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Organizations as Soap Bubbles: An Evolutionary Perspective on Organization Design[1]

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In this paper we approach the problem of organizational order (that is, how patterns in organizational actions and design features emerge) from an evolutionary perspective. It is argued that constructivist rationalism, the doctrine that organizational order is the product of human design, is inadequate, for it conflates human action with human design. We argue that organizational order is neither the outcome of anthropomorphic design nor the product of sheer chance but the nonconscious outcome of evolutionary processes. Organizations are likened to soap bubbles: they consist of individuals acting in a quasi-random manner who are plastically controlled—that is, their actions are selected by—higher-level regulative processes concerned with survival. Quasi-random trial-and-error actions are the raw material that is subsequently transformed into a meaningful whole through reflection. The latter acts as a selection process and gives rise to an enacted organizational order that is retained and conditions further sensemaking.

KEY WORDS: design; evolution; rationality; reflective action; sensemaking.

1. INTRODUCTION

> *Just as the naive or untutored mind tends to assume the presence of life wherever it perceives movement, it also tends to assume the activity of mind or spirit wherever it imagines that there is purpose.*
>
> F. A. Hayek (1988, p. 107)

The problem of complex design is of central importance in both biology and organization theory. How have complicated biological objects, on the one hand, and organizational systems and procedures, on the other, come about? What is it that makes both biological organisms and organizations orderly, patterned, elaborate, and functionally specialized? In short, what explains the order that one finds in the arrangement and functioning of organisms and organizations?

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In biology, admittedly, these are no longer questions waiting for an answer. Darwin's theory of natural selection marked the beginning of an irrevocable shift in the way we now understand and explain the sophisticated complexity of biological objects (see Dawkins, 1988). In organization theory, however, we are, by and large, still in a pre-Darwinian stage. It has long been tempting to want to explain organization in anthropomorphic terms, a temptation to which several organization theorists have frequently succumbed in one way or another. After all, organizations are human artifacts. Would it not be sensible to assume that they are the way they are because they have been so designed by certain individuals?

In organization theory, the postulate of the rational actor has long been the basic premise upon which anthropomorphic explanations have been based. An organizational form is the way it is, the argument goes, because of human choices and decisions made under norms of rationality (Thompson, 1967). One may or may not choose to study how norms of rationality are constructed and acted upon by organizational actors. If one does so, one is concerned with the strategic choices made by politically motivated actors in the light of their interpretations of the circumstances facing an organization; if, however, one does not do so, one is interested primarily in discovering the objective contingencies that shape organizational forms, without considering actors' mediation of those contingencies (Mohr, 1982). Both the strategic choice and the contingency perspectives, however, share the assumption that organizational forms are the outcome of *deliberate* human action. The two perspectives differ only in the extent to which norms of rationality are deemed as being socially constructed or as being objectively restrictive and compelling.

The anthropomorphic approach to organization design has been manifested even more clearly in the literature dealing with strategy formation. The image of the purposeful strategist tirelessly synthesizing information about the organization and its environment, and then designing the organization's strategy which is subsequently put into action, has been the most entrenched image of strategy making (for an excellent review and critique see Mintzberg, 1990). However, as Mintzberg (1989) has cogently demonstrated, such an anthropomorphic image of strategy formation is seriously limited. At best, it captures only certain cases of strategy making, while leaving out the vast majority of cases in which organizational strategies have been less the concrete result of clear intentions and grand designs and more the emergent outcome of open-ended interactive processes.

It is the purpose of this paper to explore a nonanthropomorphic approach to organization design. To this end, we shall investigate the parallels between developments in biology and organization theory. It will be argued that an evolutionary approach offers a better way to explain organizational forms and practices than the anthropomorphic perspectives we alluded to above. We will also attempt to synthesize the evolutionary epistemologies of Popper and Hayek with organization-specific accounts for acting and sensemaking. The main claim of this paper is that an evolutionary perspective resolves the tension between freedom and control, chance and necessity, via regarding the organization as a hierarchical system of *plastic controls*. Echoing Popper, the image of the soap bubble is evoked in order to convey the idea of plastic control, which, in our view, is a key feature of all social systems. An evolutionary perspective also provides the outline for a general theory of organizing applicable at micro and macro levels of analysis.

