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The Current Version of Emery's Open Systems Theory

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There are variations on the idea of an open systems theory (OST) or socioecology. This paper deals with the "current" variant developed primarily by Fred Emery, or OST(E). It is "current" because that terminology acknowledges a continuing development of knowledge. OST(E) is heir to a long line of intellectual development known as the "thin red line" and can be distinguished from other variants by its adherence to that line of development. The paper outlines the state of the art of OST(E) and its historical relation to the thin rd line.

KEY WORDS: coevolution; contextualism; genotypical design principles; interaction; learning; open systems; participative democracy; transaction.

1. OVERVIEW

The version of open systems theory developed primarily by Fred Emery, OST(E), has two main purposes. The first is to promote and create change toward a world that is consciously designed by people, and for people, living harmoniously within their ecological systems, both physical and social. "Socioecology" captures the notion of people-in-environments. Included within this is the concept of open, jointly optimized, sociotechnical (and sociopsychological) systems, optimizing human purposefulness and creativity, and the best options afforded by changing technologies. Again, these organizational systems are designed by the people themselves. The second purpose is to develop an internally consistent conceptual framework or social science, within which each component is operationally defined and hypotheses are testable so that the knowledge required to support the first purpose is created. OST(E) develops from integrated theory and practice where the practice involves important human concerns, societal and organizational.

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OST(E) preserves and strengthens a long line of antecedents called the "thin red line," which itself traces an increasingly coherent body of knowledge about people-in-environments. A chronology of the developmental landmarks of OST(E) shows, among other things, that it cannot be disaggregated into disciplines such as psychology, sociology, and anthropology (M. Emery, 1997). The thin red line is discussed in Section 3 both to clarify the nature and purpose of OST(E) and to isolate the concepts which distinguish OST(E) from other variants.

1.1. Building Blocks of Socioecology in Its OST(E) Form

"Socioecological" means "people-in-environments," which is expressed by the concept of the open system. Behind the concept of the open systems lies the concept of directive correlation (Fig. 1). *The open system* (Fig. 1A) expresses the transaction of system and environment, all components of which are governed by laws (L) which are able to be known. 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. The laws that govern them are implicitly learnt about in the OST(E) method for participative strategic planning called the Search Conference (SC). The SC is discussed in Section 2.2.

These four components are known as the basic parameters of the open system. They are the foundation for the derivation of the model of human decision making and hence also the derivation of the set of human ideals and the societal maladaptions. (See the paper by Alvarez and Emery in this issue.)

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

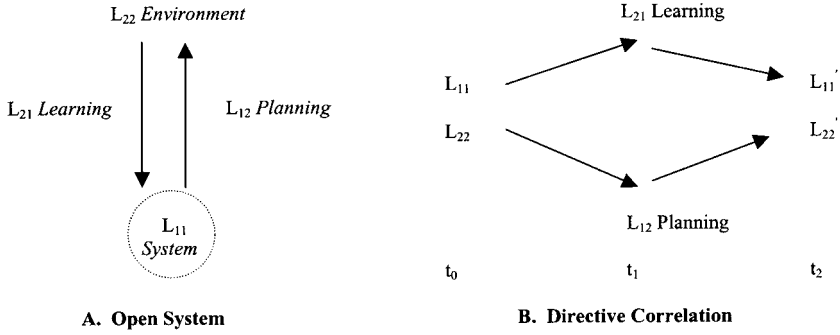

Fig. 1. The models of open system and directive correlation.

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 (Sommerhoff, 1969), 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 Fig. 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.

A system (L_{11}) is defined by its *system principle*, *unitas multiplex*, or construction principle (Anygal, 1941, p. 259). This principle expresses the unique relation between the entity and the environment and governs the behavior 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 social field of directive correlations" (F. Emery, 1977a) with a causal texture which has changed over the course of human history (Emery and Trist, 1965). This conceptualization provides a framework for cultural change and its fluctuating adaptivity.

People are defined 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 and Emery, 1972, p. 31). By constantly acting as active, responsible agents (Chein, 1972, p. 6), they change the environment.

Concomitantly, nobody is an island. Mental health is "the capacity both for *autonomous expansion AND* for *homonomous integration*" with others (Angyal, 1965, p. 254). "Autonomous" means governed from inside, purposeful activity with a systemic direction toward expansion through coherence. But "life is an autonomous dynamic event which takes place *between* the organism and the environment" (Angyal, 1965, p. 48; my italics). Autonomy without corresponding homonomy or interdependence with others inhibits growth. Humans are social or group animals constantly seeking the best balance between these two vectors.

