This paper proposes that organizational science could be applied more widely if the field were more concerned with the conditions under which research findings are valid. Papers in the field generalize about organizations as if they were all alike, or refrain from generalizing at all, as if they were all unique. The population perspective presented de-emphasizes the all-alike and all-unique approaches, placing emphasis instead on research methods that improve the description and classification of organizational forms, define more homogeneous groupings, and specify the limited conditions under which predictions may be expected to hold true. The principles of the population perspective are reviewed, and an outline is presented for developing a classification of organizational forms. Suggestions are then made on how to use the perspective to increase and improve the application of organizational research.

A spirit of application pervades most sciences. The life sciences support medical practice, the hybridization of new plant strains, enhanced crop productivity, such as the “green revolution,” and most recently, genetic engineering. Physics underlies aspects of our lives that are taken for granted such as electric power generation, electronics, and flight, and drugs, paints, and plastics reflect the innovation and productivity of chemistry. In the social sciences, economists are consulted daily in developing federal policy and budgeting, and many businesses depend on economic forecasts; psychologists apply psychology in psychotherapy, counseling, psychological and educational testing, and personnel selection; and sociologists have figured heavily in governmental policies on race and sex discrimination, welfare relief and family assistance, and international relations, and are affecting private sector developments in the emerging field of human resource management.

In organizational science (or, alternatively, macro-organizational behavior or organization studies) application is much less visible. The National Academy of Sciences, a body formed to advise the federal government, does not include organizational scientists. There is no president’s council of organizational scientists, and they do not frequent congressional offices. At UCLA, 100 teams of M.B.A. students act as consultants to Los Angeles organizations each year and find numerous opportunities to apply their knowledge of accounting and finance, marketing, industrial and labor relations, and operations research, but they almost never find ways to apply ideas or findings from organizational science. In the twenty-five years since the founding of ASQ, Ouchi’s (1981) Theory Z is the only book about organizational structure or form to reach the best-seller lists. Although some results of organizational science have proven useful, such as those from Lawrence and Lorsch’s (1967) research on differentiation and integration and Likert’s (1961) writings on effective work groups, organizational scientists lag behind their colleagues in the other social sciences in the utilization of their research.

Thompson (1956) wrote of "administrative science"; in the succeeding twenty-five years, it has come to include a macro- and a micro-component. We suspect that the component most utilized is the micro-component, which is rooted in psychology.
and social psychology — motivation, leadership, group dynamics, conflict resolution, and job design. Discovering how this subcomponent is utilized may require large-scale surveys or other methods, as proposed in the call for this special issue. The subcomponent we are interested in is one we term organizational science, one that others have called organizational sociology, organization theory, or more recently macro-organizational behavior. Organizational scientists in sociology departments do not seem to have emphasized utilization much, if at all, during the years they have been interested in the subject. Those in management schools who are more likely to be interested in applications have not established organizational science as a required course for the M.B.A. until very recently, and even now, the requirement is not widespread. Only in the last several years have professors of management published textbooks on the subject. We think that the organizational science component of administrative science is obviously not applied and that, although sophisticated studies of the obvious should not be discouraged, we should not wait for them to be completed. We therefore move directly toward a possible solution in this paper.

DEFICIENCIES OF EXISTING MODELS

Criteria of Scientific Method

An evaluation of the field in terms of three criteria of the scientific method — classifiability, generalizability, and predictability — reveals serious shortcomings. Samples of organizations are so poorly described that classifying them is impossible, generalizations can only be carelessly drawn, and the predictive power of most theories is extremely weak.

Classifiability. In biology, geology, physics, and chemistry much effort has been expended in analyzing naturally occurring mixtures of phenomena into pure groupings of their constituent specific substances — kinds of cells, minerals, subatomic particles, compounds, and elements. Only with research on pure substances did findings in these sciences become clear, consistent, and ultimately applicable. People who might use organizational science findings do not actually work in broad natural groups of mixed organizational forms — they work in specific kinds of organizations: paint shops, university departments, factories, job shops, or conglomerate headquarters. Most organizational research has been about organizations as legal entities, often large corporations, which are actually mixtures of different forms; broader forms like R&D, marketing, or production, and within production, the more specific forms like job shop, assembly line, or some other arrangement. Without adequate description and classification, users cannot be sure that such research findings are relevant to the specific organizational form they are actually responsible for or working in.

Generalizability. Much of the power of the physical and life sciences comes from the generalizability of their findings. These apply without exception in similar circumstances, and in different circumstances the conditional statements also apply without exception. Once mixtures were replaced with pure forms, it was found that species of white laboratory rats, gold, gamma rays, or whatever the form studied always behaved in
the same way. One sample from the population of white rats, gold atoms, or gamma rays behaved just like other samples. Such populations have been very carefully described and consist of members that are very nearly the same in their distinctive aspects. Almost without exception, consumers of physical and life science findings have a very high expectation that findings about sampled members of the population will generalize to their member. We do not mean that members of biological, geological, or chemical populations are identical, only that they are similar enough to be distinguished from members of other populations.