2. THE ARGUMENT FROM DESIGN: CREATIONISM AND CONSTRUCTIVIST RATIONALISM

In his famous treatise *Natural Theology*, Paley (1828) argued for the existence of God on the basis of evidence *collected from the appearances of nature* (the subtitle of his book). His argument for a Creator who, by design, created the world and the multitudes of creatures in it was knowledgeable, was passionately argued, and, above all else, seemed highly plausible. If you find a watch, Paley argued, you would naturally want to inquire about where it came from. You will never doubt for a moment that the watch must have had a maker. Such a sophisticated artifact, consisting of several elaborate components so intricately and precisely put together, is compelling evidence that there must have been someone who designed the watch—a watchmaker. Well, by analogy, is it not sensible to assume that an even more sophisticated object such as a higher organism has also been designed by an intelligent Creator? The extraordinary complexity, beauty, and sophistication that one finds in biological organisms surely cries out for an explanation not unlike the one we tend to invoke when we are faced with a telescope or a hearing aid. Just as the latter had a designer, so the human eye and ear must have had a designer too (cf. Dawkins, 1988).

Thus, for Paley (and creationists more generally), both manufactured and biological objects *appear* to have been designed for a purpose, and therefore, they must have had a designer. Our common-sense familiarity with the design of manufactured objects clearly lends credibility to such an analogy. Furthermore, it is not difficult to see how this analogy could be extended to include social institutions as well. Of course, when it comes to explaining the latter, it is not God that is invoked, but its modern-day substitute: human Reason. Since social institutions are obviously human artifacts and they appear to serve certain human purposes, social institutions must have been deliberately designed and, therefore, can be deliberately *re*designed (cf. Hayek, 1982, 1988). Hayek (1982) aptly labeled the social equivalent of creationism "constructivist rationalism."

Both creationism and constructivist rationalism are predicated on the idea of a purposeful designer who, having formulated a well-conceived plan in his/her mind, molds and instructs his/her "raw material" to take a desired shape (Mintzberg, 1990; Popper, 1987). Such an anthropomorphic view of design rests on three assumptions. First, the end product of design can be clearly envisaged—that is, it has already come to existence, it has conceptually taken its shape—by the designer. Second, all knowledge that is necessary for conceiving a particular design as well as for bringing it into reality is possessed or can be possessed by the designer. And third, for the design to be implemented and the intended outcome to appear, the designer must have complete control over how such knowledge can be manipulated. In other words, creationism and constructivist rationalism assume, in ideal-typical terms, a perfectly rational designer—perfectly rational in terms of both his/her knowledge and his/her capability to put it into action (Mintzberg, 1990; Hayek, 1982, 1988; Tsoukas, 1993b).

The cornerstone of constructivist rationalism is the conviction that action that is based on mere tradition, which, by definition, cannot be justified on rational grounds, is irrational. Only rational action is successful action. In turn, action is rational when it can be justified according to the principles of logical deduction, that is, when it can be derived from explicit premises which are demonstrably true. Cartesian deductive reasoning has been taken to be the sound cognitive basis of rationally motivated action. As Hayek (1982, p. 10) remarked,

> It is almost an inevitable step from this to the conclusion that only what is true in this sense can lead to successful action, and that therefore everything to which man owes his achievements is a product of his reasoning thus conceived. Institutions and practices which have not been designed in this manner can be beneficial only by accident. Such became the characteristic attitude of Cartesian constructivism with its contempt for tradition, custom, and history in general. Man's reason alone should enable him to construct society anew.