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 (F. Emery, 1977a, p. 69). The ideals spring from our capacity for potential directive correlation (Sommerhoff, 1969), to *imagine* and *expect*.

The ideals corresponding to the four parameters of the open system as above, are *homonomy*, a sense of belongingness and interdependence; *nurturance*, cultivating those means which contribute to health and beauty; *humanity*, expressing what is fitting for us as people, superordinate to institutions; and *beauty*, that which is aesthetically ordered and intrinsically attractive.

Also, because we are physically adapted to our planet, we are able directly to extract meaningful information from physical and social environments, *ecological learning* (Gibson, 1966; F. Emery, 1980). OST(E) uses this extracted knowledge. Viewing people as ecological learners is very different from viewing them as *tabulae rasae* who need teaching.

The DC model is also elaborated in terms of levels of environment. Apart from the L_{22}, we distinguish "task environments," which are simply slices of the L_{22} relevant for any given system. Thus the global pulp and paper industry functions as a task environment for a paper mill. Task environments allow a system better to approximate active adaptation. Similarly, we distinguish systems within systems which function as environments for smaller units within them. A large organization functions as an environment for a department within it, and that department functions as an environment for the people within it.

With this rich system of conceptual and practical tools, we can explain and plan social change, as Don deGuerre does in his paper in this issue. These building blocks enable OST(E) to capture human dynamism as purposeful people create, perceive, and change the extended social field, and the people and the social field constantly codetermine each over time.

As OST(E) cannot differentiate researcher and researched in terms of system function, the research relation is one of *collaboration* between peers, rather than an asymmetric or unequal one (F. Emery, 1977a). In addition, OST(E) uses the $^{A}X^{B}$ model (Newcomb, 1953; Asch, 1952), where A and B are people or groups and X is an object of mutual concern. The $^{A}X^{B}$ model expresses the minimum elements for task-mediated change and postulates that both learning and research proceed most effectively when A and B are engaged in work defined by and toward their common purpose, or X. Collaboration has a logical consequence, namely, that the research task means working with others to improve the human condition as well as to create knowledge. Therefore, it involves two sets of responsibilities which must be simultaneously and *jointly* addressed. When creating new knowledge, OST(E) practitioners use all three logics—deduction, induction, and retroduction—regardless of whether the method is action research or another form (Peirce, cited by Feibleman, 1946; Emery and Emery, 1997). In this issue, Michael Gloster's paper outlines this conceptually, and Alvarez and Emery illustrate this in a United States-based case.

As the system principle governs the relationship between system and environment, so the relations of people within an organization or system are governed by the *two genotypical organizational design principles* (F. Emery, 1967;

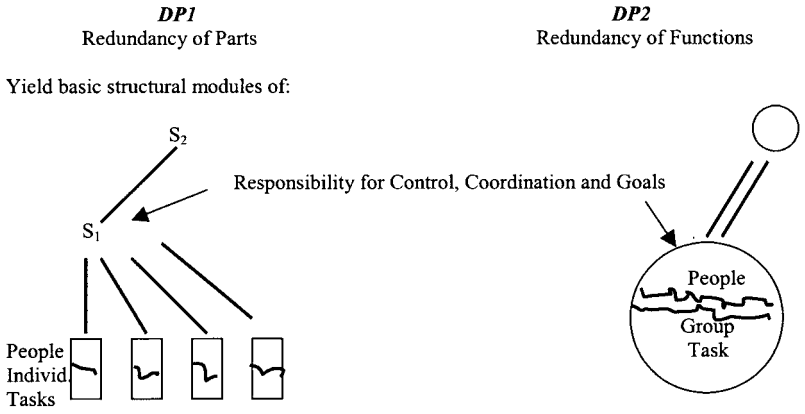

Fig. 2. The genotypical organizational design principles.

Emery and Emery, 1974) (Fig. 2). 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. 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 design principles underlie all organizational structures. Three examples should suffice. First, most of our governments are representative democracies which are DP1 structures. Voters go to the polls and elect a government to which they pass responsibility for coordination and control for their futures, for the term of that government. DP2 alternatives or participative democracies have existed and currently exist (F. Emery, 1976a, 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, shared goals can be substituted. Third, a conference is a temporary organization structure and, as such, can be structured on either the first or the second design principle. The SC is the purest form of DP2 structure, designed as such right from its inception. DP1 conferences are 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.

