992) describes the case of one company owner who decided to sell his company to the workers. The managers readily bought into the company, but the unionized tradespeople preferred to retain their employee status and did not buy in.

Some collectives have also had trouble attracting members with entrepreneurial skills and experience. Collectives often attract people from liberal arts backgrounds with similar social change aspirations. Zwerdling (1980) cites the case of a collective that ultimately failed because none of the members had the business background to make the venture work. Achieving the requisite variety in their members is a great challenge for many collectives.

3. Self Reference

Self reference refers to the concept that a system remains aligned with its deep structure even in periods of radical change. Deep structure is a relatively new and little understood concept. The deep structure of a social system is its evolutionary memory. Collective members have developed many approaches that allow their organizations to be self referencing on several

levels. In the areas of vision, rewards, job rotation and size, collective members have developed strategies that contrast sharply with traditional bureaucratic approaches and which keep the organizations aligned with their deep structures.

Organizational development theorists state that an organization should develop a vision and work with it in mind (Senge, 1990). This practice allows organizations to stay aligned with their deep structure. The "motherhood and apple pie" vision statements of many capitally-owned organizations are contradicted by the desires of the investor-owners, for whom the bottom line is fiscal, not value-based. Collectives avoid this hypocrisy. Most members make a financial sacrifice to work in collectives. The commitment to equality and to their social action agenda are the bottom lines for these members.

Reward and Punishment

One of the ways that our society trains us to be compliant is through reward and punishment strategies. Instead of receiving the natural consequences of our actions, be they positive or negative, our parents, teachers and employers take control of our actions by imposing these strategies. From a self-organizing perspective, reward and punishment strategies should not be necessary in social organizations. Rather than receiving the artificial rewards and punishments set out by a superior, members of a self-organizing system should experience the authentic reactions of the system to their actions. This

will allow them to gauge the system reaction, and from this determine their next actions. Reward and punishment schemes distort the authentic system reactions and can set in motion negative or positive feedback loops that are out of proportion with the reactions of the system.

Financial ownership overshadows the deep structure of an organization. The deep structure in a capitally owned organization is a control hierarchy. It requires reward and punishment strategies and other manipulative control measures. It doesn't matter how functional employees are being in the organization, what will determine their promotion along the career ladder is how functional they appear to their superiors. Capital ownership takes the responsibility for the survival of the organization out of the hands of the employees, and replaces this real world responsibility with game playing. Competition for rewards and fear of punishments within control hierarchies create unnatural competition within the system that can hinder its effectiveness. The employees aren't involved in role enactment, but role projection. They can't affect or benefit from the success of the organization. Even a successful organization could find them redundant and lay them off. They can only benefit from role projection to their superiors. In a capitally owned organization, the employees are serving an absentee landlord, who leaves them to play a corporate game.

Collectives replace the formal reward and punishment schemes of bureaucracies with informal consequence schemes. In collectives, there is no

corporate ladder to climb. Because everyone works as equals, the concept of promotion has no meaning. Pay, the main carrot and stick of bureaucracies, is equalized in collectives. Some collectives make pay a division of the collective's net income. Pay increases are then based on the overall success or failure of the organization, rather than on pleasing a superior.

It is difficult for collectives to attract people accustomed to the rewards and external discipline of control hierarchies.

In contrast to bureaucracies, in collectives there isn't much room for the recognition of individual accomplishments. Other than a pat on the back from fellow members, there is no career ladder or pay bonus to reward good work. This contrast between collectives and other organizations is one of the reasons that collectives do not have widespread appeal.

Job Rotation

Collectives have two methods of dividing work: job rotation and a pluralistic division of labour. Both of these pose interesting questions from the self-organizing perspective. Many collectives maintain a strict form of job rotation. All members must take turns doing all of the jobs. Collective members use job rotation to break down artificial monopolies on information that are the source of power for professionals. Job rotation also creates a type of polycentric distribution of information, which is an essential element of self-organizing systems.

Job rotation introduces equality of contributions by members: everyone does every job, so every individual's contribution is the same. The ideal of job rotation, however, presents many practical difficulties. Except in collectives in which all of the jobs are relatively easy to learn, job rotation can prevent the members from finding the work where they can make their greatest contribution. A strict adherence to job rotation means that collectives sometimes lose hard-working, committed individuals who do not want to, or cannot perform all of the tasks of the collective. One photographer for a small collectively run newspaper, for example, left the organization because she wanted to continue to develop her photographic skills, and was not interested in learning other aspects of the organization (Rothschild, 1986, p. 71). Job rotation can also put members in positions where their weaknesses are emphasized. Some members of the Jane Abortion Clinic, who were committed to the movement but who could not, or would not perform competent abortions, left the clinic (Schlesinger & Bart, 1982).