Being the paradigm of rationality, deductive reasoning reconstructs categorically social phenomena to make them conform to its logical structure. A concrete social phenomenon is conceived (hence it is *constituted*) in such a way as to identify in it a set of empirically verifiable underlying general principles (i.e., explicit premises) which are stated in the form of propositional statements (i.e., "if, then" statements). The latter codify the lawful regularities with which a social phenomenon is thought to be replete (e.g., organizations in highly uncertain environments tend to have organic structures). In conjunction with the "initial conditions" pertaining to a particular phenomenon (e.g., Apple is such an organization), propositional statements help generate the requisite conclusions (e.g., Apple will/ought to have an organic structure). After such regularities have been identified through social scientific procedures, they, in turn, can be influenced at will by those who possess such knowledge (Tsoukas, 1993a).

Most of what we know in organization design and strategic management has been cast in the form of propositional knowledge. For example, "if technology is routine, then organisational complexity is low," "If the environmental uncertainty is stable then centralisation is high," "If the organisational strategy is that of a prospector then centralisation is low," and so on (see Baligh *et al.*, 1990, pp. 41–44; Glorie *et al.*, 1990, p. 87). These propositional statements both serve as explanations of certain recurring phenomena and are intended to be guides for managerial action.

To sum up, Creationism is the doctrine that, like manufactured artifacts, biological objects are how they are because they have been so designed by a creator. Constructivist rationalism, being the social equivalent of creationism, similarly asserts that since social institutions serve human purposes, they are, and ought to be, the product of deliberate human design. The latter is deductively derived from explicit premises and is codified in propositional statements. Social scientists generate increasingly sophisticated propositional statements which are subsequently used by practitioners as reliable guides for rational action.

3. THE CASE AGAINST DESIGN: NATURAL SELECTION

Paley's analogy between a watch and a living organism is partly correct and partly false; to put it better, from certain apparent similarities between the two, it leads to false conclusions. It is indeed the case that both a watch and a living organism are too improbable and too beautifully made to have come into existence by chance. Both of them are complicated entities, that is, they both have a quality, specifiable in advance, that is highly unlikely to have been acquired by chance alone. A manufactured object such as a watch has the quality of doing something for us (notably to show the time) and it is for this reason that it has been designed. The quality a living organism possesses is proficiency in maintaining a difference with its environment—staving off death and propagating genes in reproduction (Dawkins, 1988).

Paley's analogy assumes that both a watch and a living organism are created in a *single step*, for what else does it mean to say that both watches and living organisms, being as complicated and functional as they are, could not be the products of chance alone? What is meant by "chance" here is something like the likelihood of taking the parts of (say) a watch, jumbling them up at random, and obtaining the whole device (say a working Rolex). The odds of assembling a Rolex through such a process are extremely small—for all practical purposes, it is impossible. Similarly, the chance of getting a 28-letter sentence, such as Shakespeare's "Methinks it is like a weasel" right ("space" counts as one letter), using a 26-character keyboard, is 1 in 10,000 million million million million million million—not exactly a very realistic outcome (Dawkins, 1988, p. 47)!

Single-step selection (namely, selecting things once and for all) appears indeed a very unlikely process whereby complicated entities could have come into existence. Living organisms, however, need not be (in fact they are definitely not) the products of single-step selection; they are the products of *cumulative selection.* In cumulative selection, the results of one selection process are fed, through reproduction, into the next, and so on—in other words, the end product of one generation of selection is the starting point for the next generation of selection. If one attempts to reproduce Shakespeare's phrase we mentioned above through cumulative selection, one can do this in a matter of seconds in the computer, whereas using the same computer in single-step selection it would have taken billions of years! This astonishing difference comes about because, in cumulative selection, an initial random sequence of 28 letters is duplicated repeatedly, with a certain chance of random error ("mutations") each time. At each stage, the computer examines the mutant phrases (the progeny), compares them with the target phrase, and selects the one which most closely resembles the target phrase. In other words, cumulative selection yields complex patterns by taking advantage, *at each stage*, of slight improvements and building on them over long periods of time. In such a process, chance (namely, random mutations) is only a minor element; the most important element is cumulative selection, which is fundamentally nonrandom. In Dawkins's (1988, p. 49) words,

> There is a big difference, then, between cumulative selection (in which each improvement, however slight, is used as a basis for future building), and single step selection (in which each new "try" is a fresh one). If evolutionary progress had had to rely on single-step selection, it would never have got anywhere. If, however, there was any way in which the necessary conditions for *cumulative* selection could have been set up by the blind forces of nature, strange and wonderful might have been the consequences.