A change of design principle is systemic and will ultimately require the

redesign of all subsystems. For formal, employing organizations, the design principles are embedded in industrial relations legalities such as duty statements, job specifications, and contracts. Changing to DP2 involves changing career paths to a system of 'pay for skills and knowledge held." Classification and individual performance systems become irrelevant. Only DP2 produces a "*learning organization*," an organization "structured in such a way that its members can learn and continue to learn within it" (M. Emery, 1993, p. 2). This is the only sensible definition of a "learning organization," as organizations can't learn because they don't have nervous systems. DP2 structures are variety increasing and provide opportunities for setting goals and challenges and receiving feedback. They attenuate error over time (F. Emery, 1977a, pp. 91–100). DP1 structures are variety decreasing, do not provide those opportunities, and amplify errors.

People directly perceive that DP1 structures inhibit them. They consequently make and act upon "group assumptions" (Bion, 1952, 1961) to ameliorate the inhibiting effects. In DP2 structures, people adopt the "creative working mode," cooperating on tasks toward shared purposes in such a way that communication and learning are enhanced. In other words, the design principles have profound effects on human behaviour including our affects or emotions. Thirty years of accumulated practical learning about the design principles has demonstrated that if people are immediately placed in a DP2 structure such as a SC, they do not go through the stages of group formation, "forming, storming, norming, and performing." These stages have been held to be necessary (Tuckman, 1965) but they have proven to be specific to DP1 structures. In real-life DP2 structures, people immediately form well-functioning groups using the creative working mode which they maintain for the duration of the task.

Because OST(E) is a transdisciplinary social science, it takes as its appropriate subject matter anything that has people in it. Therefore, it has explored a wide range of human phenomena, from personality to education to market research to the ways in which people use different technologies. It has also developed systemic statistical methods (F. Emery, 1976b) to replace reductionist forms; see Alvarez and Emery's paper in this issue.

2. THE LONG-TERM PRACTICAL PURPOSE OF OST(E)

2.1. Conceptualization of Cultural Change

It follows from the above joint responsibilities of OST(E) as social science that there must be a conceptualization of human history and future in terms of human requirements and adaptations. As the basis of its conceptualizations, OST(E) takes the changing causal texture of the L_{22} over time (Emery and Trist, 1965; F. Emery, 1977b). The most long-lasting and adaptive 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 induced by the introduction of DP1 into the West on a broad scale. Imposing widespread DP1 led to a suppression of group life, with consequential societal maladaptions (F. Emery, 1977a).

The Type III in the West was inevitably short-lived, as it conflicted with predispositions to the earlier Type II environment, and in the period 1945–1953, a series of events undermined the two key assumptions that had governed the acceptance of hierarchical domination of the people by the state. 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. 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, was more than sufficient to convince the global population that the assumption that the state guaranteed their security was untrue. Both assumptions were discarded (F. Emery, 1977b).

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 environment. Since 1945 we have had dynamic systems in a dynamic field with an accompanying growth of maladaptions, particularly dissociation and superficiality (F. Emery, 1977b). These maladaptions indicate a reluctance to engage with the structures left over from the Type III environment. The Alvarez and Emery paper in this issue elaborates on these maladaptions.

Data also indicate the emergence of an active maladaption called Synoptic Idealism, which is an attempt to reassert state authority (see Alvarez and Emery, this issue). These opposing trends create even greater uncertainty. Fortunately there is evidence that active adaptation and a new cultural way can be achieved by carefully designed interventions.

Therefore, the long-term practical purpose of OST(E) is cultural change. It aims to change the Type IV back to a modern form of Type II through *active adaptive cultural change* at all societal levels. This involves a shift from a society based on hierarchical domination to a *participative democracy* where **all** systems want to be and are purposeful and responsible. This Type II will be associative, joyful, and wise (M. Emery, 1999). How can this be achieved within the current multitude of competing value systems? Years of SCs now have proven that Emery (1977a) was theoretically correct when he stated that people within a DP2 structure can function at one system level higher than that of the organization. Because the SC is structured on DP2, its members have the opportunity

to move from purposefulness to ideal seeking. When people collectively seek ideals, the ideals take precedence over their individual but different values, creating stability of direction. As the ideals are then translated into the goals of their organizations and communities through the SC, the directions of these entities are once again aligned. See M. Emery (1999) for a detailed explanation of how this occurs.