In the field of organizational science, one is never really certain that findings about organizations actually sampled apply without exception to organizations not sampled. For example, Lawrence and Lorsch (1967) studied two plastics, two container, and two consumer organizations. As a vertically integrated producer of plastic containers of margarine, may I properly say my organization is like any of those sampled? All of them? None of them? Since the populations are not described and since the samples are only two out of x, how can I tell if my organization is in the same population and if the sample is representative of the population? May I safely use the results of this classic study? Or do I have to hire a researcher to perform the study again in my organization, whatever kind it is?

Predictability. To paraphrase Kurt Lewin’s memorable statement, nothing is so practical as a good theory, nothing is so practical as predictable universal statements. Thrown objects always fall. Hot air always rises. Lithium always burns in water. Jet airplanes almost always take off and land safely. Almost? Even when statements are probabilistic, if they are close enough to universal statements, they can be used. Imagine an advertisement in Scientific American, announcing: “Transcontinental Airline’s latest study showed that on a sample of 1000 flights, the null hypothesis of no difference between the number of safe takeoffs and safe landings was not rejected at the p < .01 level.” What sane person would still use the airline? Nevertheless, every issue of ASQ and other journals is full of predictive statements claiming certitude at the .05 or .01 level.

Thompson (1956: 103) said, “It is no longer a ridiculous idea that regularities can be found in human behavior.” In the twenty-five years since then, many regularities have been found—at the .05 or .01 levels. But are patterns explaining less than 10 percent of the variance (a typical level) useful? Even in baseball, hitters are expected to do better than a 10 percent average. Is it reasonable to expect people to use findings that are correct only ten percent of the time—and one can’t say when? Though living in a world where applications of physics, chemistry, biology, and geology are expected to be correct all the time, organizational scientists have satisfied themselves with finding faint patterns. These lack the strength or clarity users have come to expect from modern sciences.

Review of Research for Classifiability, Generalizability, and Predictability

A review of empirical, nonexperimental papers published in ASQ in 1979, 1980, and 1981 showed that very few investigators were concerned with the issues of classifiability or generalizability. In view of the uniformly low levels of explained
variance, attention to predictability also appeared questionable. We examined 59 articles and evaluated the amount of information provided on the composition of the sample. Nine articles used samples of individuals drawn from other than an organization source, such as graduating M.B.A. classes, and thirteen articles (22 percent) were case studies of a single organization.

Of the 50 articles based on samples of organizations, 38 percent were based on fewer than 10 organizations, and 70 percent on fewer than 50 organizations. Descriptive information provided about the sampled organizations differed widely, but it was extremely brief in almost all cases. Only 15 articles provided enough information to allow an estimate of the size of the organization(s) studied, and even fewer provided information on size distributions. Only 9 articles provided information on organizational technologies, broadly defined.

With respect to generalizability, 68 percent were based on only one type of organization, where “type” is treated as a common-sense category (for example, banks, hospitals, or insurance companies). In some cases, descriptive information on the sampled organizations was so inadequate that we could not tell how many types were studied. Only four articles mentioned SIC codes as a basis for sampling or data collection. Of the 47 papers for which sufficient information on types was available, only 7 (15 percent) studied more than 10 types and therefore may presumably draw more broadly generalizable conclusions. We also examined articles in the Academy of Management Journal and other journals.

Our brief review of three years’ of empirical articles in ASQ convinced us that few investigators are consciously attentive to differences between organizational types or forms. We recognize that many older studies (see March, 1965) or recent studies published in journals other than ASQ focus narrowly on institutions such as schools, prisons, hospitals, unions, or military organizations, and limit their generalizations to these kinds of organizations. A question unanswered by these studies is whether their results apply equally to intra-class kinds or to other types; for example, are general, teaching, chronic care, and proprietary hospitals all the same?

We explain these findings by the logic of the paradigm underlying the research design of these studies. The logic of research designs can be differentiated into reconstructed logic, which appears in articles as explicit statements about the philosophy of science and methodology, and logic-in-use, which may be extrapolated from the research reports (Kaplan, 1964). We think that investigators are using two broad approaches to describe organizations: (1) organizations are all alike, or (2) organizations are all unique, and that these approaches emerge at both the reconstructed logic and logic-in-use levels.

Organizations are all alike. Most studies are reported as if one organizational form characterized all larger, more complex organizations. Studies such as those by the Aston group (Pugh et al., 1968; Pugh, Hickson, and Hinings, 1969; and many subsequent ones), Child (1972), and Khandwalla (1977) sampled from broadly defined populations with the explicit objective of generalizing to all (or at least most) organizations. Other studies have sampled from a more narrowly defined population (Lawrence and Lorsch, 1967; Blau and Schoenherr, 1971;
Populations, Natural Selection

Meyer, 1979; Daft and Macintosh, 1981; Leatt and Schneck, 1981), but their results have been treated as probably applying more generally, as the following quote from Meyer and Brown (1977: 383–384) illustrates: “Several implications arise from these results. First, the patterns described here need not be peculiar to finance agencies or to the history of the civil service movement in the United States. Effects of origins and the environment and the discontinuous pattern of change should be evident for diverse institutional structures.” What was actually studied was very specific — finance agencies in city governments — yet virtually no limitations were placed on the presumed generalizability of the results. Similarly, Leblebici and Salancik (1982: 239) noted in their case study that “Although only one setting, the Chicago Board of Trade, has been studied here, it is assumed that the phenomenon applies to all systems of exchange.”