A strict adherence to job rotation is one area in which the actions of collectives contradict self-organizing principles. Strict job rotation means that there is no room for excellence in collectives. Jantsch (1980) writes:

Protection of all that is weak corresponds to the ethics of a self-reflexive society. But it is often misunderstood and misapplied in the sense of "homogenistic" equalization which slows down creative dynamics; i.e. concern for the weaker students rather than the 1% setting out to test the eternal verities (p. 261).

An Einstein could not flourish in a collective with job rotation. In strictly adhering to job rotation, collectives mistake equality with sameness. Full equality, which would mean sameness along all parameters, is not possible between human beings. Collectives should decide along which parameters they will pursue their goal of equality. Equal value of member contributions and equal protection of rights is possible without job rotation.

A pluralistic division of labour, in which people hold different jobs, but each job is essential to the functioning of the collective, is more in keeping with the self-organizing perspective. In a self-organizing system, the components of the system differentiate their functions. Information is distributed throughout the system, but each component does not have the same information. Self-organizing systems are heterarchical in power, but differential in function. Collectives with a pluralistic division of labour allow members to fulfill the collective functions according to their abilities. From a self-organizing perspective, organizations need the freedom that allows members to align their work according to their strengths and interests. So that each member's contribution is valued equally, each job must be essential to the functioning of the collective.

Size

Collectives have settled into an ideal size structure of between five and fifteen members. This coincides with the group size suggested by Probst (1984) using a self-organizing perspective. At least five members are needed to achieve the requisite variety necessary for the experimenting component of collectives. More than fifteen members makes consensus decision making unworkable (Mansbridge, 1973). The small size of collectives allows flexibility in their responses to environmental turbulence and frees them to make fast, accurate, innovative responses to new situations (Mansbridge, 1973).

Rule Use

Members of collectives make a conscious attempt to minimize rule use and to discuss decisions on the level of principles (Rothschild-Whitt, 1979). For the most part, the rules of the organization are those that emerge from the collective's tasks. This view coincides with the self-organizing perspective. Rules are negative feedback mechanisms that at times impede the effective functioning of a system. In a turbulent environment, rules can dampen the novel responses that must be created for a system to adapt to changing circumstances.

4. Resonance

Resonance in social systems occurs on two levels, in the relations among members of the group and in the relations between the group and other groups and systems. Each of these systems and subsystems generates its own dynamic variables. But this complex view: "does not lead to chaos, just as the joining of marked individualists in a dynamic, motivated society does not necessarily lead to chaos. Resonances and synchronizations occur in quite natural ways" (Jantsch, 1980, p. 246). The goal, then, in collectives or any self-organizing form of organization is to find the means to allow these resonances and synchronizations to occur, and to get them back on track when they are thrown off.

Internal Resonances

Collectives nurture a sense of community among members by taking time for social interaction outside of the normal work hours. The sense of community helps the collective achieve internal resonance. With strong relationships in place, members of collectives are able to bear the normal psychological injuries of working in a group. In collectives where strong relationships have been developed, members do not have to retreat from system boundaries. Members can interact with each other without slipping into role projection. At the Cheeseboard, where members have strong

friendships, conflict between members is not seen as a destructive, but as a strengthening force (Jackall, 1984).

The internal functioning of a collective, however, can also lead to burnout or destructive conflict. The self-organizing perspective suggests several reasons for these systemic problems including entropy buildup, the lack of buffer zones and the lack of negative feedback mechanisms.

Entropy Buildup

Working in a nonequilibrium organization such as a collective seems to require a great deal more energy than working in systems that are closer to equilibrium. By analogy to a dissipative structure, there would be a need in collectives to tap off the buildup of unusable energy (entropy). It is the buildup of entropy in the system that causes burnout and conflict. Bureaucratic structures usually function closer to equilibrium and require less energy input. Employees often have nine-to-five jobs that they can leave behind them at the workplace. The buildup of entropy, therefore, is not as great. In a collective, however, every worker is an owner and, therefore, every worker feels the pressure that an independent owner feels. They are responsible for keeping the organization viable.

