

Open Systems Theory

Implications for Development and Learning

Merrelyn Emery

Fred Emery Institute, Melbourne, Australia

This chapter is written from the perspective of Open Systems Theory (OST) as it has developed from the early work of Fred Emery, Eric Trist, and their colleagues. The three-volume anthology of the Tavistock Institute gives some flavour of OST (Trist & Murray, 1990, 1993; Trist et al., 1997). The reasons for my preference for this conceptual framework will become obvious below. Choice of framework has momentous implications for the management of change, particularly the psychological aspects of it, as no less than the very definition of a human being and human behaviour is at stake in this field. Once we understand that this most basic level of consideration is involved, the choices presented by such matters as diagnosing organizational problems and addressing them become very stark indeed.

I argue here that the major reason for the high failure rate of change processes in organizations, as well as communities and other entities, lies not with the particulars of the methods and tools themselves but much deeper in social science. I believe it lies in the general failure of social science to come to grips with people and human behaviour. As the conceptualizations of people are inadequate, so too are the means devised from the conceptual base.

I would argue that concepts and conceptual frameworks are also tools. Assumptions also are essential tools as they provide the necessary economy we must all employ when we consider the diverse range of human behaviours. Assumptions underlie the choice of conceptual framework and the methods that flow from that choice. But today's social science landscape lies strewn with mutually exclusive assumptions and the tools they spawn. What is the basis for such opposing assumptions? Basically everything we use in social science is a means to an end, which raises the interesting question of how people are defining the end(s). Most method designers, hopefully, would aim for a conceptually based, orderly arrangement of meaningful steps to achieve their main aim.

In this chapter I will use the term 'social science' to cover all conceptual and applied work although I am aware that many practitioners do not see themselves as 'social scientists'. Perhaps they should? Science, including social science, is itself a process, something that human beings do (Chein, 1972: 304). As we have argued from Charles Peirce's concept of retroduction, everyone does research (Emery & Emery, 1997). Many who consider themselves part of the 'helping' professions could add to social science knowledge by realizing that their actions and effects can contribute to universal or general rather than merely particular or local knowledge (Gloster, 2000).

Social science has devised a range of methods and tools which claim to be tailor-made for the investigation of human and social issues and problems but this claim does not always stand up to scrutiny. 'Willy-nilly, in our conduct as scientists, we commit ourselves to philosophical, metaphysical, ontological, epistemological and axiological positions' (Chein, 1972: 301). As much as it would appear silly to adopt a philosophical or epistemological position without thinking about how it could be

operationalized or even if it would work in practice, it also appears silly to rush into practice without examining the system of ideas and assumptions which lie behind it. And yet, when one does attempt such a methodological analysis, it can become readily apparent that the assumptions made about human behaviour simply do not fit with anything observable about our species and its diverse behaviours. Yet our ‘first responsibility, one that transcends all others, is to our observables’ (ibid.: 8). Chein, like many before and after him, expressed disquiet that a field concerned with human behaviour and social systems such as organizations has produced so little of lasting relevance to its subject matter. Chein says ‘the failure must, then, become [an] occasion of searching self-examination’ (ibid.: 4). I will show that as many methods employ assumptions at odds with the observables, such self-examination must be pretty rare.

DIAGNOSING ORGANIZATIONAL PROBLEMS

Accurately diagnosing problems is of course the first step to solving them and it is here that the relationship of assumptions and observables can become acute. This applies no less to organizational problems than it does to the medical variety. Attempting to cure the wrong problem, or a problem that does not exist, can cause more trouble than accepting the status quo.

TWO SYSTEMS OF CONCEPTUAL TOOLS

Our tools derive from accumulating knowledge, but there are two streams of knowledge based on two views of the nature of reality. Within each stream many different schools of thought have waxed and waned over the centuries but each school within a stream bears greater resemblance to others within that stream than it does to those in the second stream. The streams may be characterized as ‘realism’ and ‘idealism’ (Mead, 1932).

The idealism stream runs through philosophers such as Kant to the physicist Newton, to social scientists such as Thorndike, Freud, Hull, and Lewin. Lewin occupies a unique place in this schema as the diverse nature of his huge contribution spawned two separate interpretations of his work: open human systems and the human relations movement (Trist, 1985; Emery, M., 2000a). Realism runs through the philosopher Leibnitz to the physicists Maxwell, Faraday, and Wigner who explored electrical fields, and then to the polymath philosopher Charles S. Peirce. In the modern era of social science proper there are many, some referenced herein, who have made significant contributions to realism. Table 2.1 shows that realism and idealism contain quite different assumptions that lead to very different processes.

TABLE 2.1 Assumptions from two systems of conceptual tools

From Material Universals—Realism	From Abstract Universals—Idealism
Reality exists	Reality is a social construct
Human and social systems are open	Human and social systems are closed
People directly extract meaningful knowledge of their environments	People cannot know their environments, they are <i>tabulae rasae</i> and must be taught
People actively and purposefully shape their environments, physical and social	People are passive recipients of environmental forces, both physical and social
The sufficient conditions of behaviour are in ‘system-in-environment’	The sufficient conditions of behaviour are within the organism or social unit
Units transact	Units interact
There are universal or species-wide laws governing human behaviour	There are no universal or species-wide laws governing human behaviour

Those employing material universals accept 'as real physical bodies and their activities; the other nontangible formal qualities and logical and mathematical truths' (Chein, 1972: 146). Human knowledge develops from the identification and classification of particulars and these competing views of reality identify entirely different types of taxonomies. Cassirer and Lewin define them as the 'class concept and the series concept' which are also described as phenotypical (superficial appearances or similarities) and genotypical or 'genetic' (Lewin, 1931: 10–11). These classes or laws are called 'universals' and there appear to be only two basic forms of universal, known as material and abstract. Material universals describe a material or real world (Feibleman, 1946: 451) and derive from particular dynamic events. Realism uses a language based on serial genetic constructs or functional entities that have testable relations with other entities, including context (Cassirer, 1923). This language is very different from the everyday usage of nouns to express the generic nature of things. Identifying things as nouns out of context involves us in circular arguments as properties such as extroverted behaviours define an 'extrovert' and the 'fact' that a person is an 'extrovert' explains the extroverted behaviours.

Choice of material or abstract universals for social scientists is more fraught than for others as people deliberately create novel phenomena. Do the sufficient conditions of this behaviour lie purely within the person or in the person-in-environment? Realists choose person-in-environment because they perceive people transacting and coevolving with their environments. They behave very differently from inanimate things and from animals without consciousness. Therefore, realists make the assumption that human systems have boundaries open to environments. If boundaries are permeable, people must be able to learn from their environments. Also, you can observe people learning from their environments.

[Realism] in all its forms, is the movement toward recovery of the sense of transaction. The schools of thinking based on self action and interaction assume that the sufficient conditions of behaviour are within the 'organism' or, in social determinism, in the (so-called) 'social organism'. With self action and interactionism the emphasis is on analysis: with transactionalism the emphasis is on synthesis. This is not the synthesis of metaphysics—it is [the synthesis of] systems. (Emery, F., undated)

Choice of realism leads to choice of unit as person- or system-in-environment in all their changing particulars. That choice yields an holistic social science. In the course of a day a person may behave quite differently in each setting in which they find themselves. A study of that person as a human being involves asking 'What is s/he doing, how and why?' It identifies what in a particular context has effects on that person and what changes in that person's behaviour can affect what changes in the context. Such a study identifies the universal in the particulars. Novelty or emergence is recognized as such and perceived to follow from transaction or coevolution.

Choice of an intra-individual or social unit taken context-free is handled by asking 'What is it?', 'What is its essence?' When the latter question is asked, problems of novelty or emergence can be handled only by reductionism or the postulation of other different entities. Hence we see the endless multiplication of specializations and taxonomies within social science and the search for smaller, determining units until we arrive at the absurdity of 'medieval genetic determinism' (Sapolsky, 2000: 12). 'The boundaries of genes are in fact no more clearly definable in the long term than those of individuals' (Rayner, 1997: 36). But we have lost the species as the subject matter long before we get to DNA. Specializations within social science have led us into innumerable varieties of people, in families, in management or worker roles, in sickness and in health.

Explaining novelty and human creativity is a critical choice point for material and abstract universals and, therefore, it is in social science that the choice becomes consequential for practice. The endless definitions of a 'human nature', a static generic concept, contrast starkly with Ackoff and Emery's (1972) serial genetic construct of a person as an open purposeful system, given in full below. These

people 'also use conversation as preparation for concerted action (de Laguna, 1927) with a huge range of skills, motives, and affects (Tomkins, 1962).

These people choose, change their minds and in all ways behave just like us. They appear to be an entirely different species from the impoverished creatures we tend to find in other varieties of social science. On the line of abstract universals we find people who are imprisoned within their skins or other static boundaries such as the life space (e.g. Lewin), who must be induced or taught to cooperate (e.g. the Human Relations school), who are passively subject to irresistible 'drives', instincts and forces (e.g. Freud), and those who, incapable of directly perceiving reality, are condemned to guessing it from reading their instrument panel (e.g. Maturana & Varela, 1980). We end up with two quite irreconcilable human portraits. (Emery, M., 2000b: 636-637)

Another of the implications of using abstract universals within social science is that specialization and fragmentation have led to the position where there is abrogation of responsibility for discovering laws governing human behaviour and, therefore, being able to identify species-specific behaviours. Gustavsen et al. (1996: 54) observed that the 1980s were a period of postmodernism that 'came to imply deconstruction and "downsizing" of many of the earlier efforts to create a "grand theory"—a theory identifying universal front lines in organization development'. This trend elevates cultural relativism to an art form and, in the process, loses opportunities inherent in, for example, the cross-cultural testing of concepts and methods. Everything becomes a discrete case study. 'The problems arising in organizations and workplaces share no essences. We see "family resemblances" in the good and bad points of organizations, but action research does not generate a theory of workplaces in general' (Toulmin, 1996: 214). Leaving aside the fact that 'essence' is a key concept in theories deriving from abstract universals, Toulmin's position is something more than a failure to see the wood for the trees. It virtually denies the possibility of the accretion of knowledge about organizations or people since because every organization is different, there can be only 'local theory'. This in turn leads to an educational failure since if there is no general species knowledge, then there is nothing of continuing value to pass on to others. It may also help account for a demarcation between those who see themselves as practitioners or 'facilitators' and those who class themselves as researchers. As we shall see below, while every organization is phenotypically different, they are certainly not genotypically different.

Each stream provides a system of internally consistent dimensions. An expression of one dimension of the set of transaction/interaction, open/closed, purposeful/not purposeful, and synthesis/analysis almost inevitably involves the author in the others (Emery, M., 2000b). They are systems of assumptions.