Blau and his associates worked on a research program that explicitly included organizations of more than one type (Blau, 1974: 18). Their objective was to formulate propositions that were true for all types studied. Major studies of employment security agencies, local branches of these agencies, city finance departments, department stores, and universities were compared, and deductive propositions applying to all organizations (not just these types) were proposed. They found that the amount of work performed, the amount of differentiation, and the number of employees were correlated in the organizations studied. A conservative conclusion would be that generalizations about these variables could be applied to these kinds of organizations. However, in research reports from this work, the implicit assumption is made that the results apply to all work organizations. We found no qualifying statements, or at least no obvious ones.

Since, for example, the organizations that Blau’s group studied were labor-intensive, one might suspect that his fundamental proposition, “The larger the volume of work of a certain kind, the larger is the number of persons needed to perform it” (Blau, 1974: 346), does not apply with equal force to capital-intensive organizations. Some of the measured variables certainly do apply to kinds of organizations other than those studied, but the level in a hierarchical classification scheme where these kinds of organizations would all come together in the same class is so high, and consequently the relevant variables so abstract, that practical application of the findings is difficult.

In other studies, a small number of cases was chosen on which to build generalizations, with no attempt made to obtain a representative sample of the population. These case studies were then used to uncover models that were described as though they applied to unspecified broader populations (Biggart, 1977; Cafferata, 1979; Rosenbaum, 1979; Stern, 1979; Kimberly, 1980; Niv, 1980; Pfeffer and Moore, 1980; Roos and Hall, 1980; Hambrick, 1981; Ross and Ferris, 1981). Finally, in some studies, in perhaps the most straightforward expression of the all-alike approach, no attention was paid to organizational differences, representativeness, or populations (e.g., Oldham and Hackman, 1981).

The thrust of the all-alike approach is succinctly captured by the “fifth major proposition” in the lead article of ASQ’s first issue (Litchfield, 1956: 28): “Administration and the administrative
process occur in substantially the same general form in industrial, commercial, civil, educational, military, and hospital organizations.” If this proposition is accepted, investigators do not have to pay attention to different kinds of organizations and, thus, need not worry about methods for identifying subpopulations or describing them. If all x’s are the same and all one is studying are x’s, no detailed attention to description is necessary—all we have to do is differentiate x’s from non x’s. In the case of organizations, one can either point to them and say, “That’s an organization” (March and Simon, 1958), or one can define them theoretically, as Parsons (1956) did in the same first issue of ASQ.

Organizations are all unique. Some studies are reported as if every organization possesses a unique form. Explicit statements of this logic-in-use are elusive. No one really writes something like: “This is an in-depth analysis of one organization. There is no reason to believe any other organizations like it exist, because its employees are unique, its history is unique, and its geographical location is unique. The findings here are clearly not generalizable to any other organization. However, this organization is important or interesting so let me tell you about it.” Yet, the subjectivist reconstructed logic of phenomenology and humanistic psychology (Husserl, 1965; Schutz, 1967) and radical sociology (Horowitz, 1971) have pushed some theorists toward the position that organizations are unique entities. Grounded theory (Glaser and Strauss, 1967), ethnomethodology (Garfinkel, 1967), thick descriptions (Geertz, 1973), action research (Susman and Evered, 1978), Marxian praxis orientations (Benson, 1977; Frost, 1980), idio- graphic methods (Swidler, 1979), and qualitative methods (Van Maanen, 1979; Morgan and Smircich, 1980) all have the implication of organizational uniqueness when they are applied. We hasten to note that qualitative methods, if applied to a representative sample of organizations and properly coded, can be just as useful to the deductive nomological model as quantitative methods.

In specific studies that do not attempt to generalize in any way beyond the organization studied, it is very hard to find authors stating explicitly that their results are not generalizable. In a study of cause maps (Bougon, Weick, and Binkhorst, 1977), the authors say almost nothing about generalizability. Obviously they think cause maps exist in other organizations and that their method is applicable elsewhere, but they do not say or imply that any specific pattern in the Utrecht Jazz Orchestra’s cause map has relevance for any other organization. Hall’s (1976) paper on the Saturday Evening Post’s failure presented a wealth of detail on the magazine’s operations and history, yet although Hall made some comparisons with other magazines, he carefully avoided generalizing his results to any population and limited his general remarks to methodological points. Miles (1979), in his account of the Project on Social Architecture in Education, documented a common tendency for case studies to be thought of as unique sites and as exceptions to general principles.

Studies under the all-unique approach may offer enough descriptive information to identify an organization in terms of a classification scheme, if one existed, but they do not meet the other criteria of generalizability and predictability. Are they
scientific? Not according to the paradigm calling for generalizability and predictability. What is ironic about these studies is that the authors also sometimes appear to subscribe to the all-alike view. The papers usually end with a statement that, though the specific details of the study are unique, the model constructed appears to have broader application.