In real life, of course, there is no target according to which mutant progeny are judged; there is no purpose which the process of cumulative selection serves. The only criterion for selection is survival (namely, the capability to maintain a difference with the environment) or, more generally, reproductive success. All living organisms, therefore, have an *adaptive problem*, that is, a problem that affects reproduction, and their *design features* are those that have been selected according to how well they have helped their carriers to solve an adaptive problem. Darwin's theory of natural selection has provided a causal account of the relationship between adaptive problems and the design features of organisms. Cosmides *et al.* (1992, p. 9) have succinctly and elegantly summarized Darwin's theory as follows:

> Imagine that a new design feature arises in one or a few members of a species, entirely by chance mutation. It could be anything—a more sensitive retina, a new digestive enzyme, a new learning mechanism. Let's say that this new design feature solves an adaptive problem better than designs that already exist in the species: The more sensitive retina allows one to see predators faster, the new digestive enzyme allows one to extract more nutrients from one's food, the new learning mechanism

> allows one to find food more efficiently. By so doing, the new design feature causes individuals who have it to produce more offspring, on average, than individuals who have alternative designs. If offspring can inherit the new design feature from their parents, then it will increase in frequency in the population. Individuals who have the new design will tend to have more offspring than those who lack it, those of their offspring who inherit the new design will have more offspring, and so on, until, after enough generations, every member of the species will have the new design feature. Eventually, the more sensitive retina, the better digestive enzyme, the more reliable learning mechanism will become universal in that species, typically found in every member of it.
>
> Darwin called this process *natural selection*. The organism's interaction with the environment—with "nature"—sets up a feedback process whereby nature "selects" one design over another, depending on how well it solves an adaptive problem (a problem that affects reproduction)."

In sum, from a Darwinian point of view, complex design is neither the outcome of chance alone nor the result of an omniscient creator. Clearly, it is not the case that "anything goes," since it is only certain design features that confer their carriers reproductive advantage. At the same time, particular design features in the present cannot be traced back with any desired degree of precision, provided that we have sufficient knowledge about their origins. What the theory of natural selection has done is to have introduced an entirely new way for thinking afresh the relationship between perfect chance and perfect determinism, between freedom and control. It has replaced the simplistic dichotomy "either chance or cast-iron control" with the intermediate notion "chance *and* control"—what Popper (1979) has called "plastic control," that is, the simultaneously restrictive and enabling relationship between an organism and its environment based on feedback.

4. BEYOND MACHINES AND GARBAGE CANS: ORGANIZATIONS AS SOAP BUBBLES

The anthropomorphic image of organization design presupposes complete knowledge of all the relevant facts, as well as complete power to manipulate them in order to produce the intended result. The paradigm for the logical structure of such knowledge is the deductive syllogism (Hayek, 1982). For these assumptions to be correct and for deductive reasoning to be the only valid generator of rational action, organizations (and social systems more generally) need to be replete with event regularities, since it is only the latter that lend themselves to be described in a propositional form. Event regularities are possible only within closed systems (or systems that can be *made* closed to one degree or other), and for closure to occur the following two conditions must be met (Bhaskar, 1979; Sayer, 1984; Tsoukas, 1992).

First, the generative mechanisms producing event regularities must not undergo qualitative change (the intrinsic condition of closure). And second, the relationship between generative mechanisms and the external conditions that matter for the mechanisms' operation must remain constant (the extrinsic condition of closure). To the extent that actors' meanings and conceptual structures differ across contexts, and change over time, organizations violate both conditions of closure. Actors have the potential of learning and developing (Gharajedaghi and Ackoff, 1984), thus violating the intrinsic condition for closure. Given also that actors' action is essentially context-dependent (Bateson, 1979; Weick, 1979; Winch, 1958) and that contexts change in ways that are not always predictable or even intelligible, the extrinsic condition of closure is also violated. IBM's current plight, for example, is a good case in point. The company that set the standards in the market for personal computers and, for most of the 1980s, was the biggest PC maker eventually failed to adjust to a state of affairs that it itself had helped generate. The actions of competitors, technological advances, and changes in the behavior of customers throughout the 1980s all gave rise to a new context in which earlier policies, no matter how successful they had been , were no longer appropriate (see *The Economist*, 16/1/1993, pp. 18–19, 23–25).