The two streams are captured by 'world hypotheses' which are systems of assumptions flowing from root metaphors, that is, they are hypotheses about how to approach the world. Contextualism assumes there is a whole changing over time, one that we can know by investigating a series of historic events within the changing context of the whole. It is the only world hypothesis that can deal with novelty and change (Pepper, 1942). The other three adequate hypotheses assume a closed and static system. The two most relevant today are 'mechanism', which assumes that everything is and works like a machine, and 'organicism', which is based on constant integration of data into wholes. Neither can encompass the notions of open purposeful systems, a social field or active adaptation. Mechanism assumes a closed, static mechanical universe inhabited by goal-seeking people (Ackoff & Emery, 1972) with fragmented sensory systems who are unable to extract meaningful information about their world. Organicism is currently manifesting itself as 'whole systems' (context-free). If we are dealing with organizational change, it becomes pretty obvious that only a conceptual framework that lies within the world hypothesis of contextualism will work.

But despite there being a reliable and known alternative, the allure of abstract universals remains strong within the social sciences. Bertalanffy's open system has spawned the burgeoning progeny of General Systems Theory (GST):

In 1965 Trist and I provided a conceptual framework whereby systems could be related to empirical testable environments instead of to the abstract undifferentiated environments of Bertalanffy and Prigogine. It became fashionable to make references to our Type IV, 'turbulent' environment'. Otherwise the conceptual framework could be said to have met no felt need amongst system theorists. Ackoff and I made an attempt to provide a common language, and a common goal of seeking to understand purposive systems (1972). This was ignored. (Emery, F., undated)

The GST offspring have become part of the problem rather than the solution because they are simply variations on the other three world hypotheses while pretending to be different. In this class we can include the current variants of complexity and chaos theories which De Paoli (2000) recognizes as mechanistic, empiricist, and positivist. *The Economist* (2001: 79) claims that these variants are showing a 'new-found humility' but that is not really the point. While they remain wedded to abstract universals, they may well continue to make 'a big noise but cast little light'.

To illustrate the differences between these two approaches in diagnosing organizational problems I shall take four common examples of presenting symptoms as defined by the organization. These are expressed as (1) variants of strategic plan failed; (2) lack of employee motivation which also includes failure of employees to accept responsibility; (3) communication problems which include a subclass of personality conflicts; and (4) error rates. All four are highly interrelated and are also related to productivity, flexibility, and organizational viability, and futures in general. Notions of people and organization are inseparable as there is a potential organization any time two people meet. Organizations are fundamentally sets of structured relationships between people pursuing some purposes. Definitions of a person and human behaviour are, therefore, crucial to organizational analyses.

DEFINITIONS OF PEOPLE AND HUMAN BEHAVIOUR

Following the historical material universal stream in Table 2.1, OST defines people as open, purposeful systems who 'can produce (1) the same functional type of outcome in different structural ways in the same structural environment and (2) can produce functionally different outcomes in the same and different structural environments'. They display will (Ackoff & Emery, 1972: 31). By constantly acting as active, responsible agents (Chein, 1972: 6), they change the environment. A belief that there is only passive adaptation, 'that life merely adapts to its environment' (Bond, 2000: 47), is not only conventional wisdom in the social sciences but also in science more generally. As Bond notes, this belief is changing. But not only do people constantly and purposefully change their physical environments, they actively and purposefully change their social field as they change their minds about what they value and why, and persuade others of their view. All this is directly observable and measurable (Emery & Emery, 1979; Alvarez & Emery, 2000).

The first basic premise underlying any purposeful behaviour is 'that things do exist and events do occur independently of our perceptions of them' (Chein, 1972: 51). If this first premise is rejected, the rejection itself does not exist, which leads to an absurdity. Using our criterion of everyday observation tells us that 'people live their lives in a real world and . . . their behavior never leaves the reality even when it most seems to be doing so' (ibid.: 145). This applies, for instance, when people are imagining and expecting events, characters and characteristics that are at the moment strictly unreal. 'Much of human endeavor . . . is concerned with controlling and shaping the future' (ibid.: 142) and organizational change involves a future referent. Chein continues the discussion by pointing out that the complete set of determinants of the future including organizational change includes what people will do as well as variables that exist within the bodies of individuals and within the environment. In other words, the outcomes are also a function of human motivation. For example, if an individual cannot envisage a particular, more desirable future state or specific set of outcomes, there will be little or no motivation to pursue that outcome. It will be classed as impossible and treated accordingly.

Methods that ignore purposefulness as the defining human characteristic are truly doomed to failure. The dismal track record of attempts at organizational change (see Introduction in this volume) is a testament to both our ingenuity at 'beating the system' whenever we choose, and to the fact that so many methods continue to implicitly deny our purposefulness. If employees don't want a method to succeed, it won't.

OST includes four other major characteristics of people. For development and mental health, people require a reasonable balance of autonomy, self-governance, homonomy, and interdependence with others (Angyal, 1965: 254). Autonomy without corresponding homonomy actually restricts and inhibits personal growth. Methods that isolate individuals and deny interdependence will have very different effects from those that build in or at least encourage it. Fortunately many popular methods today (Holman & Devane, 1999) are based on small and/or large groups but the current rash of applications of personal coaching could be an emergent and worrying trend back to individuation.

People also have the potential for ideal seeking. They can confront choices between purposes and choose outcomes called ideals that are endlessly approachable but unattainable (Emery, F., 1977: 69). The ideals spring from our capacity for potential directive correlation (Sommerhoff, 1969), to imagine and expect. Ideal seeking and autonomy-homonomy are linked through the genotypical organizational design principles discussed below. When structures are based on the first design principle, they encourage autonomy and cannot provide an environment for ideal seeking. Only structures based on the second principle provide this environment (Emery, F., 1977) and they encourage autonomy and homonomy simultaneously. Methods that fail to take the human capacity for imagination, expectations, and the ideals into account are not optimizing, let alone maximizing, their potential for change. When people collectively seek ideals, the ideals take precedence over their individual but different values, creating stability of direction. Ideals have also been shown to be motivators in their own right and the necessary and sufficient conditions for their elicitation are known (Emery, M., 1999). Clearly, if a method cannot elicit ideal seeking, it is missing a component that is vital for sustainable change.

Also, because we are physically adapted to our planet, we are able to directly extract meaningful information from physical and social environments (Gibson, 1966; Emery, F., 1980; Emery, M., 1999). Once we view people as ecological learners rather than *tabulae rasae* who need teaching about how their world works, a variety of methods that rest on the latter assumption come into doubt. We return to this characteristic below.

Last but not least, humans have consciousness. Any time we consider processes involving cultural evolution, individual learning, or system or organizational development, we immediately confront the complexities of human adaptation caused by consciousness. Chein (1972: 77, 95) defines behaviour as 'any spontaneous directed action' and from this basis derives his definition of consciousness as 'an awareness accompanied by an awareness of it'. Both Chein and Vygotsky conclude that that consciousness demands a hierarchical framework which is itself a system (Vygotsky, 1962: 92). This is inherent not only in Chein's derivation of consciousness from awareness and consciously motivated behaviours from behaviour, but also in Ackoff and Emery's (1972) hierarchy of goals, purposes, and ideals. People may function at quite different system levels. A full model of consciousness and its relation to adaptation has been developed in terms of actual and potential directive correlations (Emery, M., 1999: 70-95). This allows us to better explain phenomena associated with various methods and derive testable hypotheses to improve their efficacy.

This model shows among other things that the effectiveness of methods may be judged by the extent to which they induce upward changes in the system of motivated behaviours. If a method reliably demonstrates that it can induce the replacement of lower-order and more fragmented goals by higher-order conscious behaviours and motives, it can create an econiche for perceptual reconstruction or Lewin's original unfreezing-refreezing phenomenon (Lewin, 1943).

THE LAST STRATEGIC PLAN FAILED—TRY AGAIN?

There are several reasons why strategic plans fail. Here I address the most common one. Also common is lack of employee motivation to implement the plan which is discussed below.

Most strategic plans fail because they use a closed systems framework. Those charged with the responsibility of determining the strategic plan very carefully work out what the organization's strategic goals should be and how they should achieve them. Because they assume that their organization is closed, they plan in a social vacuum. They ignore influences or pressures from outside sources, the changing ideals, values, and expectations of the global community, those that supply, distribute, and consume. They forget they are also at the mercy of their employees who may or may not choose to implement their little bit of the plan.

For example, the reality is that consumers may decide that a particular product or service no longer fits their value system. During the 1960s and 1970s, consumers began to decide that they valued products that contributed to environmental sustainability. Phosphates disappeared out of detergents. Construction of nuclear power plants became astronomically expensive. Now genetically modified substances are being resisted around the world, reflecting the continuing public resistance to having change imposed upon them. These phenomena are neither random nor chaotic. They are demonstrations of a very orderly and lawful human process.

If one adopts the world hypothesis of contextualism and, therefore, a socio-ecological or open systems framework, people and organizations can be seen to exist in a social field, exactly as they exist within a physical or ecological environment.

An open system (Figure 2.1A) expresses the transaction of system and environment, all components of which are governed by laws (L) which are able to be known (Emery & Trist, 1972; Emery, F., 1977). The system (designated '1') acts upon the environment (designated '2'). This is the planning function (L_{12}). Environment acts upon the system and is known to us through the function of learning (L_{21}). L_{11} and L_{22} express the intrinsic nature of the system and environment respectively.

A system (L_{11}) is defined by its *system principle*, *unitas multiplex*, or construction principle (Anygal 1941: 259). This principle expresses the unique relationship between the entity and the environment, and governs the behaviour of the system and the arrangement of its parts. Organizations may or may not be systems.

The environment (L_{22}) is a social field consisting of the changing values, expectations, and ideals of the human systems within it. It is formally defined as the 'extended field of directive correlations: a social field within a shared natural environment' (Emery, F., 1977: 2) with a changing causal texture

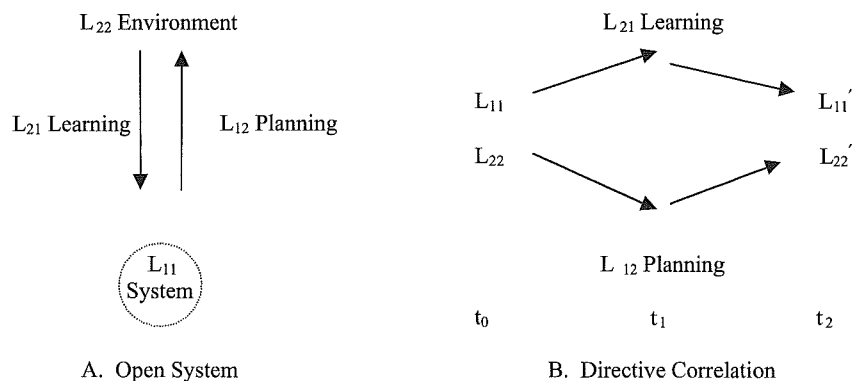


FIGURE 2.1 The models of open system and directive correlation

(Emery & Trist, 1965). This conceptualization provides a framework for cultural change and its fluctuating adaptivity.