At the theoretical level, cultural change is given by a series of directive correlations over time. At the practical level, it is approximated by the two-stage model of active adaptation.

The basic model of directive correlation can be extended infinitely to address cultural change over much longertime spans where culture is defined as a system of behaviors in context (M. Emery, 1999, p. 29). Cultural change is produced by an integrated sequence of activities in which there is an individual goal for each stage and, at the same time, an ultimate goal to the whole sequence. Figure 3 shows that as system and environment mutually determine each other over time, so cultural change can be produced by purposeful systems deliberately acting to influence the extended social field, which, of course, then influences not only their change but that of all other systems within the field. As L_{22} and L_{11} are coimplicative, sequences of directive correlation show changed outcomes at each successive point in time (F. Emery, 1993, pp. 88–89). Any one system has only a limited effect on the field, but as systems influence each other and coordinate their directions relative to the field, they begin to have a significant effect. Ultimately, there is a distinctly different culture which, when sufficiently widespread, produces a new environment. The open systems model is inherently and continuously dynamic. Sequences of change can be planned and mapped.

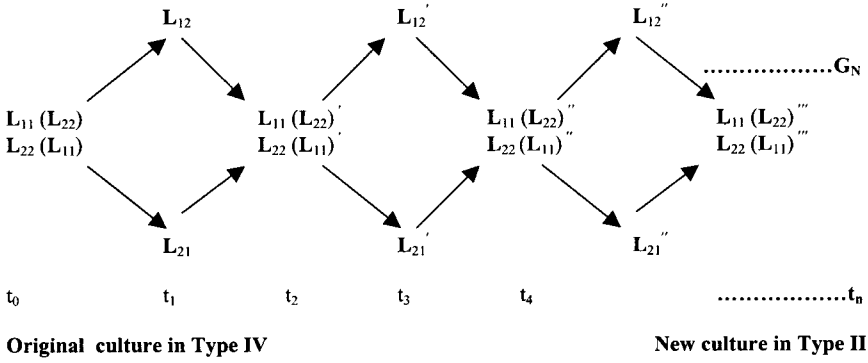

Fig. 3. Codetermination of cultural change over time.

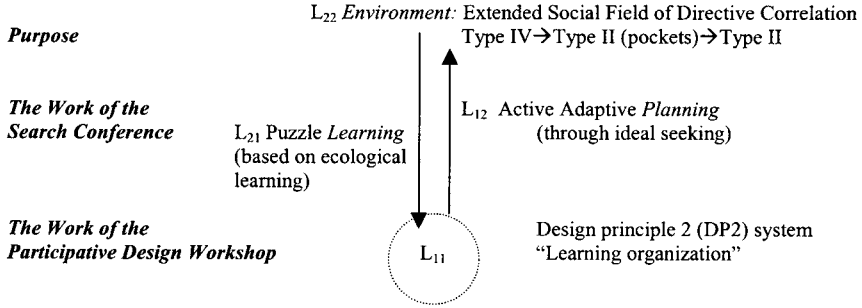

Fig. 4. The two-stage model for active socioecological adaptation.

2.2. The Two-Stage Model

The two-stage model (Fig. 4) has been designed to establish active adaptation in practice (M. Emery, 1999). There are two parts to active adaptation, with a method for each. The relation between the L_{11} and the L_{22} is changed by the *Search Conference* and the intra-L_{11} relations are changed by the *Participative Design Workshop*.

The Search Conference (SC) establishes an active adaptive relationship between the system and the environment through the creation of a new system principle. This is contained within the new set of strategic goals called the "most desirable system." This answers the question, "Where and what do we want to be in year X?"

Each SC is a carefully designed integration of external and internal structure and process incorporating all the major OST(E) constructs. In addition, people practice *puzzle learning*, using their perceptual abilities of *figure ground reversals* (Koffka, 1935). They focus on the *embryos of social change* (F. Emery, 1967), systems emerging within the L_{22} that may indicate value shifts and develop into major social movements. Identifying these embryos and keeping an eye on them are a powerful form of preparation for adaptive change. Searching incorporates *the conditions for influential communication* (Asch, 1952) and the *strategy of the indirect approach* (Sun, 1943; Hart, 1946), the oldest strategy in the world, itself entailing constant monitoring of the environment for active adaptation. As the purpose of the two-stage model is to build a *community*, most work takes place in plenary, generating excitement, joy, and the energy that powers diffusion (M. Emery, 1986).