Case study reports seem to suggest that product-oriented collectives - those with publishing and other tasks with concrete products and deadlines - fare better than process-oriented collectives - those delivering social services

and other tasks with neither a concrete product nor a deadline. For example, one free school (education being considered as a process-oriented task) went through three incarnations in its first two years of operation because of conflict (Lindenfeld, 1982). By contrast, the members of Women magazine, with a product-oriented task, report that "the Journal was not infected with the worst kinds of power struggles, competition and envy that could have erupted under such circumstances" (Blanchard, 1992, p. 95). Members of a collective with a product-oriented task to perform cannot let interpersonal conflicts get too large because there is work to be done. In this way, the work dissipates the unusable energy (entropy) of destructive conflict.

Buffer Zones

Whether collectives are performing a process- or product-oriented task, interpersonal conflict seems to occur more often, or more destructively in collectives than in other forms of organization. Members of collectives blame individuals for conflicts. "Members generally attribute conflict to the stubborn, wrongheaded or otherwise faulty character of others" (Rothschild-Whitt, 1979, p. 66). Bureaucracies with clearly defined roles and jobs are designed to easily tabulate who is to praise or blame for a project. Accountability at each level is built into the system - so if something goes wrong, it's easy to determine who to blame. This trend for individual blaming, however, cannot work in a collective. Members of collectives need to be trained to look at the pressures on

each individual. To reduce conflict, collectives should train members in systems thinking.

Because of its prevalence, Rothschild-Whitt (1979) maintains that conflict is a structurally induced, inherent cost of participatory democracy. She cites both the principle of consensual decision making, which means that conflicting opinions must be taken into account even if they are held by only one member, and the practice of face-to-face decision making which personalizes the conflict, as two factors that exacerbate conflict. Because everyone holds equal status in a collective, the distinctions of rank, profession and title that depersonalize relationships in most organizations are not in place. Personalizing rather than professionalising relationships develops the sense of community among workers, but it can lead to problems (Mansbridge, 1973, p. 126). Because of the strong sense of community, conflicts must be dealt with carefully, so they do not seem like personal challenges.

Negative Feedback Mechanisms

The self-organizing perspective suggests another reason that conflict in collectives can become so destructive. Collectives don't have many negative feedback mechanisms. In a collective an interpersonal conflict can form a positive feedback loop that can destroy the system. Control hierarchies, on the other hand, use their reward and punishment schemes, and the intimidation of the control hierarchy to suppress potentially destructive conflict.

External Resonances

Smith and Comer's (1994) study may explain why collectives were most successful in the 1970s. Their proposition is that self-organizing features are related to group effectiveness only in nonequilibrium or near-chaos conditions. The self-organizing features of collectives, therefore, would only make them successful organizations when they are part of a social movement, or when they are part of a process of sweeping social change. Without the energy input from the collective network, and of a society in a state of transformation, there may not be enough energy to maintain individual collectives. The exception in the 1980s has been the feminist collectives, which received their energy, not so much from being part of a social transformation, as from being part of the feminist movement. This recent history suggests that collectives require a sizable social action movement to provide the energy to survive.

One way in which being part of a larger movement fuels the growth of collectives, is that the larger movement gives members the sense that their work is more important than their daily tasks. One member of the Cheeseboard (Schlesinger & Bart, 1982) found fulfillment in her daily tasks because she thought her work to be part of a larger social transformation. Working at the Cheeseboard was "more than just cutting cheese," she stated (Zwerdling, 1980, p.102). The experience of collectives, thriving in a turbulent environment, has gained a new relevance in the 1990s as capitally owned

organizations look to self-organizing principles to guide them in the turbulent marketplace.

Boundaries

In order to maintain a state of nonequilibrium, to encourage openness to symmetry breaking and experimenting, to keep aligned with deep structure, and to achieve internal and external resonance, collectives must operate close to their boundaries. Within a collective, the members must develop the skills to maintain open communication, and not to shy away when conflicts of ideas arise. Collectives must also retain strong ties with other collectives in order for the movement to thrive.

This belief in working close to boundaries is an acknowledgement that meaning is a social construct. The self-organizing paradigm shows that meaning is a negotiated outcome of a group. Consciousness and understanding emerge out of circular interlinked processes as a whole, they are not the result of linear causal chains (Dachler, 1986).