Figure 2.1B also shows that the open systems model is based on the concept of directive correlation (Sommerhoff, 1969). The concept of *directive correlation* (DC) states that it is a necessary condition for the subsequent occurrence of a certain event or goal that two or more variables, at least environment and system, should at a given time be in exact correspondence for an adaptive relationship. Environment and system are then *directively correlated* with respect to the goal and the starting conditions, that is, they are correlated in terms of direction. They act to bring about the same future state of affairs from the same starting point. From the original condition at t_0 which consists of system and environment, both system and environment make changes at t_1 , resulting in a new set of conditions consisting of a changed system and environment at t_2 . In Figure 2.1B the changes shown are *directively correlated* and, therefore, adaptive. There are, of course, an infinite number of cases in which system and environment are not *directively correlated* and, therefore, are *maladaptively related*. The DC model expresses precisely when adaptation is or is not occurring over time.

Directive correlation not only encompasses what Holt (1915), Chein (1972), and Ackoff and Emery (1972) define as purposive behaviour, it also models coevolution rather than evolution. It can encompass the concepts of perception, cognition, memory, and motivation. Expressing these phenomena as directive correlations enables testable hypotheses (see Emery, M., 1999: 70–103).

When an organization is involved, the basic model in Figure 2.1 is elaborated by adding the level(s) of organization, or organizational system. Depending on the focus of the inquiry, an organization can be seen either as an entity or system in a social field or as a task environment for the people within it (Emery, M., 1999: 18–19). Using the DC model enables a full conceptualization of cultural change over time and that may be used both to explain and to plan long-term strategic changes, taking into account all levels of organization and environment (de Guerre, 2000).

As organizational change is a subclass of human adaptation, and making cultural change towards adaptation, it is critical to understand the changing nature of the social field with which organizations and people transact. This is given by the changing causal texture of the L_{22} over time (Emery & Trist, 1965; Emery, F., 1977). The most long-lasting and adaptive L_{22} option yet tried by the human race is called the Type II or ‘clustered, placid’ environment which lasted from our dim beginnings to about 1790. ‘Placid’ means stable value systems and the Type II was characterized by cooperative systems. The Industrial Revolution ushered in a totally new environment, known as the Type III or ‘disturbed reactive’ environment. The Type III was characterized by competition between large, virtually identical systems accompanied by the widespread introduction of hierarchical dominance into the West. Introducing this led to a suppression of group life with consequential societal maladaptions (Emery, F., 1977).

The Type III in the West was inevitably short-lived as, first, it conflicted with predispositions to the earlier Type II environment and, second, a series of events in the period 1945–53 ushered in the Type IV field. According to Fred Emery:

I think I had been looking in the wrong places for what pushed us into turbulence. I was looking at what was new, big and growing in the old society. Now I think the answer lies quite elsewhere; in the demise of two silent assumptions that have provided the historical rationale for the persistence of the principle of ‘hierarchical domination’; and done so even after the demise of ‘the divine right of aristocracies’ and the eternal threat of ‘hell fire and brimstone’.

(Emery, F., 1978: 12–13)

The two assumptions that have governed the subordination of individuals to their nation–states are:

- there is not enough to go around to support everyone at a decent level of living, and hence some centralized bodies or agreed practices must exist to ensure survival of the ‘worthy’ (the ‘work ethic’). In its so-called socialist form, this was parodied as ‘to each according to his contribution’.

- preservation of the nation-state as the prior requirement for having adequate centralized power to allocate; and hence all individual aspirations must be subordinated to the nation's requirement for waging war and to preserving and enhancing that power (patriotism). Together they enshrine a 'struggle for the survival of the fittest' and 'the indispensability of elites' (Emery, F., 1978: 13).

The extraordinary levels of production achieved during World War II destroyed the assumption that government control was required to guarantee the equitable distribution of scarce resources. They weren't scarce and we could produce more. The dropping of the A bombs on Japan, followed by the development of thermonuclear weapons and the MAD (mutually assured destruction) strategy of the cold war, were more than sufficient to convince the global population that the assumption that the state guaranteed their security was untrue. Both assumptions were discarded (Emery, F., 1978).

With these two assumptions gone, the old value systems that sprang from the acceptance of hierarchical domination also began to be rejected. People are still sorting out what they now value to replace the previous value set, and it is this process which creates the *relevant uncertainty* of the Type IV. This is its characteristic feature which is the consequence of us changing our minds as above. Since 1945 we have had *dynamic systems in a dynamic field* with an accompanying growth of maladaptions, particularly dissociation and superficiality (Emery, F., 1977). These maladaptions indicate a reluctance to engage with the structures left over from the Type III environment and we have obtained similar pictures of them from Australia and the USA (Emery & Emery, 1979; Alvarez & Emery, 2000).

It is important to understand the genesis of the Type IV because such understanding cuts through the confusion about what is really going on in the world today. Obviously, we have to be able to diagnose global social maladaptions as well as discrete organizational problems because if we cannot, what chance do we have of redesigning organizations in such ways that we can move towards adaptation rather than produce further maladaptions? I have also used the term 'unpredictable' rather than the commoner and original term 'turbulent' environment because we have learnt a lot about this environment since 1965. In particular, we saw that the name itself was causing problems of interpretation and understanding as the analogy is with aero- and hydro-dynamic systems rather than the intended psychological and social variety. 'Turbulent' lent an impression of mechanism to what is one of humanity's unique characteristics, our propensity to change our minds, a phenomenon far from mechanistic.

For a planning method, then, not to include an examination of the extended social field, extracting the learning from it and building that learning into the strategic plan for ongoing active adaptation mean that the method has denied its participants an opportunity to be genuinely active adaptive. Active adaptation within a social system is by definition a property of system-environment transaction. It is being in a constant state of purposeful change appropriate to the people, particularly their ideal seeking, and to a continuously changing environment. It encompasses the continuous learning and dynamism that are inherent to open systems. Once an organization has embarked on the implementation of an active adaptive plan, it returns at regular intervals to survey changes in the L_{22} and adjust accordingly if necessary. Without active adaptation and coevolution with the environment, the organization is likely to be taken unawares when the next environmental discontinuity hits. Similarly, without an experience of examining the L_{22} , people will lack even the implicit knowledge of the laws operating within it that is gained from methods such as the search conference.

Some methods have gone half-way to examining the L_{22} . Many today include an examination of the 'business environment' but this is merely a narrow and usually a quite idiosyncratic slice of the L_{22} . While this may be an improvement on being environment-free, these methods cannot hope either to discover the major value shifts occurring globally or learn how to anticipate them. Additionally, because the organization will attempt to actively adapt to its business environment, it increases the relevant uncertainty in the L_{22} and risks further maladaptation. The search conference, the first of which was held in 1959 (Trist & Emery, 1960), distinguished itself from all previous methods of strategic planning in that the L_{22} was addressed as a major component of the planning process. Other methods, particularly those adapted from the search conference, may incorporate an environmental scan based

on the L_{22} but treat it as a motivator or icebreaker. The serious implications of the scan are neglected as also is the emphasis on hard data and the hard work it takes to ensure that the strategic direction and system principle are actually adaptive.

LACK OF MOTIVATION

If the assumption is made that the sufficient conditions for the unmotivated behaviour lie within the people or within their interaction, then the symptom can be cured by directly attempting to increase the motivation of each individual or by changing the nature of their interactions. The marketplace is full of 'motivational' techniques that their promoters claim will motivate the 'turned off' when professionally applied. Similarly, we do not lack for variety in the multitude of 'motivational' methods covered by the terms 'team building'.

If 'motivation' really does arise from or reside within an individual, it can be seen as a commodity to be moved from one person to another, hence the 'pep talk' delivered by one animated person to the unmotivated. However, the evidence says that the conditions for motivation lie in the transactions between the people and their social environment, and also particularly in the organizational case, in the nature of its genotypical structure.

What is a motive? Chein (1972: 77, 23), who defines behaviour as 'any spontaneous directed action', argues that 'a behavior is a motive of the behaviors it includes'. A motive is an expression of purposefulness and hence drives such as hunger are not motives. People can choose not to eat when they are hungry. This is why Maslow's hierarchy of needs is an inaccurate portrayal of human behaviour. Even in extreme circumstances, people frequently choose to ignore basic needs in favour of 'higher' ones (Des Pres, 1976). Motivation involves perception, learning, memory, inference, meaning, and all the other psychological processes, and also

involves transaction between subject and object, transaction that requires commerce with mediating and intervening objects. In other words, it is in the very nature of motivation, and particularly of complex motivational structures that one should be concerned with the world in which behavior is taking place. (Chein, 1972: 85)

He sees it inevitable that we should be constantly scanning our environments and ourselves for information relevant to our purposes.

People live and work within organizational structures that function as task environments for them and these exist within the extended social field. There are, therefore, three sets of transactive relations. The relation between individuals and the field is often forgotten but it is required to explain the dynamic nature of life within organizational structures. People bring to any organization the ideals, values, and expectations derived from the whole of their life and their immersion within the field. They find there is either a congruence or a lack of it between these features of the field and those operationalized within the organization. When these ideals, values, and expectations are not met within the organization, an intensifying spiral of discontent is generated (Emery, M., 1999: 19). This was noted in the original study (Trist & Bamforth, 1951) which led to the development of open jointly optimized sociotechnical systems (Emery, F., 1959) and has been constantly documented since. The organization must be one which is appropriate for open purposeful systems and, when it becomes so, those who work within it negotiate to ensure that it begins to meet their ideals, values, and expectations.

How best to measure motivation? Motivation or, rather, its lack is immediately evident when one confronts any basic organizational statistics such as error or accident rates, productivity, machine downtime, or customer complaints. These are indirect measures but motivation can be more directly measured. Here we normally make a distinction between *extrinsic motivation*, which derives from such factors as money, and *intrinsic motivation*, which derives from the whole person-in-organization-in-social-field unit. It should be noted here that there is an asymmetric relationship between such extrinsic

and intrinsic motivations. Financial increases do not necessarily motivate the intrinsically unmotivated but perceiving that one is unfairly compensated for one's work will quickly demotivate.

Intrinsic motivation, which is what makes people want to leap out of bed and do a great day's work, is measured by the psychological requirements for productive human activity, known for short as the 'six criteria'. These criteria are the intrinsic motivators, first published by Emery and Thorsrud (1969). The six criteria are:

1. Elbow Room, optimal autonomy in decision-making.
2. Continual Learning for which there must be:
 - (a) some room to set goals;
 - (b) receipt of accurate and timely feedback.
3. Variety.
4. Mutual Support and Respect, helping out and being helped out by others without request, respect for contribution rather than IQ, for example.
5. Meaningfulness which consists of:
 - (a) doing something with social value;
 - (b) seeing the whole product or service to which the individual contributes.
6. A desirable Future, not having a dead-end job.

The first three pertain to the individual who can have too little or too much and are measured from -5 to +5 where 0 is optimal. The second three pertain to the climate of the organization and of these you can never have too much. They are measured from 1-10. They have a long history and have been routinely measured in countless Participative Design Workshops since 1971 (Emery, M., 1993). They provide a highly reliable measure of intrinsic motivation and work equally well regardless of the purpose or nature of the organization, including universities (Emery, M., 2000c).