The idea that organizations are quintessentially open systems (open in the sense described above: both conditions of closure are violated, and therefore, event regularities are impossible to be reliably obtained across space and time) implies that the success of organizational action depends inescapably on more particular facts than anyone can possibly know. Since individuals inevitably develop and contexts constantly change, the knowledge that each organizational member has, as well as the knowledge that each organization as a whole possesses, is only a fraction of the knowledge possessed by all. Thus the human capacity for self-reflection, for reinterpretation, and, thus, for novel action vitiates any attempt to offer an absolute description of a social system (Tsoukas, 1993b); there will always be an ineradicable indeterminacy in what the action of a social system is about and where it leads to.

The rise and recent decline of IBM will help illustrate these points (see *The Economist*, 16/1/1993, pp. 23–25). IBM's entry into the personal-computer market was viewed as an undoubtedly sensible move at the time. IBM had originally thought PCs would actually boost the demand for its mainframes because it believed PCs would be connected to these. Alas, that is not how the market reacted! IBM's move may have been intelligent from a technical-cum-commercial point of view, but it inevitably had more dimensions to it—that is, it was interpreted by others in ways IBM had not thought of. The entry into the PC market, for instance, *legitimized* the PC for thousands of big companies that previously had been wary of them (see *The Economist*, 16/1/1993, p. 24). Consequently, several ripples (not all of them intended by IBM) followed the initial move into the PC market. The market exploded and IBM became the biggest PC maker, while, ironically, at the same time, demand for PCs began to undercut the demand for its mainframes, and naturally, attracted by the phenomenal success of the PC and the relatively low barriers to entry, new competitors made their appearance. The corporation that in 1985 looked invincible, in 1993 announced the biggest annual corporate loss ever recorded!

As the story of IBM demonstrates, the pattern of strategic moves in an industry rarely conforms to an organization's intentions and plans. It rather emerges as the outcome of interaction between the plans followed by particular organizations and the latters' response to the particular conditions in which each one of them finds itself, and the particular interpretations it applies to certain situations. As Hayek (1982, p. 12) remarks, we must bear in mind "the fact of the *necessary* and *irremediable ignorance* on everyone's part of most of the particular facts which determine the actions of all the several members of human society" (italics added). And he continues (pp. 14–15),

> The characteristic error of the constructivist rationalists in this respect is that they tend to base their argument on what has been called the *synoptic delusion*, that is, on the fiction that all the relevant facts are known to some one mind, and that it is possible to construct from this knowledge of the particulars a desirable social order. [. . .] They seem completely unaware that this dream simply assumes away the central problem which any effort towards the understanding or shaping of the order of society raises: our incapacity to assemble as a surveyable whole all the data which enter into the social order.

More than anyone else, Mintzberg has brought to our attention the irreducibly emergent character of organizational strategies. Strategies for Mintzberg are not the plans produced by a certain group of top managers and technocrats but the patterns in streams of decisions. The latter emerge, disappear, mutate, and get realized in a manner that is beyond a person's (or a group's) propositional knowledge and control (see Mintzberg and Waters, 1985; Mintzberg, 1989). Mintzberg's argument is essentially about how one can discern order in an organization's actions even in the absence of central intentions. While constructivist rationalists would seek to explain organizational actions anthropomorphically, that is, in terms of the intentions and plans of key decision makers, Mintzberg's approach is to analyze a given pattern of actions in terms of the interaction among individual agendas, local circumstances, and central plans. Whereas the anthropomorphic image tends to reduce organizational action to the intentions of individual actors, an evolutionary perspective highlights the importance of chance events and the patterns of response they initiate under the regulative notion of survival.