The Participative Design Workshop (PDW) is a workshop with the single purpose of producing a DP2 structure. It enables people to design back into their organizations the human dimension of work that is summarized by the psychological requirements of productive activity, or the *six criteria*. These criteria are

the *intrinsic motivators* (Emery and Thorsrud, 1969). Therefore, in DP2 structures people are motivated to produce quantity and high quality regardless of whether they are producing widgets, services, or ideas. Because the PDW entails a transfer of all the conceptual knowledge and tools required for organizational design and redesign, the participants also learn how and why to maintain DP2 and its consequences.

The PDW comes in two forms: one for redesigning existing DP1 structures, the other for designing a new structure from scratch. For employing organizations with an existing structure, the PDW follows an agreement that the design principle will be legally changed. For large organizations, a series of PDWs is designed for a total systemic structural redesign. The form for design rather than redesign is that used after the SC to complete the two-stage model. Geographic communities, for example, do not have an existing organizational structure but one is required to carry the implementation of the SC action plans. Unless the system affords the learning that is required for implementation, the work of the SC will ultimately be wasted. In this PDW, people answer the question, "How do we organize ourselves to ensure that we reach our most desirable future?" Therefore, the members of the SC design **themselves** into a DP2 structure.

While the SC and PDW can be used as complementary methods, they are totally different in their design and management. Both require preparation for their introduction in any particular organization or community. The better the preparation, the better the outcome. These methods are not recipes but flexible, conceptually based practices designed to make lasting change based on tested principles. Every aspect of their design and management has been researched in order to make them highly reliable. Those who manage these methods must understand the theory.

3. THE PAST AND FUTURE OF OST(E)

The previous sections have briefly examined the current shape of OST(E). A similarly brief examination of its aetiology may throw more light on its nature and purposes. In this section we look back over three distinct phases of the development of OST(E).

3.1. The Thin Red Line

Historically, we can discern two major streams of accumulating knowledge based on two views of the nature of reality (see Table I). Within each stream many schools of thought have waved 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 Platonic and Aristotelian, summed up by "realism" and "idealism" (Mead,

Table I. Material and Abstract Universals

	Material universal—*Thin Red Line*	Abstract universals
The question is	What does it do?	"What is it?"
Identification	What in a particular context has effects on the focal thing or event and what changes in that thing make what changes in the context—grasped in the grasping of the particular	The "thing in itself," its essence, context-free—what is true about a thing or event in any circumstances
Proceeds by	Structural corroboration–corroboration of "facts" by its relation to other "facts"	Multiplicative corroboration—confirmation of the same "facts" by replication
Language based on	Serial genetic constructs	Generic things, nouns
Assumption–sufficient conditions of behavior are	In system-in-environment	Within the organism or social unit
Units	*Transact*	*Self act* or *interact*
Novelty or emergence	Recognized as novelty or emergence from *transaction* or *coevolution*	Handled by reductionism or postulation of other entities
Area of research	Social science	Disciplines, specializations
Emphasis	Synthesis	Analysis
People	Open systems with permeable, dynamic boundaries	Imprisoned within impermeable, static boundaries
	Can purposefully change their environments	Subject to "drives" and forces
	Can consciously *extract* knowledge from environments	*Tabulae rasae*; must be taught

1932). It may surprise some that Plato lends his name to the first rather than the second stream, but Jordan (1981) has shown that it was the younger Plato associated with Ideal Types and that he radically changed his mind later in life, dissociating himself from the Aristotelian tradition.

The Aristotelian stream (idealism) 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; M. Emery, 2000b). The

later Platonic stream (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 such as Pepper, Asch, Chein, Tomkins, Jordan, and Gibson whose realist contributions, as mentioned above, provide some of the foundations of OST(E). This chronology brings us up to the early flowering of OST(E) at the Tavistock Institute in London in the period 1951–1969. The Tavistock contribution is documented in *The Social Engagement of Social Science* (Trist and Murray, 1990). Fred Emery and Eric Trist led this development which, was explicitly based on the realism stream whch they called the *Thin Red Line* (M. Emery, 2000a).