The six criteria are correlated with the genotypical organizational design principles (Emery, F., 1967; Emery & Emery, 1974). It is difficult to get good scores on the six criteria from structures based on the first design principle (below), even when management has gone out of its way to attend to all hygiene factors (Herzberg, 1987) and such efforts are appreciated. Hygiene factors and intrinsic motivators are independent. The nature of the relationship between design principles and the six criteria has held in every country and culture tried so far. They are very good examples of species or human laws.

The relations between people in an organization are governed by the two genotypical organizational design principles. The first design principle (DP1) is called 'redundancy of parts' because there are more parts (people) than are required to perform a task at any one given time. In DP1, responsibility for coordination and control is located at least one level above where the work, learning, or planning is being done. DP1 yields a supervisory or dominant hierarchy. Individuals have fragmented tasks and goals. The second (DP2) is called 'redundancy of functions' because more skills and functions are built into every person than that person can use at any one given point in time. In DP2, responsibility for coordination and control is located with the people performing the task. The self-managing group works to a comprehensive set of agreed and measurable goals. DP1 structures are hierarchies of personal dominance. DP2 structures are hierarchies of function where all change is negotiated.

The design principles underlie all organizational structures. Three examples should suffice. First, most of our governments are representative democracies, DP1 structures. Voters go to the polls and elect a government to which they pass responsibility for coordination and control for their futures. DP2 alternatives or participative democracies have existed and currently exist (Emery, F., 1976; Emery, F., 1998). Second, committees are DP1 structures where the chairperson holds responsibility for coordination and control of the work of the committee and its members. Their dynamics fully justify the joke about committees designing camels. Groups with a set of agreed goals can be substituted. Third, a conference is a temporary organizational structure and as such can be structured on either the first or second design principle. DP1 gives the conventional 'talking heads' variety where responsibility

for coordination and control of the conference rests not with the audience, the learners, but with the sponsors, organizers, chairs, and speakers. The purest form of DP2 conference is the search conference (Emery, M., 1999). Given the diversity of organizations from multinationals to tiny voluntary organizations and families, I use the term 'members' rather than 'staff'.

There is a third form called '*laissez-faire*' which is the absence of a design principle and coherent structure. Its behavioural effects are similar to those of DP1 but more intense (Lippit & White, 1943). Unfortunately, we have many *laissez-faire* organizations today where the structure is DP1 on paper but generally ignored (de Guerre, 2000: 657–658).

These design principles have also been discovered independently by Riane Eisler (1995: 105) who calls the systems flowing from them 'androcracy' and 'gylany'. She also recognizes they are extremely powerful and affect most aspects of organizational life as well as male–female relationships. The design principles have relevance for each of the matters discussed below. Over time DP1 actively deskills and demotivates, DP2 skills and motivates (Emery & Emery, 1974). If an organization genuinely wants high levels of intrinsic motivation, it appears to have no choice but to change the design principle that underlies the structure. Many other organizational problems such as failure to follow the strategic plan are motivational. Usually only those who produced the plan bother with it. Genuine psychological ownership produces intrinsic motivation.

COMMUNICATION PROBLEMS

Those who use a conceptual framework or make assumptions that flow from abstract universals will accept that communication problems are a legitimate concern and should be dealt with directly. They will say 'of course people and communication can be difficult, and as communication is a primary property of behaviour and organizational life, it is important to give people additional communication skills. Increasing these skills will overcome the problems and then the organization will work better.' This view fuels a huge training industry.

There are difficulties with this view. The first is that communication is not a primary property but a secondary one. 'It is and has always been a necessary condition for people to act socially. Not, however, a *sufficient* condition. Many situations can be observed where communication channels exist but are not used. In many situations communications can reduce social activity' (Emery & Emery, 1976: 147). The second is that both quantity and quality of communication are significantly influenced by the organizational structure. The third is that an increase in skills does not translate into improved communication unless the person is motivated to use the skills. As we have seen above, in DP1 structures people are less likely to enjoy optimal or satisfactory levels of the six criteria and, correspondingly, they will be less likely to be motivated to employ the communication skills they hold which are readily displayed in other settings.

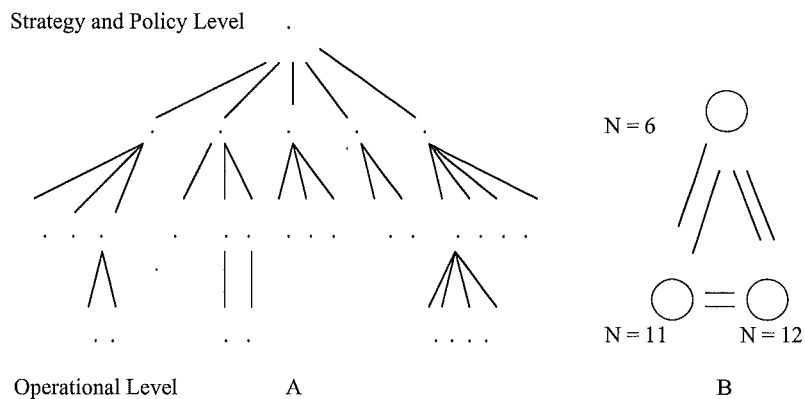
Ackoff and Emery (1972: 142) define communication by stating that one purposeful system (B) communicates with another (A) when a message produced by B changes one or more of the parameters of A's purposeful state. The message may change the degree of A's familiarity with something by *informing*, it may change A's perception of the probable effectiveness of courses of action by *instructing*, or it may change the probability of an outcome by *enlightening* or producing understanding (Emery & Emery, 1976: 154).

'Both parties in communication must be purposeful. If we push a button to start a machine and the machine has no choice, communication has not taken place' (Ackoff & Emery, 1972: 142). In other words, the act of pushing the button has not produced change in a parameter of the state of 'mind' of the other and, therefore, the nature of the relationship is interaction, not transaction as above. When we consider communication within the whole system environment unit, we see that communication can be more broadly defined as the response functions which map a set of starting conditions of both the system and the environment for a behaviour to meet a purpose (Emery, M., 1999: 79). Because

TABLE 2.2 Formal reporting channels and task-mediated relations

Steps removed from policy-maker	No. in DP1	No. in DP2
1 step	5	2
2 steps	15	0
3 steps	8	0
Total of formal reporting channels	28	2
Task-mediated relations between peers, maximum. This is calculated for within groups. We could add 1 under DP2 for between peer groups	0	136
Paper-generating function*	59	2

* Note: This table is adapted from Emery and Emery (1976: 166–171) where we stated that this was an estimate of the paper-generating function based on previous experience that it increased by the square of the distance from the bottom level. We multiplied number of steps by steps removed from the top.

**FIGURE 2.2** Structures of a small organization under the two genotypical design principles

all experiences and behaviour are coloured if not motivated by emotion or affect (Tomkins, 1962; Thatcher & John, 1977: 113), communication has the potential to be maladaptive as well as adaptive for individual, organization, and environment. This becomes important below when we consider the nature of communication in a structure that induces competition.

Looking first at the influence of design principle on quantity of communication, consider Figure 2.2A and B. Both A and B are charts of the same organization. All that has changed is the genotypical design principle, yielding in A, a typical 4-level DP1 structure. B shows the structure based on self-managing groups after the principle has been legally changed from DP1 to DP2. In fact, if this organization were to really redesign itself, it would quickly be found that a group of six people is far too many in such a small self-managing organization. There simply wouldn't be enough productive work to keep them occupied and in DP2 structures everybody does productive work and nothing but productive work.

Table 2.2. documents the differences in quantity of communication in the two structures shown in Figure 2.2. Even for this small organization, the quantity of communication is vastly different. Also while I continue to use the term 'formal reporting channel', it should be noted that relations between the strategy or policy-making level and the operational level in DP2 are vastly different from the asymmetrical relations between superior and subordinate found in DP1. The double lines in Figure 2.2B indicate that these relations are negotiations between peers. We now consider this qualitative aspect in more detail.

Within DP1 structures with their relations of personal dominance, communication has three characteristic features: asymmetry, egocentrism, and 'them and us', an adversarial characteristic. Asymmetrical relations lack the reciprocity of sender and receiver that can be observed in a discussion between equals. There can be a total absence of discussion and a predominance of orders or instructions. Orders require reactions or responses, not conversation or negotiation. Asymmetry is a characteristic of the 'communication' between an operator and a machine and that it is reflected in person-to-person communication should come as no surprise. The principle is 'redundancy of parts'; the world hypothesis from which it derives is mechanism. The replaceable parts often refer to themselves as 'cogs in the machine'.

Egocentrism is expressed in statements such as 'I want this by Friday' and 'It should be done this way'. Use of 'I' versus 'we' was one of the most distinctive language differences between autocratic and democratic organizations (Lippitt & White, 1943). In DP1 structures whole tasks are split into one-person pieces with individual responsibility attached. The interests of individuals are, therefore, best served by looking out for themselves. They are not concerned to communicate information that could be of benefit to others, either laterally or up and down. Similarly, unless a received communication is of benefit, there is little concern to attend to it, let alone remember it. When we analyse a DP1 structure, we see that it is essentially competitive with all the dynamics that are associated with competition. This is illustrated by the simplest example of promotion which in DP1 structures is usually up the hierarchy. When the top position in Figure 2.2A becomes vacant, those below will be competing for that position. Communication patterns including remembering and forgetting reflect the competitive dynamics.

The competitive nature of the DP1 structure also explains the adversarial nature of bureaucratic communications. Each step in the communication chain represents a difference in status and, therefore, a difference in the interest of the parties towards the effects of the communication. Superiors want the truth if they know they can do something about it. If not, they would prefer not to know or they may request a report because simply requesting it makes them look good and responsible. Unfortunately, superiors frequently believe they do know what is going on in their organizations but have been suffering from distorted information or a severe lack of information. Failing to inform is a powerful way of waging organizational war vertically as well as horizontally. Inferiors may distort communications to make themselves look good or blameless, and make competitors look bad:

A status gap between communicants is always a potential barrier to communication. It constitutes an inherently unstable medium: always ready to amplify or attenuate messages in ways that have nothing to do with a truthful correspondence of source events and message. (Emery & Emery, 1976: 152)

These three characteristics illustrate the dilemmas involved in placing a great mass of purposeful systems into a structure which by its nature forces them to act primarily as goal-seeking systems (Ackoff & Emery, 1972), able to choose only means to an end rather than being involved in choosing the ends. They get their revenge by exercising their purposefulness in exactly the way the structure demands. As it is inherently competitive, so they compete. But the ends they serve bear no relation to the organization's goals. Because the organization is not adaptive to the nature of the people within it, the communications serve their own adaptive needs. This may lose them a job in the long term if the organization fails. (This is not a speculative statement. Some of us know organizations that failed because of constant deliberate sabotage.)