If a pattern of actions and a set of design features cannot be reduced to their makers, nor can they be entirely accidental outcomes (the chance of the latter happening in manufactured and biological objects and, by extension, to social institutions is, as we have seen, vanishingly small), how, then, can they be explained? What we are looking for is an explanation of organizational order (actions and design features) which, while avoiding anthropomorphic determinism, steers away from chancelike indeterminacy. An additional criterion is an explanation which will do justice to the open character of organizations (open in the sense defined earlier) and to the quasi-random action of organizational members, on the one hand, and will allow for the patterned and orderly nature of the actions and design features of organizations, on the other.

Although a soap bubble might look like an unlikely analogy to invoke in order to understand organizational order, it does provide some useful insights into the phenomenon of organizing. More specifically, an organization and its members are related analogously to the way soapy film is related to air in a soap bubble—both subsystems are mutually constituted and controlled through feedback. Popper (1979, p. 249) has elegantly described the plastic control that exists in a soap bubble as follows:

> The soap bubble consists of two subsystems which are both clouds and which control each other: without the air, the soapy film would collapse, and we should have only a drop of soapy water. Without the soapy film, the air would be uncontrolled: it would diffuse, ceasing to exist as a system. Thus the control is mutual; it is plastic, and of a feed-back character. Yet it is possible to make a distinction between the controlled system (the air) and the controlling systems (the film): the enclosed air is not only more cloudy than the enclosing film, but it also ceases to be a physical (self-interacting) system if the film is removed. As against this, the film, after removal of the air, will form a droplet which, though of a different shape, may still be said to be a physical system.

Similarly, an organization can be seen as a hierarchical system of plastic controls—as a system of quasi-randomly acting individuals having their own agendas and possessing their own local knowledge, who are plastically controlled by the "whole" in a similar way that a cluster of gnats, in spite of their irregular movements, does not diffuse but keeps together in a relatively coherent manner (Popper, 1979). The process through which plastic control operates is that of natural selection. Quasi-random movements and variations (i.e., the equivalent of mutations) are accepted, that is, they are selected and retained, when they fit into the higher-level structure of the controlling organization (Cambell, 1987; Popper, 1987). The latter, in turn, seen as a set of rules and institutionalized practices, is nothing else but the outcome of earlier processes of variation, selection, and retention.

It is worth noting that such an evolutionary account of organizing resolves at once two conceptual problems: the problem of reductionism and the problem of anthropomorphism. Let us consider each one of them separately.

From a reductionist point of view, organizational order is explained upward: if one understands the constituent parts of a whole and how they interact, one will come to understand the whole itself (Dawkins, 1988; Gharajedaghi and Ackoff, 1984). In contrast, an evolutionary perspective substitutes downward causation for the view of upward causation implied by reductionism. We speak of downward causation when a higher-level structure operates causally on its substructures. From an evolutionary point of view, downward causation is understood as a process of selection operating on lower-level, quasi-randomly fluctuating individual behaviors. Thus Mintzberg's (1989) account of how the National Film Board of Canada (NFBC) found itself pursuing a strategy of making films for television (selection), for about a decade (retention), is explained evolutionarily by noticing that an impatient film-maker, following his own instinct and inclination—that is, having his own agenda and possessing local knowledge about which the rest of the organization was necessarily ignorant—had quietly set a precedent by making a film for television (quasi-random variation). That film was a success, and was quickly imitated by a stream of other similar films made by several of his colleagues. Thus, the organization followed a strategy which, although it was not consciously chosen by the center, was selected because it fitted the broad mission of the organization in a changing environment.