As Table I shows, each of the streams provides a constellation of internally consistent dimensions. "One of these views accepts as real physical bodies and their activities; the other nontangible formal qualities and logical and mathematical truths" (Chein, 1972, p. 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, pp. 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, p. 451) and derive from particular dynamic instances or events. They identify the limits of reality within which a claim to "truth" is made so that the search for material universals inclines more to "verities" than to an abstract "truth" (Chain, 1972, pp. 319–336). Despite the recent sorties of physics into a "theory of everything" (Wertheim, 1995), science generally proceeds by structural corroboration (Pepper, 1942, pp. 39–70) or the identification of invariants (Gibson, 1966), the same actions happening in different places at different times. Science 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, which is one of the reasons that popularizing science is so difficult. Identifying things as nouns out of context involves us in circular arguments, as properties such as extroverted behaviors define an "extrovert" and the "fact" that a person is an "extrovert" explains the extroverted behaviors.

While debate about the nature of "evolution" rages in the biological sciences more generally, the choice of material or abstract universals for the social scientist is more fraught because people also deliberately create novel phenomena. There is a choice of assumption—Do the sufficient conditions of behavior lie purely within the person or in the person-in-environment? Theorists on the Thin Red Line choose person-in-environment because they perceive and, therefore,

acknowledge that people transact and coevolve with their physical and social environments. They behave very differently from inanimate things and from animals without consciousness, which OST(E) defines as "awareness of awareness," following Chein (1972). The Thin Red Line

> 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. (F. Emery, undated)

The differences between transaction and interaction and their internally consistent relations with open/closed, purposeful/not purposeful, synthesis, and analysis are illustrated by contrasting two major definitions of a system. The first is that of Angyal (1941) and Emery, above, where the identification of the system principle provides a serial genetic construct of a whole system in its environment. "In a system the members are, from the holistic viewpoint, not significantly connected with each other except with reference to the whole" (Angyal, 1941, p. 250). As we have seen, this unitary system transacts with a humanly created social field in a whole to whole relation of mutual influence. The second definition is that of Ackoff (1974, p. 13), namely, "a system is a set of two or more interrelated elements of any kind." In 1999, Ackoff elaborated this definition and follows it with "a system, therefore, is a whole that cannot be divided into independent parts" (p. 16), a definition which flows from a closed rather than open system logic because it has no relation to an environment. He then explains (p. 16) that "the essential properties of a system taken as a whole derive from the interactions of its parts, not their actions taken separately."

Ackoff's (1999) book contains two sets of definitions, the first of which (1999, pp. 27–34) distinguishes human from other systems but only in terms of the differing relationships between the whole and its parts, not between the wholes and their environments. The second set (1999, pp. 52–57) discusses differing systems in terms of their environments such that people are differentiated by the fact that they are purposeful systems, who purposefully act to change their environments (Ackoff and Emery, 1972; Ackoff, 1999, p. 54). He based his general definition of a system, as above, on the first set. Had he used the latter classification as the basis of his definitions, he would have had to address the system–environment relation.

Similarly, if he had used the purposeful system definition, he would not have been able to stay with the concept of *interaction* between parts of human systems because other people and social systems are part of the environments that people are purposefully changing. Therefore, people are continually influencing each other. In other words, they are *transacting*. Machines **do** interact,

to exchange information for example, but they do not change their minds about the meaning of the information exchanged, i.e., they do not mutually influence. People do precisely that. People are also influenced by the changing nature of their social environments which are also human creations. So while the concept of interacting parts is appropriate for non purposeful systems such as machines, it is inappropriate when applied to people and social systems.

Ackoff's method for determining whether an entity is or is not a system requires finding a larger system in which to embed the smaller system. It breaks down at the point where there is no larger system in which to embed the smaller system. Using the example of a school, his method requires finding the function of the larger education system within which the school is embedded. But where does one go to find the larger system within which the education system is embedded? The nation state, then the planet, and then the universe? He states (1999, p. 16) that "a system is a whole that cannot be understood by analysis," but ultimately for these largest systems, his definition requires just that. It is not until one has analyzed the relations between the parts and the relation of the parts to the whole entity that one can decide whether or not that entity is a whole or a system. His conceptualization is ultimately one of analysis. Here we see the relations among closed systems, interactionalism, and analysis. While Ackoff's work has been used to illustrate the internal consistencies of the abstract universals stream and its divergence from the thin red line, it is characteristic of many of the variants of General Systems Theory mentioned below.