In self-organizing groups, one member does not analyze the group's situation and plan a course of action. Instead, the analysis is done jointly, and the understanding which results is held by all members of the group. Planning is also done jointly, so that the strategies that emerge are owned jointly by all members.

Thus design, control and development of collectivities does not have a monocentric origin, nor do the components of collective

meaning, such as common goals, strategies and collectively articulated actions have their origins at some powerful center. Instead these are polycentric, complexly interconnected processes involving the simultaneous intertwining of the perceptual sense-making cycles of many actors throughout the relational network (Dachler, 1986, p. 140).

The analysis and planning done by powerful individuals within bureaucracies is not as effective as that done jointly by groups in other organizations.

Analysis done by individuals lacks the depth of what could be achieved jointly. Because the understanding which emerges from individual analysis is not shared by those who must implement the plans, those doing the implementation resist the tasks assigned to them.

Collectives allow members to take part in both analysis and planning of group situations through consensus decision making. In order to create the most effective group, all members must be part of the meaning making process. By taking part in the consensus process, all members share ownership in the meaning that arises. This creates a greater commitment to decisions, not merely because they get to have their voices heard, but because they are part of the self-organizing process of making meaning.

Consensus decision making in collectives gives them an advantage over not only bureaucracies, but also over other co-operatives. Majoritarian democracy, which is practised in co-operatives, has at least two features which do not correspond to the self-organizing perspective (Jantsch, 1980). The rule by majority negates the role of creative fluctuations. Novel ideas introduced by a single member or a minority do not have to be fully considered. Consensus

decision making means, however, that organizations must discuss ideas, even if they are held only by a single member, until the group arrives at consensus.

Majoritarian democracy is also a process of bargaining in small steps. Periodic elections result in one step forward, two steps back, and therefore in the rigidification of structures. Consensus decision making, on the other hand, gets everyone who will be affected by the decision involved in making the decision.

With consensual decision-making, authority and responsibility are distributed throughout the organization. This distribution creates the heterarchy with a polycentric information base that is essential to a dissipative self-organizing system. In practice, consensus decision making requires that all members have the level of responsibility and self-discipline that is necessary to enact decisions. Conflict can erupt if some members are not up to this demand (Santa Barbara, 1982). Conflict may also erupt if responsibility is not commensurate with decision making power. Curbside School (Glover, 1994) ran into problems on this issue because the staff were making decisions that put the "manager" in a difficult predicament with funders and other social organizations. The staff members who created the problem did not have to deal with the funders. The staff members were buffered from the consequences of their actions. A different arrangement of roles would have forced the staff to operate more closely with the organization's boundaries.

Some of the difficulties that collectives have to cope with result from face-to-face meetings. The social pressure involved in these meetings can cause members to avoid potentially divisive issues (Mansbridge, 1982). From a self-organizing perspective, this avoidance represents a retreat from boundaries. Because the issue is not addressed, the tension it creates can build. In an organization functioning far-from-equilibrium, the destructiveness of this tension is magnified. One of the most acute causes of conflict in collectives arises when a member is not working out, and the other members need to fire him or her. At the Jane Abortion Clinic, rather than firing someone, members would just socially ostracize the person until they got the message and quit. Not addressing this situation directly increases the tension for everyone, and makes the dispute more destructive than it need be.

As well as the regular meetings on the functioning of the organization, many collectives have formal "criticism" meetings, which help members to function close to boundaries. At these meetings, members express considered and constructive criticism of themselves and of each other. The meetings help members support each other "in their individual struggles to overcome personal ties to elitism, sexism and professionalism" (Santa Barbara Legal Collective, 1982, p. 249). The meetings can also diffuse the build up of tensions that can result from not voicing concerns. The Santa Barbara Legal Collective (1982) follows these guidelines for their "criticism meetings": be gentle rather than abrasive, reflect on the criticism before making it, avoid personal attacks, make

criticisms in the situation rather than letting problems go unresolved. These meetings also reduce the inequalities of influence and check the potential abuse of power. Rothschild (1986) states that "the build up of destructive hostility and the growth of unequal influence may occur more readily in groups without a formal and sanctioned process of criticism" (p. 86).

External Boundaries

Collectives offer members greater freedom than bureaucracies, but do not buffer members from environmental turbulence. Bureaucracies insulate employees from environmental turbulence. We have a tendency to follow leaders in order to receive this insulation; with a leader we don't have to think, or make decisions for ourselves, and we are somewhat sheltered from the vagaries of the marketplace. In collectives no one is buffered, hence the greater tension. Not just one, but all members are responsible for the ongoing survival of the organization.