The progress of organizational science in satisfying the three criteria of classifiability, generalizability, and predictability, and thereby enhancing the utilization of findings, will not significantly improve until the prevailing reconstructed logic and logic-in-use are refocused. The orientation we propose is away from the all-alike and all-unique approaches and toward a view that places much more emphasis on research methods that improve the description and classification of organizational forms, defines more homogeneous groupings for purposes of improving generalization, and either improves the level of prediction or supplies a logic for de-emphasizing prediction as the only test of scientific understanding. A reorientation will not be easy, as reconstructed logic and logic-in-use are embedded in a scientific paradigm (Kuhn, 1970), i.e., a consensual system of beliefs, held by organizational scientists.

In his initial work, Kuhn (1970: 175) broadly defined a scientific paradigm as encompassing “the entire constellation of beliefs, values, techniques, and so on shared by members of a given community.” Later, after much criticism, Kuhn considerably narrowed his definition. Still later, Ritzer (1975: 157) suggested a definition more like Kuhn’s early one: “A paradigm is a fundamental image of the subject matter within a science. It serves to define what should be studied, what questions should be asked, how they should be asked, and what rules should be followed in interpreting the answer obtained. The paradigm is the broadest unit of consensus within a science and serves to differentiate one scientific community or subcommunity from another. It subsumes, defines and interrelates the exemplars, theories, methods, and instruments that exist within it.”

We have described current organizational research as operating within two paradigms, the all-alike and the all-unique, and we expect that most papers for this special issue will fit one of them. We believe that the lack of utilization of organizational science results from fundamental paradigmatic assumptions, rather than from inadequate procedures within the paradigms. Rather than calling for modifications of procedures within the two approaches, we propose the basic outline of a new perspective. In our approach the findings underlying each established paradigm are placed in a complementary relation to each other, rather than being treated as antithetical. Because of space limitations, our discussion only outlines the new paradigm.

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1 In our discussion we use the term organization interchangeably with the term organizational form. These terms refer to any organizational unit having an identifiable form, e.g., paint shop, assembly line, R&D section, university department, government agency, company, corporate headquarters. What the field comes to accept as organizational forms, we argue, is ultimately an empirical question.

POPULATION PERSPECTIVE

Definitions

To overcome barriers to the utilization of organizational science, we propose adoption of the population perspective, encompassing four related areas of investigation: taxonomy, classification, evolution, and population ecology. Taxonomy focuses on activities pertaining principally to developing a theory of
organizational differences and a theory of classification. *Classification* procedures allow identification and description of organizational populations and their relation to other more or less similar populations. *Evolutionary* inquiry supports taxonomic and classificatory activities by providing an underlying theoretical framework explaining how different kinds of organizations come to be different, why they remain different, and what taxonomic characters might be evolutionarily significant. Evolutionarily significant characters are attributes that enhance an organization's ability to survive; they may persist even though the specific environmental condition for which they were favorable no longer exists. Ultimately they comprise the vast majority of attributes characterizing the population of which an organization is a member. *Population ecology* explains the relations of organizational forms to their niches and environments. We will not discuss the latter, since some work in that field has already been published and is continuing to be produced at a rapid pace (Hannan and Freeman, 1977; Brittain and Freeman, 1980; Hannan, 1980; Freeman, 1982). The basic work in the other three areas is developed in books by Aldrich (1979) and McKelvey (1982).

The population perspective is borrowed from biologists, who have developed it into an extensive, conceptually rich theory and method. The advantage of borrowing from another discipline is that much of the theoretical and methodological work has already been done; the disadvantage is that the perspective might not fit. Our view is that it has several clear advantages: (1), it offers a way to break the mental set of the existing models, as its theory and concepts sensitize us to see the organizational world in a new way; (2) it already has in place many essential concepts; and (3) the theoretical and methodological issues are already identified, so we have a map showing where all of the difficulties and points of interest are likely to be. Of course, while organizations in changing environments have many functional parallels to organisms in changing environments, there are differences. We are fully aware that alterations and new theoretical and conceptual inventions might have to be made for the perspective to be of use in the study of organizations. Our view is that the functional parallels are strong and that the approach has much of promise and ought not to be discarded until it has been thoroughly tried.

**Population and Species**

In biology, most populations are defined as sets of interbreeding members highly similar to each other (though it is recognized that some populations are asexual). The smallest of these are termed local populations. Species are composed of one or more local populations. The variance within local populations is low enough that they are formally recognized as classes (subspecies, varieties); however, they are isolated by geographic or other factors rather than by an inability to produce nonsterile, viable offspring, and thus they behave as one population with respect to the interbreeding criterion. The species rank is a bifurcating category in the hierarchical classification of biological organisms, because the lower ranked local populations are not sexually isolated, whereas the higher ranked groups are not interbreeding populations. Species are thus unique in that they are the only rank category in which the judgments of systematists, those who conduct taxonomic and
Populations, Natural Selection

classificatory research, may actually be empirically tested, that is, by testing for interbreeding capability (in sexual species, of course).

For organizations, a bifurcation in the classificatory hierarchy may not be so pronounced and thus the species label is somewhat more arbitrarily given to a particular category in a hierarchical ranking of categories. Warriner (1980: 11) defined a population as “similarly constituted organizations, occupying the same ecological niche, and sharing the same modeling or replication materials through interconnections among the organizations in that population.” McKelvey (1982: 192) defined organizational species as “polythetic groups of competence-sharing populations isolated from each other because their dominant competencies are not easily learned or transmitted.”