Another of the consequences of choosing one stream rather than the other involves the ultimate subject matter. On the one hand, if the choice is person-in-environment in all of their changing particulars, that choice yields an wholistic social science. For example, a person in daily life may move from home to workplace to the doctor, to the pub, to home, to an experiment as a voluntary subject, and back home. In each setting, the same person behaves differently. A study of that person as human being involves the questioning and process of identification outlined under Material Universals in Table I—What is s/he doing? How? and Why? On the other hand, if the choice is an intraindividual or social unit taken context-free, 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, for example, DNA as the determinant of human and social behavior. But we have lost the species as the subject matter well before we reach the stage of determinist genetics. Specializations within social science have led us into innumerable varieties of family members, of people in management or worker roles, of sick and well people, and innumerable varieties of people under rigorous experimental conditions.

Therefore, it is in social science that the choice between the two streams becomes stark and consequential for practice. The endless definitions of a

"human nature," a static generic concept, contrast sharply with the serial genetic construct of a purposeful system as above, one who "can produce. . . ." In OST(E) the people who inhabit and purposefully change the world also use conversation as preparation for concerted action (de Laguna, 1927) with a huge range of skills, motives, and affects (Tomkins, 1963). 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 and Varela, 1980). We end up with two quite irreconcilable human portraits.

3.2. The Flowering of OST(E) at the Tavistock Institute

During the period 1951–1969, there were major theoretical and practical innovations and also departures from conventional wisdoms. In 1965, Emery and Trist published the classic paper, "The Causal Texture of Organizational Environments," which brough to maturity Bertalanffy's (1950) concept of an open system. Without this conceptualization of the social field and its changing causal texture over time, it was impossible to answer the questions, "What are we adapted to?" and "How do we know if we are maladapted?"

> Though von Bertalanffy's formulation enables exchange processes between the organism, or organization, and elements in its environment to be dealt with in a new perspective, it does not deal at all with those processes in the environment itself which are among the determining conditions of the exchanges. To analyze these an additional concept is needed—*the causal texture of the environment*—if we may reintroduce at a social level of analysis, a term suggested by Tolman and Brunswik (1935) and drawn from S. C. Pepper (1934). (Emery and Trist, 1965, p. 54)

In this way, they consciously placed OST(E) within Pepper's (1942) world hypothesis of contextualism.

World hypotheses are systems of assumptions flowing from root metaphors, that is, they are hypotheses about how to approach the world. Contextualism assumes that 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 integra-

tion 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 and 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) and a rash of mystical "New Age" "theories." In 1959, the first SC was held (Trist and Emery, 1960). It distinguished itself from all previous methods of strategic planning in that, for the first time, the L_{22} was addressed as a major component of the planning process.

While contextualism informed the basic framework of OST(E), directive correlation (Sommerhoff, 1969) brought it to life. Directive correlation not only encompasses what Holt (1915), Chein (1972), and Ackoff and Emery (1972) define as purposive behavior, but also models coevolution rather than evolution. It has become the central concept of OST(E), as it also can encompass the concepts of perception, cognition, memory, and motivation. Expressing these phenomena as directive correlations enables testable hypotheses (see M. Emery, 1999, pp. 70–103).

But the allure of abstract universals remained strong within the social sciences and Bertalanffy's open system 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. (F. Emery, undated)

The GST offspring became part of the problem rather than the solution because they are simply variations on the other three world hypotheses while pretending to be different.

The difference between OST(E) and GST could not put better than by De Paoli (2000, p. 40) in his "reflections on Prigoginism" and its merger with chaos theory, which he describes as "a recently introduced, fancier name for the mechanistic, percussive-attractive-interactive systems of the Paolo Sarpi school of empiricists and positivists." He concludes (p. 42), "The uniqueness of human culture is expressed ... by the continuous production of ideas.... This process is not mechanical nor mechanizable."

The other major conceptual breakthrough during the Tavistock flowering of OST(E) was the discovery of open, jointly optimized, sociotechnical systems (Trist and Bamforth, 1951; F. Emery, 1959). This broke with all previous conceptualizations of the relations between people and their tasks. The radical nature of this break is now difficult to imagine, accustomed as we are to talk of "self-man-

agement," and unaware as we often are of its origins and accurate conceptualization. However, the further discovery of the genotypical organizational design principles by Fred Emery in 1967 heralded another breakpoint which coincided with the end of the creative period associated with the Tavistock Institute.