The latter remark leads us to the problem of anthropomorphism—the tendency of constructivist rationalists to explain organizational order in terms of the conscious intentions of those who helped shape it. As Hayek (1982, 1988) persistently argued, the error in such an argument is the identification of human action with human design. Like a strategy or an organization design, a painting, for example, is certainly the product of the painter's action but it rarely is the outcome of the painter's design. The reason is that, as Gombrich (1960) aptly remarked, "making comes before matching"—the making of variations comes before their selection by the environment. In Popper's (1979, p. 253) words,

> A painter may put down, tentatively, a speck of colour, and step back for a critical assessment of its effect in order to alter it if it does not solve the problem he wants to solve. And it may happen that an unexpected or accidental effect of his tentative trial—a colour speck or a brush stroke—may change his problem, or create a new sub-problem, or a new aim: the evolution of artistic aims and of artistic standards [. . .] proceeds also by the trial-and-error method.

[For similar analogies likening strategy making to crafting pottery, and reflective action to painting, see, respectively, Mintzberg (1989) and Schon (1983).] A painter, like any other practitioner, is constantly engaged in problem-solving by trial and error—he/she reacts to new and old problems by quasi-random trials which are eliminated if unsuccessful. [It is perhaps worth noting at this point that the notion of quasi-random trials or variations does not so much imply randomness, in the sense of trials being equiprobable and independent, as "blindness"—the idea that variations are produced without prior knowledge of which ones are going to correlate with the final product (see Cambell, 1987; Popper, 1987).]

Problem-solving, however, is not a conscious process. As Popper (1979, p. 246) remarks, "When we speak of a problem, we do so almost always from hindsight. A man who works on a problem can seldom say clearly what the problem is (unless he has found the solution); and even if he can explain his problem, he may mistake it.'' Thus the NFBC's film maker who first made a film for television did not solve the problem of whether his organization should be producing films for Canadian television and what they should be, nor did he even solve his problem of how to make such a film—in fact, his own TV film was almost accidentally made. In the same vein, IBM was not solving a previously defined problem when it entered into the PC market. It was *creating* a new market in the hope that it would nicely complement its (at that time) thriving market for mainframes. In other words, at any point in time, the problems we manage are (at least partially) almost always the results of our earlier attempted solutions (Watzlawick *et al.*, 1974), which, in turn, were the result of attempting to manage even earlier problems, and so on. Making comes, indeed, before matching!

How is objective problem-solving possible without an individual consciously solving problems? Weick's evolutionary perspective on sensemaking may hold the answer. According to Weick (1977a, b, 1979), under the constraints of retained wisdom, an individual's pure trials and quasi-random activities bracket some portion of the stream of his/her experience for further examination. The bracketing is crude and blind: at this stage, which Weick calls ''enactment,'' no judgments of error are made—sheer experimentation, softly constrained by previous experiences, generates unjustified variations which provide the raw data for sensemaking.

The raw data thus generated are subsequently transformed into information by processes of reflection: ''what [individuals and] organisations say and do provides displays that they can examine reflectively to understand what is occurring'' (Weick, 1977b, p. 195). This is the stage at which selection activities take place. The raw data generated by enactment are chopped into sensible units, which are subsequently connected to form a meaningful whole. Finally, at the retention stage, knowledge of what one thinks is stored in the form of an enacted environment. Says Weick (1977a, pp. 279–280),

> [A]n enacted environment is the residue of a sensemaking episode that is stored in the retention process as past wisdom. An enacted environment is the output from an episode of sensemaking, not the input to it.
>
> Environments enacted on previous occasions can constrain contemporary enactment. When it is said that an organization is influenced by what it already knows, we mean that contemporary activities of generating and bracketing are affected as well by the present stream of experience as by environments that have been enacted on previous occasions.

Thus for Weick, individuals enact (create) their environment, which they *subsequently* seek to understand reflectively. Again making comes before matching. Individual (and organizational) activities are partly blind: there is no prior knowledge as to how they will fit the final outcome since it is not clear what the final outcome will look like. Individuals act according to the local knowledge they alone possess, and within the limits of the retained knowledge by which they are constituted. In that sense, organizations are irremediably open systems within which chance events and quasi-random trials are not only possible but inevitable. Sensemaking (and thus organization) gradually forms as a result of the raw data generated by the quasi-random process of enactment being plastically controlled (i.e., punctuated and connected) by higher-level, context-dependent regulative processes concerned with survival (i.e., maintaining a difference with the environment).