Nor do these distortive effects operate only at the level of the individual. They also operate at the level of the group. Bion (1952, 1961) discovered that groups can make a set of three basic assumptions (bas) about their leadership. The bas are a totally different mode of operation from the 'creative working mode' which Bion referred to as W for task-oriented work. Calling them dependency, fight/flight, and pairing, Bion saw these bas as modes which preserve the life of the group. (For a discussion of the

bifurcated form of pairing, see Emery, M., 1999: 127–132.) After nearly thirty years of working with the bas, we now know that they are structure-specific. They appear only when DP1 is operating. As implied by the statement above about the leadership of the group, Bion's patients knew that he was the boss. While Dr Bion remained in charge, his chances of creating a 'leaderless group' were low. In contrast, when people begin work in a DP2 structure, they immediately go into the creative working mode and stay there.

The bas create even more problems for team builders and communication skills developers. They also help explain the frequent lack of transfer effects from the training situation to the organization. Usually the trainers attempting to improve communications or teamwork find themselves in the same structural position as Bion. Their trainees are vulnerable to the bas. Many trainers believe that every group must go through the stages of 'forming, storming, norming, performing' (Tuckman, 1965). Some who work with groups will deliberately engineer these phenomena to speed up to the performance stage. But for many employees, this is the stuff of everyday life. They are also experts in it and if they don't feel like performing, they won't. Our experience shows that it is possible to go straight to performing (Emery, M., 1999: 132–133). The bas are far easier to prevent than to cure, by designing methods based on DP2 structures.

If the trainees adopt either of the most common bas, dependency or fight/flight, there will be little learning. 'Least learning occurs in dependency, more in fight/flight and more again in pairing' (Emery, M., 1999: 117, 134) but less than in the creative working mode. Add this to the motivational deficit, particularly when it is realized that they are being sent to fix their problems, and then wonder why they have poor 'listening skills'. 'Poor listening skills' is yet another mythical problem promulgated by the schools of self-action and interaction. Exactly the same people show no deficit in listening skills when they are enjoying a spirited discussion at the pub or are working together for their local voluntary organization. Listening is also subject to motivation and refraction.

ERROR RATES

Because organizational structures are an econiche (Emery, M., 1999) and function as a communications medium, they not only distort or refract messages, they also affect other forms of errors including accidents. DP1 structures are inherently error-amplifying. Error rates are intimately related to communication failures and reflect the same sort of system failure. Errors seep in from the environment and are then subject to the refraction of the three characteristics above. Using Stafford Beer's (1972) formulae for error amplification and attenuation, F. Emery (1977: 91–99) has shown how the flow upwards of information from one level to the next dramatically changes between the two structures.

In both cases in Table 2.3, a manager has five people reporting to him or her, people who are truthful (T) or make sound judgements eight times out of ten. In the DP1 structure there would be, on average, only one in three occasions that the manager could say that this must be sound advice because they are unanimous. Managers, therefore, seek independent judgements to avoid collusion but the mathematics show that the more managers achieve control of subordinates, the deeper they move into error.

In the DP2 structure there would be only about three times in ten thousand that they will unanimously give wrong advice. While the assumed degree of fallibility (F) is the same in both structures, it will vary in nature. The characteristic features of communication found in DP1 structures are not found in DP2

TABLE 2.3 Error amplification and attenuation by design principle

DP1, error amplification	DP2, error attenuation
$T = (1 - F)^n$	$T = (1 - F^n)$
$T = (1.0 - 0.2)^5 = 0.33$	$T = (1.0 - (0.2)^5) = 0.9997$

because people have shared responsibility for coordination and control. They are also responsible for their agreed measurable outcomes that they know are aligned with the strategic goals of the organization. The symmetrical dependence of DP2 ensures cooperation rather than competition with the effect that it is in everybody's interests to provide accurate and timely feedback on mistakes. As the whole group has been involved in setting the group goals and individuals negotiate pieces of work to provide personal challenges, both the conditions for continuous learning are in place (Emery & Emery, 1974). Therefore, when errors enter a DP2 structure, they become the source of learning rather than defensive posturing.

When error rates are judged unacceptably high, quite commonly the diagnosis is that training has been inadequate and more is required. Often this training is provided on a blanket basis. While further training may indeed be required, it will not in and of itself reliably reduce error rates in the long term. That requires attention to the underlying causes. In DP2, an individual who has made a mistake will request training either by course if necessary but more frequently unless it is in a highly technical area, by change of functions to learn on the job from other more skilled persons. Therefore, the training is targeted and immediately remedial.

The class of problem called 'personality conflicts' arises from exactly the same principles and dynamics as communication problems and error rates. As errors are amplified when they enter a DP1 structure, so are personality differences. Asymmetry, egocentrism, and the 'them and us' syndrome, together with the prevalence of dependency and fight/flight, contribute to the hothouse atmosphere where even small personality differences are accentuated. Far from being a cool, impersonal task-oriented setting, bureaucratic structures are often wracked by waves of intense emotion played out as office or palace politics, clique formation and maintenance, and buck passing. In such settings, any small quirk of personality is quickly amplified and, if the predominant basic assumption is fight/flight, will fuel a 'personality conflict'.

SUMMARY

This brief appraisal of differences in diagnosis shows very clearly that in each case, accepting the validity of the symptom and the assumptions underlying it is doomed to result in a long-term failure of curative method. The problem presented is symptomatic of a deeper malaise, one that cannot be changed by attempting to change the people. The people are obviously just being open purposeful systems and adopting an extremely rational approach to the situation in which they find themselves, one that is not fit for purposeful systems. The assumption that the problems lie within the people or within their patterns of interaction leads directly to actions upon the people which they define in the vernacular as 'blaming the victims'. This elicits a further rational and purposeful response that does not bode well for the productivity or future of the organization.

The other major implication of this discussion is that effective organizational practice necessarily has a strong educational component. The customers are not always right and their diagnoses should not be accepted at face value. But over and above these implications is another; practitioners strongly adhere to abstract universals, the associated world hypotheses, and the assumptions that flow from them. The evidence comes a very poor second. Besides, most managers who pay the practitioners also believe in abstract universals. There is also resistance to changing the genotypical design principle which springs in part at least from educational elitism born of high valuation of abstract knowledge (Bartel & Emery, 1999).

DESIGNING NEW ORGANIZATIONS IN AN UNPREDICTABLE ENVIRONMENT

As diagnoses must be genotypically and environmentally correct, so must the redesigns precisely meet the diagnoses. When methods are based on the primacy of communication, changing the people or

incorporating assumptions of a Type III environment, which is shown by dependence on the expert role, the efficacy of these methods is usually short-lived. A study quoted by *The Economist* (2000: 61) showed that 20 per cent of organizational change projects were successful, 17 per cent showed no improvement at all, and in a whopping 63 per cent the change was only temporarily sustained. There is nothing new about this result. Apart from indicating that most methods are inadequate, this data also indicates that there is still a vast and sufficient amount of goodwill for change in organizations but, eventually, those involved discover that 'nothing has actually changed'. This is a typical comment from those who have borne the brunt of these attempts at change. If change is to be effective in the long term, it must be designed for purposeful systems living in a Type IV environment. As it would appear that the rejection of hierarchical domination is now well and truly with us, organizational structures will eventually have to be redesigned on the second design principle.

There are other implications:

1. Methods must concentrate on accelerating diffusion (Emery, F., 1969). To aid diffusion, they must incorporate practices that increase the probability of positive affect as this fuels diffusion (Emery, M., 1986; Emery & Bartel, 2000).
2. They must be genuinely participative as practitioners playing expert roles give a DP1 structure. Once genuine participation and trust are established, conceptual knowledge may be introduced. For example, the Participative Design Workshop (Emery & Emery, 1974; Emery, M., 1999) includes conceptual briefings but only after a period of comprehensive and extensive preparation.
3. Methods must be flexible rather than mechanistic in terms of fixed designs or steps in the process with fixed times. How else can we ensure that the unique circumstances of an organization are taken into account? For planning there may or may not need to be sessions dealing with changes in task environments, for example. Also, nobody can definitely know in advance where a group will flounder or shine. Process management must entail juggling times and tasks so that the group has the best possible chance of achieving a high-quality result. Working from a conceptual framework rather than a recipe provides potential for high flexibility.
4. Flexibility and sustainability demand that greater time and effort be put into participative and educative preparation before the method proper is used. This preparation period is frequently the longest part of the whole process. The better the preparation and pre-planning, the better the result. If the design principle is to be changed, attention must be paid to all the systemic changes that follow, including pay and classification systems. There should be at least an 'in principle' agreement governing the legal change from DP1 to DP2.
5. In the actual design phase, no design must be imposed. People must be able to design their own section of the organization as only they really understand it, and if they are to accept working within it, they must have psychological ownership of it (Emery & Emery, 1974). There must be guarantees that designs will not be changed arbitrarily by others. Autocratic behaviour would immediately put the project at risk.
6. Rather than the current concentration on technological systems (Purser, 1993: 217), designs should focus on the social system as, once DP2 structures come into being, employees will take responsibility for fixing or redesigning their technical systems. Giving priority to redesigning technical systems shows relatively infrequent technological innovation (Passmore et al., 1982).
7. Methods must be designed and executed with genuine collaboration, elaborated below.

PLANNED CHANGE, PROGRAMMATIC CHANGE, AND ACTIVE ADAPTIVE CHANGE FOR DEVELOPMENT

Active adaptive change as discussed above shows that it is not planned change in the sense that it is top-down or expert-driven. It is just as clearly not programmatic in the sense that there is a planned and relatively fixed series of steps or phases to be governed by feedback mechanisms and further planned

interventions if necessary, which there usually are because the change never goes to plan. Active adaptive change as pursued through the two-stage model (Emery, M., 1999) does, however, contain elements of planned and programmatic change when we use the terms in everyday language. There is a logical and psychological order to the sequence of plan followed by structural design. Similarly, there is a logical flow within the phases of the methods themselves. There are no necessary conflicts or dilemmas between planning or programming steps in the change process when some basic parameters are reconstructed.

Active adaptive change is clearly planned in Boonstra's sense of 'a conscious, deliberate, and collaborative effort to improve the operations of a human system through the utilization of scientific knowledge' (see Introduction). The first question is which scientific knowledge and from which science? The second question is, who collaborates with whom? I discuss this below.

Boonstra later gives the answer to the question of which science when he states that programmatic change 'requires the ability to predict and control developments. To be able to predict developments, an eye must be kept on relationships between cause and effect over a longer period of time.' This marks programmatic change as having its feet on the abstract universal line.

Causal thinking has been used in science for such a long time, and in certain fields with such success, that it is almost generally considered to be the scientific thinking, although it may well be only a subvariety. It is, in any case, a firmly rooted habit, not easily changed to a basically different approach. Dealing with relations and dealing with systems involves quite different psychological processes. In causal thinking and research the task is to single out, from a multitude of data, pairs of acts between which there is a necessary connection. (Angyal, 1965: 48)

Add to this the notion that change must be planned and controlled by 'experts' or organizational authorities. 'Managers and consultants take a rational approach: they analyse the surroundings, formulate goals, develop a strategy, and then implement the change' (Boonstra, Introduction). It may be 'rational' but the assumptions it makes about others within the organization is far from according with the everyday observation that they too analyse their surroundings, formulate goals, develop strategies, and implement them. Perhaps the failure of observation is related to the fact that they often do this in ways that conflict with the demands and expectations of managers and consultants?