The key ideas embedded in these definitions are (1) the similarity of members, (2) the sharing of replication materials and competence within species or populations of organizations, and (3) the absence of sharing among species of organizations. Species differences materialize as different organizational forms that are discernable and measurable.

Organizational Form

Organizational scientists are beginning to believe that organizations come in so many varieties (populations) (Perrow, 1970; McKelvey, 1978; Aldrich, 1979; Lammers and Hickson, 1979; Scott, 1981; Hall, 1982) that it no longer makes sense to search for a few essential attributes captured in an all-encompassing definition of “organization.” Traditional definitions are useful for separating organizations from other major social entities, such as families or societies. Aldrich (1979: 4) held that “organizations are goal-directed, boundary-maintaining, activity systems.” Hall (1982: 32–33) offered a somewhat broader definition: “An organization is a collectivity with a relatively identifiable boundary, a normative order, ranks of authority, communications systems, and membership-coordinating systems; this collectivity exists on a relatively continuous basis in an environment and engages in activities that are usually related to a set of goals.” Organizational scientists recognize that these definitions do not apply uniformly to all kinds of organizations. Scott (1981) recently suggested three definitions covering three kinds of organizations. The accumulating findings pointing to the diversity of organizations mean that these and other theoretical definitions do not offer investigators guidelines for defining groups of organizations homogeneous enough to ensure that the scope of a representative sample can be held to a manageable size.

We have defined populations as comprising highly similar organizations. The polythetic group idea underlying the definition of organizational form points to the expectation that even within populations, organizations are not identical on all significant attributes. We reject the idea of monothetic grouping that all members of a group must have the same attributes, and with it the essentialist classification theory that all members of classes must be identical with respect to the few essential attributes. Biologists (Mayr, 1969; Sneath and Sokal, 1973) and some organizational scientists (Bailey, 1973; McKelvey, 1978) now recognize that such a theory will not work for entities as complex as organisms and organizations because too many
significant aspects of behavior are not accounted for by the few so-called essential attributes.

We believe the traditional approach of organizational scientists in defining organizations (an essentialist classification view), should be abandoned. A better approach is to describe different kinds of organizational forms empirically, letting thorough descriptions identify each kind of organizational form in some detail, thus providing the descriptive material that helps producers and users of scientific research set one form apart from another. Since an empirically valid taxonomy and classification of organizational forms is not yet available, we lean toward a definition of form that points inquiry toward any measurable attribute that is significant in discriminating one form from another and helps investigators understand why they have evolved to their present configuration. The definition at this time should be broad enough to avoid precluding any heretofore unrecognized element of organizational form. One such definition is given by McKelvey (1982: 458): Organizational form is composed of “the internal structure and process of an organization and the interrelation of its subunits which contribute to the unity of the whole of the organization and to the maintenance of its characteristic activities, function, or nature.” Such an empirical approach calls for sophisticated classification methods.

The concept of organizational form is critical to the population perspective: organizations are neither all-alike nor all-unique, but rather appear to be a moderate number of different populations composed of similar forms. The complementary inclusion of findings underlying the two established paradigms by the population view materializes here in the sense that the all-alike approach is included as the within-population view, whereas the all-unique approach is used at the population level, at which differences among populations are posited. The latter approach is also used at the level of variations in human behavior within individual organizations.

Elements of a Concept of Organizational Species

Organizational scientists could frame an entirely new population theory, unique to organizations, or could, as we choose to do, take advantage of the biological one already developed, changing it as necessary. The central questions leading to an explanation of the existence of populations are: What forces create populations in the first place? How do organizations within a population come to be similar and remain similar? And do they remain different from organizations in other populations? We have adapted to an organizational context the three processes underlying the generation and persistence of forms suggested by Mayr (1969): ecological, generational, and isolating processes.

Ecological processes. Most theorists agree that environments influence individual organizations, but are there environmental forces that produce and shape populations of organizational forms? The actual number of discrete organizational forms is potentially nearly limitless. For example, for n generally accepted organizational attributes, each having two states, present or absent, n! different forms are possible, if one assumes that the presence or absence of a single attribute signifies a recognizable difference. In reality, there could be more or less
than $n$ attributes; each could have more than two states; and it might take two or more state changes before one could discern a difference. Given the possibility of more or less than $n!$ forms, why is the organizational world neither just one form nor a vast number of forms?

Constraints on population differentiation into endless variety are imposed by external forces that result in a limited number of homogeneous groups. Such forces are found mainly in the organizational-ecological community, rather than in the broader environment, which is the context for all social activities. An ecological community is a delimited association of interacting populations of organizational forms (Pianka, 1978: 271). The environment of one or more organizational forms is defined by the broader political, economic, legal, cultural, and technological forces prevailing (Hall, 1982).