Thus, for example, in an orchestra attempting to play a new composition, the first play-through consists of the quasi-random activities of the musicians who, under the influence of their own particular backgrounds, skills, and expectations, play a particular composition accordingly (see Weick, 1977a, 1979). In doing so they generate a set of raw data—"a display"—about themselves as a team upon which they subsequently reflect, and turn into information. The process of reflection controls plastically the quasi-blind behavior of the musicians and shapes it to become a meaningful whole—that is, a set of variables which individual members infer as being systematically related. Thus, gradually, the equivocality that there was in the initial activities of the musicians is *organized* into mutually restraining patterns of behavior. As in a soap bubble, without the quasi-random activities of the musicians, the orchestra could not exist; and without the higher-level restraining influence (plastic control) of the orchestra, the musician's behaviors would be uncontrolled—they would lead to no such thing as an orchestra. The latter acquires and maintains its own autonomous identity via constantly attempting to preserve a proficiency in maintaining a difference with its environment.

5. CONCLUSIONS

The problem of explaining organizational order is a central problem in organization theory. Organizing does imply higher-level control and constraint, yet without the autonomous activity of individuals organizing becomes impossible. Organizations do indeed manifest order, coherence, and patterns in their actions, and functionality in their design. It should not be surprising, therefore, to see that the individual and the organization have been pitted against each other, nor should it be strange to realize that, traditionally, the actions and design features of organizations (organizational order) have been conceptualized in anthropomorphic terms. Organizations (and social institutions more generally) do *appear* to serve certain purposes and it does not take much for one to jump to the conclusion that they must have been specifically designed to serve those purposes.

Such a claim, however, would be problematic, for it would not distinguish between *human action* and *human design*. While social institutions are inevitably human artifacts, they are not necessarily the products of human design. Such an eventuality would have been possible had the designer known in advance what he/she wanted, had possessed all the requisite knowledge for such a task in his/her mind, and had had the power to mold such knowledge in such a way as to produce the intended outcome. Organizations, however, decidedly do not conform to these assumptions. Insofar as individuals learn, reflect, and, thus, develop, and so long as the contexts upon which human action depends for its being intelligible and effective change in ways we do not fully understand or predict, organizations are inherently open systems. Thus, event regularities, which are a prerequisite for rational human design, will be impossible to be established across space and time in a reliable manner. Hence deductive reasoning is an irremediably incomplete guide for action.

The irreducible open-endedness of organizations implies that they are distributed knowledge systems in which it is impossible to assemble as a surveyable whole all the knowledge that is necessary for effective action. The success of organizational action depends on more factual (local) knowledge than anyone can possibly have. Individuals are like randomly moving air molecules enclosed in a soap bubble. For the latter to be a distinctive system, its soapy film must be in a relation of mutual (plastic) control with the air molecules. Quasi-randomly acting individuals supply the raw material which must be plastically shaped in a meaningful whole. Individuals' chance trials (trial-and-error movements) must become more than an array of discordant activities if an organized entity is to emerge. Such an entity strives to preserve its proficiency in maintaining a difference with its environment. In doing so it selects those chance activities that fit with it.

The raw material for organizational order is individuals' (partially) blind trial-and-error movements. The latter are what they are because of each individual's factual knowledge (what they locally know) and constitutive past knowledge (where these individuals come from). Such raw material is subsequently parsed, that is, it is punctuated and then connected, in a reflective manner. The process of reflection shapes the raw material into a meaningful whole, which then becomes an enacted environment. The latter, in turn, restrains (that is, it becomes an input into) a subsequent sensemaking process.

Thus, from an evolutionary perspective, the main tenet of constructivist rationalism is turned on its head: not only does rational thinking not come before acting, but we do not know what we do until we have done it. Doing, in all its diversity, comes before sensemaking; making comes before matching; variety comes before selection. And order comes from reflective action, not from design.

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