Collective members, however, can fall into the trap of ignoring fluctuations from their environment when these fluctuations contradict their philosophical aspirations. In the past, members have created collectives, not because of their practical efficiency, but because the collective system embodies the ideals that they wish to promulgate through their work. The danger in collectives is that the ideals can blind members to the practical realities of the environment in which they are functioning. For example, one member of a

collective foodstore complained that customers were selectively shopping for bargains in the store (Zwerdling, 1980). The goal of the store was to provide safe, environmentally friendly food products without profit. The store was competing with large grocery chains which can buy in bulk and can afford to attract customers with loss leaders. The member's complaint indicates the existence of a buffer zone between himself and the store's customers. The member worked in the store because of his political commitment to its objectives, and was upset that many of the customers did not share this political commitment. The member needed to communicate with the customers to find out what their needs were, and to explain his philosophy of the store.

Conclusion

The self-organizing paradigm furnishes us with many systems principles with which to deepen our understanding of collectives. From the self-organizing perspective, collectives appear as nearly ideal workplaces. Their commitment to equality provides them with a polycentric power and information base that is one of the defining elements of a self-organizing system. Collectives also possess qualities that coincide with the four components of self-organizing systems: 1) Their social change agenda encompasses a healthy suspicion of implanted structures and gives members a "transitional perspective" which suits collectives for symmetry breaking. 2) Without a control hierarchy, members are free to suggest and pursue their

ideas, which provide the organization with the experimenting component of self-organizing systems. 3) Their avoidance of reward and punishment strategies and their choice to make decisions based on principles rather than rules keeps them aligned with their deep structure. 4) By nurturing a sense of community, collectives allow internal and external resonances to occur.

Collectives also function close to system boundaries because of their commitment to nurturing a sense of community and because of their reward system.

Through their freedom, collectives have created organizational structures that are far more complex and therefore resilient to turbulence than consciously planned control hierarchies. This complexity is most evident in one member's description of the functioning of Curbside School:

There was a formless structure, a seamless structure. It wasn't you go here now, you go here. It was all flowing and moving at the same time. It was really nice to be part of sometimes, this well-oiled machine that probably looked like hell on wheels (Glover, 1994, p. 15).

With the self-organizing perspective, this quote takes on layers of new meaning. The member is describing a fully functioning complex team structure that could never have been planned and implemented by a controlling authority. The complexity of the structure allowed the school to deal with the complexity of the environment in which they were working.

From the self-organizing perspective, the failings of collectives appear in practices which breech self-organizing principles. The strict adherence to job

rotation in some collectives reduces the ability of members to master skills in one area of the collective. Operating close to system boundaries is very difficult without training and practice. Members sometimes shy away from face-to-face conflicts, thus allowing entropy to build up and potentially destroy the organization. Collective members also occasionally allow their idealism to buffer them from real contact at system boundaries.

These failings suggest several areas in which the collective system could be modified. Adopting a pluralistic division of labour over a strict practice of job rotation would allow members of collectives to develop excellence in the areas where their interests and skills lie. Collective members should also face the practical realities of the environment in which they are operating. The prevalence of conflict in collectives also suggests the need for communication skills training to assist members in the transition from working in control hierarchies, to working in egalitarian organizations.

The self-organizing paradigm also suggests reasons for the successes and failures of the collective movement as a whole. In order for self-organizing components to offer an advantage to an organization, the organization must be operating in a turbulent environment. Collectives thrived in the social upheaval of the 1960s and 1970s. But their growth was dampened in the 1980s as social equilibrium was re-established. Only the feminist collectives thrived through the 1980s because their movement was still strong.

The collective experience is taking on a new relevance in the 1990s. In our turbulent economic environment, mainstream organizations are looking for guidance from self-organizing principles. Many organizations are adopting project team structures to provide them with the innovation and effectiveness to survive in a highly unpredictable environment. Other organizations are moving through periods of worker ownership to provide them with the flexibility to stave off bankruptcy caused by poor hierarchical planning.

The self-organizing paradigm suggests that the value of equality, and the commitment to community, consensus and job plurality that were originally embraced by collective members twenty-five years ago are not only values to be pursued for their humanitarian import, but they are also values to be pursued because they represent the most effective way to operate an organization.

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