One might conjecture that organizational environments are composed of discrete pockets of resources or conditions, which are well differentiated from one another. Under these conditions, organizations well adapted to their pockets would thus, ipso facto, be differentiated from organizations in other pockets. This approach strikes us as not very promising. Biologists considered the same possibility and concluded that the environment is not composed of niches that are “out there” waiting to be filled by some new form of organism (Pianka, 1978). Instead, niches are conceptualized as developing along with each species. A niche cannot be defined without considering a particular species (Lewontin, 1978). A niche is the activity space of an organization or population or community of organizational forms that reflects the sum total of both its adaptation to environmental forces that are not subject to its influence and adaptation of environmental forces that are subject to its influence (drawn from Pianka, 1978; and McKelvey, 1982). Organizational environments are not composed of pockets or niches, but rather are best seen as broad resource pools, which may be drawn upon in return for goods and services.

Population differentiation is best conceptualized at the level of the organizational ecological community, where the activities of one kind of organization create new resource possibilities for other organizations. For example, a large aerospace contractor in Southern California, tapping a large resource pool such as the federal government, generates product designs that create opportunities, in turn, for small subcontractors. Small entrepreneurial organizations, pioneering and developing new products, provide opportunities for the large conglomerates which try to survive by absorbing them. The actions of governments are often responsible for new resource opportunities, as when regulations of the Environmental Protection Agency forced utility companies to search for organizations manufacturing stack scrubbers.

Only resource opportunities, not niches, are created by an ecological community of organizations. It is possible that one large, flexible, diversified organizational form could emerge that would draw on all the available opportunities and thus prevent any other kind of organization from emerging. Alternatively, a large number of very small organizations might emerge. Our view is that it is possible for many kinds of organizational forms to evolve that tap a particular resource opportunity created by members of an ecological community.
Generational processes. Although ecological communities offer resource pools to organizational forms, elements within organizations explain why a particular population becomes associated with a particular pool and how the organizational form of a particular population persists over generations of employees and comes to be shared by other organizations in the population. The concept of competence elements (comps) (McKelvey, 1982), helps answer this question. Comps are defined as the elements of knowledge and skill that, in total, constitute the dominant competence of an organization. Dominant competence is defined as the combined workplace (technological) and organizational knowledge and skills (e.g., differentiation, coordination, control, measurement of effectiveness, and organizing processes) that together are most salient in determining the ability of an organization to survive. We view technical and organizational competence as human responses to environmentally imposed problems (Perrow, 1970); we do not posit a technological or environmental determinism.

If the technology of the workplace (the knowledge and skill involved in the way tasks are carried out) and the organizing processes surrounding the workplace can be disaggregated into relatively discrete elements (such as designing a work flow, scheduling, maintaining machines, hiring and training competent workers, measuring quality and productivity, or controlling deviations from intended goals), then each population has a population-wide set of comps that are held as knowledge and skill by employees of the organizations in the population. All such organizations have employees who hold a large proportion of the comps of the population. No organization holds all of them, and no single comp is held by all organizations. This is the definition of a polythetic group. Now, the key to answering the question, Why only one form per population?, is that comps seem to come in highly probable combinations under conditions of competition over resources. Some combinations are simply more effective and efficient than others. Some comps enhance effectiveness because they help an organization to produce goods or services especially likely to draw resources from a particular resource pool. Thus, an aircraft landing-gear subcontractor benefits more from holding comps about aluminum extruding, welding, and fabrication, hydraulic brakes, and bearings, than from holding comps about making oxygen, storing food, or educating handicapped children. Other complys help an organization in its competition against other members of the population by improving its efficiency. Hence the landing-gear subcontractor (if it survives) will drift toward technology and organizing processes aiding efficiency, perhaps adding items like automatic aluminum forging presses, sophisticated inventory control and production scheduling, better employee-training programs, or socio-technical systems design. Differentiation between populations is enhanced by the tendency of particular comps to cluster together. For example, once an organization decides to use an assembly-line competence, there is a constellation of other competences that are especially helpful, if not clearly necessary, such as: protection of the technical core from environmental change, management of sequential interdependence, coordination by planning (Thompson, 1967), focus on specialization (unless a socio-technical systems design is used), design of jobs to minimize
training, not to mention the engineering competence to design an efficient work flow, select proper machines, and handle their maintenance. Needless to say, a rather different competence is apt to be associated with running an oil refinery, a foundry, a canning process, a film production workplace, a welfare office, or an elementary school.

Comps are held by the people in an organization. Presumably comp-s that are effective in enhancing survival are valued more highly than others. Of course this evaluation is not always timely, straightforward, or even correct in the short term, and their effectiveness in the longer run may be a better indication of appropriate comp selection. Effective comps are shared more widely within an organization than ineffective ones. Organizations having difficulty in surviving will probably try to hire people perceived as holding more effective comps away from more successful organizations. Hence the high salaries for members hired away from prestigious or effective organizations such as ARCO, Merrill Lynch, Hewlett-Packard, ABC, Dupont, or Stanford. People holding effective comps are often asked to speak at conferences, another way effective comps are spread around the population. This process of interchanging comps explains how organizational forms persist over time and how organizations within a population (all of which face the same constraints in tapping into the resource pool) come to share many of the same comps.