The very notions of expert and expert knowledge raise other dilemmas, the first of which Mao posed as the problem of 'red or expert' while the second, which is interrelated, arises directly from relevant uncertainty. The 'red or expert' dilemma is 'How does the expert make his contribution to planning without alienating people?' (Emery, F., 1977: 124). The greater the gap between the expert and the rest, the less likely they are to follow the plan. This is always the case in DP1 structures as we saw above. Relevant uncertainty leads us to ask 'How can we expect to improve our planning in the face of relatively decreasing knowledge?' (ibid.: 125). Again, we come close to a paradox: the more society changes, the more we need to be able to plan but the less we have the knowledge with which to plan. The dilemmas are interrelated in that both arise from the advent of the Type IV environment as the desire for self-determination appears to be here to stay and relevant uncertainty is still with us. But they are also interrelated because of a particular definition of 'expert knowledge'.

The expert knowledge so often used in strategic planning is derived from hypothetico-deductive science and not only is it drawn from problem-solving, it is applied as problem-solving. Problem-solving involves a known end point and needs merely to design the best means to this end. But this form of knowledge cannot devise the end point. It is abstract knowledge, knowledge abstracted from its concrete base in reality, and that is far from meeting the requirements of puzzle-solving. Only puzzle-solving (Emery, F., 1977: 126) can determine an end point and that requires extracted knowledge (Emery, F., 1980). Extracted knowledge is given by direct perception; it is ecological knowledge. Matters of ideals and values fall into this class of knowledge. No amount of up-to-date statistical

data on current ideals and values as derived from methods such as survey feedback will suffice to determine an end point when there are no guarantees that the very act of surveying them has not raised expectations. Besides, if they don't like the tone of the feedback, staff might get together and change their minds about further cooperation.

There is a further problem with the science associated with planned and programmatic change as defined above. It is based on a faulty model of so-called rational decision-making. These experts 'theorize ... as if decision making was explicable in terms of only two dimensions, probable efficiency of different paths and relative value of the outcomes'. Heider (1946), Jordan (1968), and Ackoff and Emery (1972) have shown that another dimension is necessary. 'This other dimension is the probability of choice and reflects the *intrinsic* value of a course of action to the chooser (as distinct from its *extrinsic* or means-end value)' (Emery, F., 1977: 126). Again, this is available to direct observation so while the experts may claim that their approach is scientific, it is faulty science.

There is another sort of science as discussed above. It is based on accurate observation and conceptualizations adequate to the task of genuine hypothesis testing. 'An hypothesis that postulated causes lying beyond the reach of human observation must remain unverified' (Stebbing, 1948: 316). Causal thinking is replaced by systems thinking. 'In systems thinking the task is not to find direct relations between items but to find the superordinate system in which they are connected or to define their positional value within such a system' (Angyal, 1965: 48). But again the systems thinking must not be of the mechanistic, closed variety we find in GST because that does not accord with observation and evidence of the permeable boundaries of purposeful systems open to and transacting with an extended social field.

Nor does this second sort of science confine itself to deduction and induction. C.S. Peirce demonstrated in 1878 that there were three forms of logical inference and not just two, deduction and induction, as was generally supposed. The third form, which he called 'retroduction' or 'abduction', involves reasoning 'from consequent to antecedent' (Peirce, 1986). Retroduction is the only form of reasoning which contributes new ideas in science through a process of studying the facts and 'devising a theory to explain them' (4.4, Feibleman, 1946). A singular or individual occurrence consists of dynamic relations and this is what modern physics and philosophers have termed an 'event' (1.458, Feibleman, 1946: 61 footnote), the root metaphor of the world hypothesis of contextualism (Pepper, 1942). Retroduction is, therefore, the process within contextualism that produces novelty, and creativity, and contextualism is the only world hypothesis within which novelty can be conceptualized. Peirce held that it was only by this ability to arrive at 'reasonable hypotheses' that we could have advanced scientific knowledge.

It seems incontestable that the mind of man is strongly adapted to the comprehension of the world; at least, so far as this goes, that certain conceptions, highly important for such a comprehension, naturally arise in his mind; and without such a tendency, the mind could never have had any development at all. (Peirce, 1986: 318)

Our adaptation to our planet is the basis for extracted knowledge (Emery, F., 1980) and we survived for 60,000+ years without abstract knowledge (Knudtson & Suzuki, 1992).

The science based on observable, material universals acknowledges the validity of extracted knowledge. It can distinguish the various types of knowledge, including wisdom, associated with the parameters of decision-making (Emery, M., 1999: 95-104). Therefore, it can approach planning and design flexibly, encouraging the development of the appropriate form of knowledge for the appropriate tasks and applying appropriate knowledge where required. In the face of the planning dilemmas of the Type IV environment, it acknowledges the primacy of end points over means and puzzle-solving over problem-solving. It leads to learning about the extended social field and ideal seeking. Without this scientific base it is virtually impossible to get an organizational plan which is implemented because it reflects the intrinsic value of it for those who must implement and live with it. So the parameters

that need reconstructing if planned and programmatic change is to become active adaptive are the assumptions that flow from abstract universals. 'These major conceptual shifts from world hypotheses based on closed systems to contextualism have many ramifications for education, social science and its practice, not least for action research' (Emery & Emery, 1997: 139).

ACTION RESEARCH AS AN ENABLER OF LEARNING AND CHANGE

Learning is essential to effective sustainable change. For change to be successful, employees must be motivated to implement it. If it is to be sustainable, everybody must have learnt what is involved in the change, conceptually as well as methodologically. This common-sense statement is backed by recent figures from *The Economist* (2000: 61). Four out of five of the most 'able at change' organizations quoted said that the expertise required for the change was embedded as a functional capability within the organization compared with only one out of five of the 'inept at change' organizations. The 'able' had 'institutionalized their knowledge, building it into their culture and performance assessment'. None of the 'able at change' companies said they had handed the task to consultants which a quarter of the 'inept' group had done. It is important to note here, and the above article also bears this out, that practitioners need to work with all existing levels within the organization, not just management and not just the troops. For sustainable systemic change, all levels and functional areas must be involved in the same sort of processes.

This creates a problem for some practitioners, usually consultants, who are a profession within the educated elites. Many live in a world of abstractions, pieces of disembodied 'information' and models far removed from the physical realities of most of the world's population (adapted from Lasch, 1995). They are also highly competitive and prefer to operate through *laissez-faire*, each individual consultant free to 'do their own thing'. Their culture can interfere with espoused aims of cooperation towards the common good (Emery, M., 1996). It may well be that the *laissez-faire* and competition have induced many to see their role as expert or substitute manager within an organization as it is difficult to gain higher status by other means in a highly educated and sophisticated, stratified society. While consultants continue to define their role as expert and managers accept this, it will continue to be difficult to gain acknowledgement of the need for action research that is not based on relations of hierarchical dominance.

For action research to enable learning and sustainable change, every step from the very beginning of a project through the education and preparation required for the change, to the planning and design or redesign depends on what is learnt and whether that learning fuels motivation to continue and evolve. We are not primarily discussing formal education but the extracted learning that people automatically do as they move through life with all of its changes. In particular, we are discussing that subclass called 'diffusive learning'.

The processes and principles of direct realism as medium-term adaptation, that which yields ecological or extracted learning, continue over the life span. Therefore, 'learning works because it permits the development of *effectivities* that are supported by *affordances* in a real environment' (Johnston & Turvey, 1980: 166). Affordances are properties of the environment relative to a system, the acts or behaviours permitted by objects, places, and events. They define what the environment means to a perceiver, what they can do with it, e.g. a chair affords sitting on, or for the desperate, throwing on a fire to keep warm. 'It is the affordance that is perceived' (Gibson, 1967; Michaels & Carello, 1981: 42; Reed & Jones, 1982). Affordances do not change as needs change as they are real and persistent properties. Effectivities are the potential purposeful behaviours of a perceiver, again relative to the field (Shaw & McIntyre, 1974: 307). But for people with consciousness:

no clear boundary can be drawn between affordances and effectivities except in a specifically pragmatic sense... Thus learning as adaptation at the ontogenetic level is no more and no less than the simultaneous development of affordances and effectivities towards environments that

better support human purposefulness and ideal seeking. Consciousness demands that these 'goals' are also effectivities and thus *learning is the growth of the total set of actual and potential directive correlations, or contents of consciousness, towards a meaningful order.* (Emery, M., 1999: 78)

The definition above encompasses maladaptions but we can consciously choose to use our learning to create new econiches which themselves will function adaptively, affording conscious learning to those within them. And we may consciously choose to function as an affordance or resource for others. If we are motivated to do these things, we are also motivated to enter into peer relationships with others around shared purposes including that of learning. These are the characteristics required of a diffuser so we can define 'diffusive learning' 'as that learning which motivates the learner to recreate the learning environment for others either as actual or potential econiche' (Emery, M., 1999: 78). I have also shown that diffusers and lifelong learners are one and the same people.

Motivated and sustainable organizational change requires diffusive learning. If employees are not motivated to diffuse, even moderate rates of turnover will ensure that the change dies out. But common sense tells us that if they are not motivated to diffuse, the change was probably never accepted or successful in the first place.

Before we move on, it is necessary to clarify some related propositions to be found in the field:

- *Proposition 1:* There is no such thing as 'organizational learning'. 'Organizational learning' does not and cannot exist because organizations do not have nervous systems. To take seriously such a concept of 'organizational learning' is to make a nonsense of the concept of learning itself. Such usage also cannot help further development of it. The only sensible definition of a 'learning organization' is an organization 'structured in such a way that its members can learn and continue to learn within it' (Emery, M., 1993: 2). Similarly, the concept of 'organizational memory' is a dangerous myth. Many organizations have realized this when in times of rapid turnover, they discover that their 'organizational memories' have walked out the door.
- *Proposition 2:* 'My people don't learn' (statement by a manager). It is impossible to stop people learning. Human learning is a phenomenological given but our learning and behaviour as learners will differ depending on the ecosystems of which we are a part. It is currently fashionable to describe one's organization as a 'learning organization' because it has increased the training hours provided. Such training always achieves something, but the major impact of learning in DP1 is about the organization itself. It occurs at the beginning of the experience when people may learn that they really don't want to be there. From then on, negative affect frequently amplifies that learning and people put their efforts into creative ways of 'beating the system'. So they create their own conditions for continuous learning but it is not the learning that managers wish for.
- *Proposition 3:* Learning is a cognitive activity. Far from being split three ways into cognitive, affective, and conative systems, people are unitary systems and learning cannot be divorced from the total human system. It is closely tied to affects which are characterized by their urgency, generality, and abstraction. They are a free-ranging set of motivational effectivities that provide enormous amounts of information about our self-environment relationships (Tomkins, 1962).