3.3. Post Tavistock: Fragmentation

Among others, Trist and Emery left the Tavistock in the late 1960s. An Australian group gathered around Emery to catch up with the Tavistock work. It rapidly became engaged in development as we all learned more about the genotypical design principles, their ubiquity, effects, and explanatory power. This new knowledge caused us to make conceptual and practical changes that fuelled divergences with Trist and Ackoff, now both in the United States. A few examples of these divergences follow.

First, following the early joint work on ideal seeking systems (Ackoff and Emery, 1972), Ackoff chose "idealized future" or "design" as a time-free scenario for his planning method, using consensus. "The interactive planner initiates ends planning by designing an *idealized future* for the system being planned for. This is a design of the future that begins "from scratch'" (Ackoff, 1974, p. 30). All financial and political constraints are removed although technological innovations are considered if possible. In Australia, the Emerys further developed the time based Search Conference, which necessarily includes consideration of probabilities changing over time, to elicit ideal seeking, using *rationalization of conflict* rather than consensus (F. Emery, 1966; M. Emery, 1999). We also demonstrated that ideal seeking is elicited from group task orientation (the $^{A}X^{B}$ model) within DP2 structures. This had been foreshadowed:

> The instrument employed by an individual or system operating at any functional level is always at a lower level than the level of the individual or system that uses it. If a purposeful individual (A) wants to use another purposeful individual (B) as an instrument, he can do so only by restricting the choices of B so that B acts at less than the level of purposefulness. (Ackoff and Emery, 1972, pp. 31–32)

When the organization is structured on DP1, the people within it are instruments of the organization and, as such, are limited to goal seeking or purposefulness at best. When the organization is structured on DP2, the organization is instrument for the people. Therefore, they have one more degree of freedom such that they can rise to the next functional level, which is ideal seeking. Moreover, these ideals, and the maladaptions, can be measured and tracked over time (Emery and Emery, 1979).

Second, the Australian group stayed with the system principle and design principles, while Trist (1983) worked on referent organizations and domain theory.

"The term domain references the focal organization to the organizational field, which now becomes the object of inquiry. . . . Inter-organizational domains are concerned with field-related organizational populations. An organizational population becomes field-related when its engages with a set of problems, or a societal problem area, which constitutes a domain of common concern for its members . . ." (Trist, 1983, p. 170). A domain, e.g., energy (Trist, 1983, p. 171), is called an issue in OST(E) and dealt with as one of the general class of "community" rather than "organizational" SCs (M. Emery, 1999). Trist called domain development "(meta) problem solving," while we distinguished problem solving as a means-based activity with a known end point (problem solving) and active adaptive planning for Type IV fields as puzzle solving with an unknown end point.

Third, neither Trist nor Ackoff ever used the genotypical design principles or the PDW, although Trist understood their genesis (Trist and Murray, 1990, p. 31). He contrasted "socioecological" with "hierarchical" (Trist, 1983), while we used "socioecological" as a general term to mean people or social systems in environment, with the possibility of either design principle. We distinguished hierarchies of personal dominance (DP1) from nondominant hierarchies of function (DP2). Trist (1986) used committees (DP1) in Jamestown, the structure and function of which would have conflicted and interfered with progress toward their goal of self-management (DP2).

Similarly, we developed the SC as a temporary DP2 structure where, rather than as "stakeholders" or representatives (DP1), people come just as themselves. We designed the "community reference system" in 1974 so that a community selects its own SC members without bias and collectively with all the knowledge required to plan and take responsibility for their future (M. Emery, 1999, pp. 186–187). After a SC, its members use a PDW to organize themselves into a DP2 structure within which they carry responsibility for implementing their plans. By calling the method "the Emerys' Search Conference," Morley and Trist (1993) missed the link to the first SC in 1959, at which Eric Trist monitored the dynamics and took notes (Trist and Emery, 1960). Coherence around the Thin Red Line had disappeared.

3.4. The Future of OST(E)?

OST(E) has proven to be a reliable and practical framework because it has stuck with material universals derived from collaboration with people around their everyday concerns and circumstances. Inevitably those concerns and circumstances involve their futures and those of their children.

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