**Isolating processes.** If comps from all organizational populations were interchanged and adopted, there would cease to be differences among populations. A variety of isolating processes prevent this. Comps from one population are usually not thought to be very useful to another. Truckers usually do not hire restauranteurs to gain competence, nor do airlines usually look to universities. People at the workplace-technology level of an organization often do not understand the technology of organizations in another population and executives have been found to be generally unsuccessful when crossing industry boundaries (Shetty and Perry, 1976). Members of one population typically do not attend the professional meetings of interest to members of other populations.

Comps in many populations are complicated and difficult to learn. Many managers speak of the years it takes to “learn the business.” Engineers, professors, lawyers, doctors, and many other professionals spend years being educated. Others in the building trades, police and fire protection, the military, and so on spend many years of apprenticeship or other experience-building time gaining knowledge “on the job.” All of this makes learning the comps of a population difficult and so isolates the comps of one population from those of other populations. Finally, the tendency to resist learning of other comps, to be suspicious of new knowledge, to be suspicious of outsiders or of ideas “not invented here” (Kanter, 1983) also isolates the comps of different populations.

**The Theory of Natural Selection**

The elements of the species concept we have presented are embedded in the biological theory of natural selection, with key aspects of the theory expressed by four basic principles. We think these principles apply equally well to organizations. The species concept we present here is abstracted from Mayr’s
(1969) "biological species concept," so named because its main elements make sense only in terms of the biological reproduction process. It explains speciation for the mainstream of biological organisms, though at least six other concepts (McKelvey, 1982) have been proposed to counter its deficiencies. Its advantage is that it has more explanatory power due to its basis in natural selection theory. We abstract from it rather than the others to gain the same explanatory leverage.

**Principle of variation.** The natural selection process begins with variations. Any kind of change is a variation. These may be purposeful or blind. Purposeful variations occur as an intentional response, when environmental pressures cause selection of adaptations. Blind variations are those that occur independent of environmental or selection pressures; they are not the result of an intentional response to adaptation pressures but rather occur by accident or chance. All the attention to organizational control by managers and management theorists is indirect evidence that variations occur. Corning (1974) argued that variations within organizations are purposeful; Campbell (1969), Aldrich (1979), and Weick (1979) believe they are blind; and McKelvey (1982) suggested that perhaps ninety percent of them are blind.

**Principle of natural selection.** Some variations in organizations prove more beneficial than others in acquiring resources from the environment. These variations contribute to the survival of an organization or subunit within it. Since subunits or organizations having useless or harmful variations are likely to have fewer resources and reduced chances of survival, it follows that, with the passage of time, the remaining organizations are likely to be characterized by the beneficial variations. In an ecological community, a population whose member organizations hold variations beneficial in acquiring resources against competition from other populations will have an increased likelihood of survival (Aldrich and Mueller, 1982).

**Principle of retention and diffusion (heredity).** This principle explains the retention of beneficial variations over generations of employees as well as the diffusion of beneficial variations throughout a population. Unlike biological organisms, organizations do not have offspring, though some have suggested that "spin-off" organizations may be analogous. Actually, thinking of physical bodies impedes clear thinking about the retention of favorable genes. Mayr (1969) wrote of bodies as temporary vessels holding parts of the gene pool of a population. The important thing is the preservation of the gene pool, not what actually happens in the passage of some genes from a parent to an offspring. So, for organizational scientists, the concern is rightly over the preservation of the pool of the comps of a population. Since comps are held by employees, the concern, then, is over how comps are passed through time, across successive generations of employees who belong to the organizations in an organizational population, and interchanged among organizations within a population.

An effective organization (i.e., one having enhanced chances of survival) will attempt to retain its beneficial variations by assuring that employees leaving have passed on the knowledge or skill to remaining employees. Competitors will attempt to hire people holding beneficial comps, or will attempt to learn of
them and train their employees to use them, thus leading to the
diffusion of comps throughout a population, and to the im-
provement, over time, of the pool of comps of the population. If
the conditions in an organization were such that the comps held
by a generation of employees were only randomly related to
those held by the previous generation and only randomly
related to the population’s pool of comps, the theory of natural
selection could not be applied to organizations. The present
generation of an organization’s employees has to hold comps
more like those of the previous generation and more like those
of the organization’s population than like comps held by em-
ployees in members of other populations. A recent study by
Zucker (1977) and a broader review of organizational persis-
tence by Aldrich (1979) clearly show that the retention and
diffusion principle holds for organizations.

Principle of the struggle for existence. The three foregoing
principles explain the process of natural selection (Campbell,
1969), but Lewontin (1978) observed that a fourth principle is
necessary, one clearly recognized by Darwin (1859: 61), the
"struggle for life." The field of competitive strategy (Porter,
1980) is concerned with organizations competing within what
Porter calls "industry structural groupings," roughly similar to
what we call populations, as is the recent work of others
(Hannan and Freeman, 1977; Pfeffer and Salancik, 1978;
Brittain and Freeman, 1980; Carroll and Delacroix, 1982). This
literature offers ample evidence of the competitive struggle
among organizations.

Sometimes resources are so abundant that no selection takes
place, as, for example, during the last five years in the popula-
tion of solar energy organizations — tax credits and government
subsidies meant that anyone could enter and survive. The
Reagan administration’s anti-solar-energy policies, however,
have drastically increased the mortality rate of solar energy
firms. Over the years the boom-and-bust business cycles charac-
terizing the U.S. and other economies has assured that
sometimes conditions made the struggle for existence intense
(as it is right now).