Given the criticality of motivation and learning for effective, sustainable change, the very best possible conditions for producing both should be built into the processes to be used, right from the very first moment. As above, only DP2 structures produce continuous learning because they are variety-increasing, provide opportunities for goal setting and feedback, and attenuate errors over time. DP1 structures are variety-decreasing, do not provide those opportunities, and they amplify errors. Over time they result in the 'hatred of learning' (Bion, 1961: 86–91).

Saying that DP2 should operate from the beginning of the process indicates that a project may usefully be separated into the planning and preparation stage and usage of the method proper. While the preparation and planning stage involves discussion, negotiation, and education, DP2 can be brought

into being through the nature of the relationship between the researcher and organization. This involves the nature of action research and collaboration.

PREPARATION AND PLANNING PHASE

Action research shares with all other social science research a relationship with the researched. This may not always be acknowledged by the researcher but the researched are usually aware of its nature. There are only three basic forms of this relationship which follow from the genotypical design principles (Emery & Emery, 1997: 139–142). I am disregarding *laissez-faire* here because it is almost inconceivable that any self-respecting organization or practitioner would deliberately or knowingly enter a *laissez-faire*-based relationship with the other. Such a relationship may develop by default through poor or lack of definition of terms of reference or end point, or through drift in the process itself, but one must assume that the initiator of a change project has some definite allocation of responsibility in mind.

Let us take DP2 first because it is the simplest. Here the two parties decide on joint responsibility for their mutually agreed purposes. This is known as the *collaborative* relationship (Emery, F., 1977: 198–202).

If the first design principle (DP1) is chosen as the basis of the relationship, there is a further choice. This applies not only in the action research case but also to consultancies in general. For researcher and the researched, the responsibility may rest with either party. When it rests with the researcher, it is known as the *academic* relationship, where it is assumed, as is the case for those with a strong belief in the primacy of value of abstract knowledge, that only this ‘senior’ partner has special skills and knowledge. The skills here would focus on the ability to induce and deduce from the abstract knowledge gained, especially in relation to the task of identifying the universal in the particular through logical inference. That this is a special skill is a myth: we all do it (Emery, F., 1980). In action research and other practice, leaving the responsibility with the ‘junior’ partner is known as the *servant* relation.

In action research, this three-way choice becomes acute because the researcher has implicitly, by virtue of the fact that they are working on matters of importance to the researched, accepted the unique mission and responsibility of the social sciences, i.e. the mutual enrichment of social science and the important practical affairs of people (Emery, F., 1977: 199). Choice of design principle means choosing to see the researched and researcher as the same or different level of system. Either they are both purposeful or the researched are merely goal-seeking. By choosing the academic relationship, the action researcher has classed the researched as object in the pursuit of value-free knowledge (another myth), also denying their essential human capacities to know and to reproduce:

But as the researched is still the same open human system, regardless of the choice of the researcher, this choice amounts to a subtle form of oppression, the same form involved in teaching the young that their experientially based theories constitute failure. The choice between design principles is the choice between relations of dominance of one person or class of people over another, or relations of non dominance. (Emery & Emery, 1997: 140)

It is rare to find the servant relation in action research although it is widespread in consultative relationships more generally where the assumption is that ‘the customer is always right’. This stance denies the potential of mutual learning from the relationship. Elevating the customer to the status of omniscient being can be seen as an attempt at democracy in the relationship but amounts to no more than *laissez-faire*.

The rarity of the servant relation and the ubiquity of the academic relation in action research spring from a single source, the production and socialization of an educational elite, among which we find most

social scientists and practitioners. Even action researchers who protest their advocacy of democracy and claim to practise it are often loath to give away the trappings of elite status in action. These include the right to hold closed meetings, set goals for others, unilaterally design processes for others to use or participate in, and write up reports containing *their* conclusions and recommendations.

As it is perfectly possible to achieve collaboration between 'teachers' and 'learners' in the education system, so it is perfectly possible within action research. It also achieves the same outcomes, with all parties becoming 'learners' doing mutual learning around a shared purpose. Instead of the researched (A) focusing on the researcher (B), both focus on the task (X) of achieving the purpose. This is of course the $A \times B$ model in action (Asch, 1952; Newcomb, 1953). The learning achieved is also far richer. It increases the probability of higher system level function, of moving from purposefulness to ideal seeking, and it increases the validity of outcomes. It is 'learning for discovery, the process that centrally involves ecological learning and retrodution. It is learning for the development of creativity' (Emery & Emery, 1997: 141). With genuine collaboration within the $A \times B$ model, openness, communication, and trust spiral towards the best possible solution for all parties.

The pragmatics of collaboration in a specific case will vary depending on people, circumstances, and task but we can outline some basic principles:

- *Principle 1:* If the researcher has accepted the joint responsibilities of social science as above, there must be a division of labour as the researched have only one set of responsibilities—to the purpose and the task of achieving it.
- *Principle 2:* Because the organization does not belong to the researcher who also does not have to live with the consequences of the change, the division of labour is usually around content and process. The researched take responsibility for all the content, the outcomes, and the implementation, while the researcher takes responsibility for designing and managing the learning environment and process within which the researched do their work. Accepting responsibility does not preclude the researcher involving at least some of those in the organization in this task, particularly the design phase. Only organizational members have first-hand ecological knowledge of that particular organization with all its idiosyncrasies. By accepting responsibility for the content and collaborating in the design work, organizational members are credited with having specialist knowledge of their own reality. Researchers also have their own specialist knowledge, usually in the design and management of such research and/or learning econiches and this too is acknowledged by the division of labour. The researcher's second responsibility of contributing to social science is usually handled by writing or publishing a report. Again, because the data belongs to the organization, the researcher can only validly write from the perspective of what was learnt in the process of designing and managing the learning environment and the implications of that for future work.

This perspective differs from the view that the goal of participatory research 'is the improvement not of Theory, but of Practice . . . its concern is not with universal, abstract conceptual systems, but with local, timely knowledge of particular, concrete situations' (Toulmin, 1996: 221). Against this position I argue first that practice and theory are not mutually exclusive as theory should also inform practice. Effective methods flow from good theory. Second, observing and analysing a range of method designs, and the conceptual underpinnings of their approach to the management of those processes, lead to some real breakthroughs in our knowledge of people and organizational dynamics. Two cases may be mentioned, that of the relation of genotypical structure to Bion's group assumptions and the more specific case of clarifying the dual nature of the group assumption of 'pairing' (Emery, M., 1999). This knowledge came from retroductively looking back over cycles of interventions and outcomes and the patterns of relations within the open systems model. This process generates progressive hypotheses that enable both theory development about the evolving nature of the system–environment relationship and/or theory development about interventions designed to change this relationship (Gloster, 2000: 674). Gloster calls Toulmin's local action research 'ar' and

that also designed to add to social science knowledge as 'AR'. They are not mutually exclusive as 'ar' is subsumed under 'AR'.

- *Principle 3:* There is nothing to prevent the researched from writing their own report from the social science perspective as well and, in fact, there is accelerating use of the Internet by non-elite researchers, diffusing their contributions to knowledge.
- *Principle 4:* In cases where the researcher has specialized knowledge in a particular field of relevant content, say, computing, the researcher may also write about the contribution of the organization to computer research through the process of the change without damaging the integrity of the collaborative relationship.

USE OF METHOD PHASE

Methods as far as possible should have their participants organized into self-managing groups bound into a group by a genuine task. A genuine task is a piece of meaningful work with goals, clearly defined and articulated, and entirely manageable within the allotted time. Sending a group off to discuss a difficult issue does not fit this definition. Sending them off to come back with a solution to a well-defined and problematic issue does fit. All work should be reported. Ignoring a group's work is not only discourteous but clearly conveys the message that the process was a façade and paid only lip service to involvement. People are extremely sensitive to the differences between consultation, non-genuine participation and the participation that flows from DP2.

In addition, instructions should be given and limits set on the nature of the report to be given by the group. Without these specific task instructions the group does a 'shopping list' of wishes. What is required is hard, targeted work on a thoughtful and carefully considered group product that they are going to have to implement. Even less useful than the 'shopping list' approach is the case where a 'facilitator' enforces 'democracy' by rigorously going around the room and eliciting individual thoughts. This is a travesty of both small group work and participative democracy. The huge range of individual differences to be found in organizations, or anywhere, tells us that different people will take varying lengths of time to feel comfortable in a particular setting and generate the confidence to participate. Enforced 'democracy' can only intensify discomfort and reluctance to speak and the utterances hold little validity anyway as they are said for the sake of speaking. It is better to leave sufficient time to create the conditions to bring into being a group with its own unique culture, its implicit as well as explicit agreements.

With joint responsibility and such an appropriate division of labour, action researchers can more reliably generate motivation and learning to improve the human condition. They may also more coherently and practically debate the nature of action research rather than continue to fragment the field with more hair-splitting about generic labels and genres based on abstract universals; for an example, see the special issue of *Human Relations* on action research (1993).

CONCLUSION

Years of accumulated data and knowledge have shown that many of the tools in use in social science today do not accord with readily observable, everyday human behaviour. In particular, the assumptions made about people, drawn from abstract universals, are erroneous and account for the high failure rate of organizational interventions to achieve sustainable change. Assumptions underlie organizational diagnoses and then choice of method leading inevitably to an increasingly fragmented and fractured social science. This is unnecessary as workable alternatives based on observable material universals exist with a successful track record of change. If the majority of our tools were to conform to reality, there would certainly be more active adaptive change providing higher organizational productivity and more creative work for action researchers.

REFERENCES

- Ackoff, R.L. & Emery, F.E. (1972) *On Purposeful Systems*. Chicago: Aldine Atherton.
- Alvarez, R.A. & Emery, M. (2000) From action research to system in environments: a method. *Systemic Practice and Action Research*, **13**(5), 683–703.
- Angyal, A. (1941) *Foundations for a Science of Personality*. Cambridge, MA: Harvard University Press.
- Angyal, A. (1965) *Neurosis and Treatment: A Holistic Theory*. Chichester: John Wiley & Sons, Ltd.
- Asch, S.E. (1952) *Social Psychology*. New York: Prentice Hall.
- Bartel, S. & Emery, M. (1999) Resistance to open systems theory and practice: a research note. Unpublished.
- Bion, W.R. (1952) Group dynamics: a review. *International Journal of Psychoanalysis*, **33**, 235–247.
- Bion, W.R. (1961) *Experiences in Groups*. London: Tavistock.
- Bond, M. (2000) Father Earth. *New Scientist*, 9 September, 44–47.
- Cassirer, E. (1923) *Substance and Function in Einstein's Theory of Relativity*. Chicago: Open Court.
- Chein, I. (1972) *The Science of Behaviour and the Image of Man*. New York: Basic Books.
- De Guerre, D.W. (2000) The codetermination of cultural change over time. *Systemic Practice and Action Research*, **13**(5), 645–663.
- De Laguna, G.A. ([1927] 1963) *Speech: Its Function and Development*. Bloomington, IN: Indiana University Press.
- De Paoli, D. (2000) Does time really precede existence? A reflection on Prigoginism. *21st Century*, **Spring**, 27–44.
- Des Pres, T. (1976) *The Survivor*. Oxford: Oxford University Press.
- The Economist* (2000) An inside job. 15 July, 61.
- The Economist* (2001) Making the complex simple. 27 January, 79–80.
- Eisler, R. (1995) *The Chalice and the Blade*. San Francisco: HarperCollins.
- Emery, F. (1959) Characteristics of socio-technical systems. In F. Emery (1978), *The Emergence of a New Paradigm of Work* (pp. 38–86). Canberra: Centre for Continuing Education, Australian National University.
- Emery, F. (1967) The next thirty years. *Human Relations*, **20**, 199–237. (Reprinted in *Human Relations* (1997) with postscript, **50**(8), 885–935.)
- Emery, F. (1969) The historical validity of the Norwegian industrial democracy project. Tavistock Document HRC 210. In E.L. Trist & H. Murray (1993) *The Social Engagement of Social Science* (vol. II, pp. 154–258). Philadelphia, PA: University of Pennsylvania Press.
- Emery, F. (1976) The jury system and participative democracy. In M. Emery (ed.) (1993) *Participative Design for Participative Democracy*. Canberra: Centre for Continuing Education, Australian National University.
- Emery, F. (1977) *Futures We're In*. Revised and updated (1998). Melbourne: Fred Emery Institute. www.fredemery.com.au
- Emery, F. (1978) Youth, vanguard, victims or the new Vandals? In F. Emery (ed.) *Limits to Choice* (pp. 46–59). Melbourne: Fred Emery Institute. www.fredemery.com.au
- Emery, F. (1980) Educational paradigms: an epistemological revolution. In M. Emery (ed.) *Participative Design for Participative Democracy* (pp. 40–85). Canberra: Centre for Continuing Education, Australian National University.
- Emery, F. (1998) *Toward Real Democracy*. Melbourne: Fred Emery Institute. www.fredemery.com.au
- Emery, F. Undated notes.
- Emery, F. & Emery, M. (1974) Participative design: work and community life. In M. Emery (ed.) *Participative Design for Participative Democracy* (pp. 100–122). Canberra: Centre for Continuing Education, Australian National University.
- Emery, F. & Emery, M. (1976) *A Choice of Futures*. Leiden: Martinus Nijhoff.
- Emery, F. & Emery, M. (1979) Project Australia: its chances. In E. Trist, F. Emery & H. Murray (eds) (1997) *The Social Engagement of Social Science* (vol. III, pp. 336–353). Philadelphia, PA: University of Pennsylvania Press.

- Emery, F. & Emery, M. (1997) Toward a logic of hypotheses: everyone does research. *Concepts and Transformation*, **2**(2), 119–144.
- Emery, F. & Thorsrud, E. (1969) *Form and Content in Industrial Democracy*. London: Tavistock.
- Emery, F.E. & Trist, E.L. (1965) The causal texture of organizational environments. *Human Relations*, **18**, 21–32.
- Emery, F.E. & Trist, E.L. (1972) *Towards a Social Ecology*. London: Plenum/Rosetta.
- Emery, M. (1986) Toward an heuristic theory of diffusion. *Human Relations*, **39**(5), 411–432.
- Emery, M. (1993) Introduction to the 1993 edition. In M. Emery (ed.) *Participative Design for Participative Democracy*. Canberra: Centre for Continuing Education, Australian National University.
- Emery, M. (ed.) (1993) *Participative Design for Participative Democracy*. Canberra: Centre for Continuing Education, Australian National University.
- Emery, M. (1996). The influence of culture on search conferences. *Concepts and Transformation*, **1**(2/3), 143–164.
- Emery, M. (1999) *Searching: The Theory and Practice of Making Cultural Change*. Amsterdam: John Benjamins.
- Emery, M. (2000a) The evolution of open systems to the 2 stage model. In M.M. Beyerlein (ed.) *Work Teams: Past, Present and Future* (pp. 85–103). Amsterdam: Kluwer Academic Publishers.
- Emery, M. (2000b) The current version of Emery's open systems theory. *Systemic Practice and Action Research*, **13**(5), 623–643.
- Emery, M. (2000c) The six criteria for intrinsic motivation in education systems: partial democratization of a university experience, partial success. In O.N. Baburoglu & M. Emery (eds) *Educational Futures: Shifting Paradigm of Universities and Education*. Istanbul: Sabanci Universitesi.
- Emery, M. & Bartel, S. (2000) Affects, personality and the motivation to diffuse. Draft, unpublished.
- Feibleman, J. (1946) *An Introduction to Peirce's Philosophy Interpreted as a System*. New York: Harper & Brothers.
- Gibson, J.J. (1966) *The Senses Considered as Perceptual Systems*. Boston: Houghton Mifflin.
- Gibson, J.J. (1967) New reasons for realism. *Synthese*, **17**, 162–172.
- Gloster, M. (2000) Approaching action research from a socioecological perspective. *Systemic Practice and Action Research*, **13**(5), 665–682.
- Gustavsen, B., Hofmaier, B., Ekman Philips, M. & Wikman, A. (1996) *Concept-Driven Development and the Organization of the Process of Change: An Evaluation of the Swedish Working Life Fund*. Amsterdam: John Benjamins.
- Heider, F. (1946) Attitudes and cognitive organization. *Journal of Psychology*, **21**, 107–112.
- Herzberg, F. (1987) One more time: how do you motivate employees? *Harvard Business Review*, **65**(5), 109–120.
- Holman, P. & Devane, T. (eds) (1999) *The Change Handbook: Group Methods for Shaping the Future*. San Francisco: Berrett-Koehler.
- Holt, E.G. (1915) *The Freudian Wish and its Place in Ethics*. New York: Holt, Rhinehart & Winston.
- Human Relations* (1993) **46**(2).
- Johnston, T.D. & Turvey M.T. (1980) A sketch of an ecological metatheory for theories of learning. In G.H. Bower (ed.) *Psychology of Learning and Motivation* (vol. 14, pp. 147–205). New York: Academic Press Inc.
- Jordan, N. (1968) *Themes in Speculative Psychology*. London: Tavistock.
- Knudtson, P. & Suzuki, D. (1992) *The Wisdom of the Elders*. Toronto: Stoddart Publishing Co. Ltd.
- Lasch, C. (1995) *The Eevolt of the Elites and the Betrayal of Democracy*. New York: W.W. Norton.
- Lewin, K. (1931) The conflict between Aristotelian and Galileian modeas of thought in contemporary psychology. In K. Lewin, *A Dynamic Theory of Personality* (1935). New York and London: McGraw-Hill.
- Lewin, K. (1943) Forces behind food habits and methods of change. *Bulletin of National Research Council*. National Academy of Sciences, Washington, DC, **108**, October, 35–65.
- Lippitt, R. & White, R.K. (1943) The 'social' climate of children's groups. In R.G. Barker, J.S. Kounin & H.F. Wright (eds) *Child Behaviours and Development* (pp. 485–508). London: McGraw-Hill.

- Maturana, H.R. & Varela, F.J. (1980) *Autopoiesis and Cognition*. Dordrecht: Reidel.
- Mead, G.H. (1932) *The Philosophy of the Present*. Chicago: Open Court.
- Michaels, C.F. & Carello, C. (1981) *Direct Perception*. New York: Prentice Hall.
- Newcomb, T.M. (1953) An approach to the study of communicative acts. *Psychological Review*, **60**, 283–304.
- Passmore, W.A., Francis, C., Haldeman, J. & Shani, A. (1982) Sociotechnical systems: a North American reflection on empirical studies of the seventies. *Human Relations*, **35**(12), 1179–1204.
- Peirce, C.S. (1986) *Writings of Charles S. Peirce: A Chronological Edition* (vol. 3. Ed. E.C. Moore. Bloomington, IN: Indiana University Press.
- Pepper, S.C. (1942) *World Hypotheses*. Berkeley, CA: University of California Press. Reprinted in 1970.
- Purser, R.E. (1993) Opening up open systems theory: towards a socioecological understanding of organizational environments. In T. Tulu (ed.) *Mastery of Mind: Perspectives on Time, Space and Knowledge* (pp. 181–251). Dharma Publishing.
- Rayner, A.D.M. (1997) *Degrees of Freedom: Living in Dynamic Boundaries*. London: Imperial College Press.
- Reed, E. & Jones, R. (1982) *Reasons for Realism: Selected Essays of James J. Gibson*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Sapolsky, R.M. (2000) Genetic hyping. *The Sciences*, **March/April**, 12–15.
- Shaw, R. & McIntyre, M. (1974) Algoristic foundations to cognitive psychology. In W.B. Weimer & D.S. Palermo (eds) *Cognition and the Symbolic Processes* (pp. 305–362). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Sommerhoff, G. (1969) The abstract characteristics of living systems. In F.E. Emery (ed.) (1981) *Systems Thinking* (vol. 1, pp. 144–203).
- Stebbing, L.S. (1948) *A Modern Introduction to Logic*. London: Methuen.
- Thatcher, R.W. & John, E.R. (1977) *Foundations of Cognitive Processes*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Tomkins, S.S. (1962) *Affect, Imagery, Consciousness*. New York: Springer.
- Toulmin, S. (1996) Concluding methodological reflections. In S. Toulmin & B. Gustavsen (eds) *Beyond Theory: Changing Organizations through Participation* (pp. 203–225). Amsterdam/Philadelphia: John Benjamins.
- Trist, E.L. (1985) The last time around, 1949. In E. Trist, F. Emery & H. Murray (eds) (1997) *The Social Engagement of Social Science* (vol. III, pp. 676–677). Philadelphia, PA: University of Pennsylvania Press.
- Trist, E.L. & Bamforth, K.W. (1951) Social and psychological consequences of the longwall method of coal-getting. *Human Relations*, **4**(1), 3–38.
- Trist, E.L. & Emery, F.E. (1960) *Report on the Barford Conference for Bristol/Siddeley, Aero-Engine Corporation, July 10–16*, Tavistock TIHR, Document No. 598. London: Tavistock.
- Trist, E.L. & Murray, H. (1990, 1993) *The Social Engagement of Social Science; A Tavistock Anthology*. Vols I and II. Philadelphia, PA: University of Pennsylvania Press.
- Trist, E., Emery F. & Murray, H. (eds) (1997) *The Social Engagement of Social Science* (vol. III, pp. 170–184). Philadelphia, PA: University of Pennsylvania Press.
- Tuckman B.W. (1965) Developmental sequence in small groups, *Psychological Bulletin*, **63**, 384–399.
- Vygotsky, L.S. (1962). *Thought and Language*. Ed. and trans. E. Hanfmann & G. Vakar. Cambridge, MA: MIT Press.