One additional aspect of natural selection theory deserves
attention. We build on Weick’s (1979) idea that enactments by
people in organizations are variations (mostly, if not all, blind).
The form of populations and particular organizations takes
shape over the years due to the selection of variations favorable
to survival under competitive conditions. In this view environ-
ments determine “survival paths” (one or more per population),
which effective organizations approach asymptotically (McKel-
vey, 1982). Continuing the metaphor, the resources of envi-
ronments are located adjacent to survival paths. Organizations
in a population approach the path as they evolve toward an
effective form. Survival paths are usually only vaguely discern-
able in the complex mix of resources and competitors in
environments.

Nothing forces organizations to choose a particular path. Or-
organizations, through their dominant coalitions, can enact incor-
rectly, move slowly, copy other firms, innovate, avoid decisions,
argue and fight over courses of action, and so forth. We call this
“myopic purposefulness.” People in organizations are inten-
tional or purposeful, but conditions are such that it is highly
unlikely that a successful organizational form can be attributed to any particular, identifiable, intentional act, or set of acts, especially so for a population form.

Since environments are diverse, uncertain, and imperfectly perceived, we think it improbable that a particular individual will both have the correct view and know it. Since organizations are composed of people limited by bounded rationality, suffering from limited or biased information and poor communication, and subject to processes of social influence and reconstructions of reality, we also think it improbable that a person with the "correct" variation will be in a position to implement it.

Classification

The population perspective would be nothing but arm-chair theorizing if taxonomy and classification methods were not available to identify populations and arrange them in a classification framework, usually termed a dendrogram or family tree. Classification methods have only recently been brought into the mainstream of the social sciences (Bailey, 1975; Mezzich and Solomon, 1980; Hudson and Associates, 1982). Although some empirical classifications of organizations have been made (Haas, Hall, and Johnson, 1966; Pugh et al., 1968; Dodder, 1969; Goronzy, 1969; Pugh, Hickson, and Hinings, 1969), McKelvey (1982) appears to be the first to provide an extended treatment of how classification theory and methods might be applied specifically to organizations. Of the several classification methods used in biology, numerical taxonomic and evolutionist methods seem most suitable for organizational systematics.

Actual numerical classification methods, such as factor analysis, multidimensional scaling, creation of numerical resemblance coefficients, structural clustering analysis, testing and comparison of resultant groupings by discriminant analysis, and methods of cophenetic correlation are reasonably well worked out, though hardly perfected. Two principal difficulties remaining for organizational scientists are the selection of taxonomic characters and the initial selection of organizations for study. In biology, a well-established evolutionist classification easily supplied numerical taxonomists with initial populations and taxonomic characters to be sampled as they began their studies in the late 1950s. Organizational scientists start without a classification, so that the risk of poor selection of either characters or organizations is high (McKelvey, 1975). The advantage of a combined evolutionist-numerical approach is that the evolutionary theory of classification provides a theoretical basis for selecting characters and cases.

Not all researchers will want to conduct elaborate taxonomic studies before getting to the substance of the problem that interests them. As progress is made in a theory of organizational differences, in the identification of various populations, and in the identification of evolutionarily significant characters, the number of organizations and characters needed to classify a broad initial grouping will decrease. The better the a priori understanding of populations and the better the theory of why they exist and are different from other populations, the easier the classification problem will be. Alternatively, those not trusting a priori theory may choose to base numerical taxonomic analysis on samplings of both organizations and characters.
without making initial delimitations, no matter how broad, as was suggested by McKelvey (1975). In that case, two guidelines to follow are: (1) draw organizations and characters from broadly defined sets of preliminary populations (really families of populations, such as the electronics group) and all known characters; and (2) assume that closure on the definition of a particular population and appropriate, nontrivial characters will happen only after a number of studies. Modest taxonomic studies are better than nothing, but caution should be exercised until the population and sets of characters are confirmed in subsequent replications. Obviously this means a lot of work and funding. We expect that important, interesting, easily available populations will be studied first, and this seems appropriate.

**USING THE POPULATION PERSPECTIVE**

The population perspective is best seen as a fundamental reorientation of organizational science, and it cannot be judged at the start by how effective it is in offering practical advice to practicing managers. It may take some time before the implications of the new view are developed to the point where change in the application of findings is fully appreciated.

**Explanation through Natural Selection Theory**

Fundamental to the successful application of findings from organizational science is an understanding of why organizations succeed or fail. Except for the population ecology approach, explanations in the literature invariably attribute the behavior of organizations to individuals in organizations (e.g., see the review of the literature by Scott, 1981). Many analysts are reluctant to give up this view, as shown in their critiques of the population perspective (Miles, 1980; Van de Ven and Astley, 1981; Hall, 1982). Generally, the level of resistance and emotion about this issue is high. Perhaps the critics are correct in resisting a new, possibly very blind, variation; perhaps it is simply resistance to change; or perhaps it is a residue of the pre-Copernican need of people to see the earth as the center of the universe, now replaced by a need to attribute causality to a visible hand (Chandler, 1977).

Explanations of individual behaviors in organizations can be decoupled from explanations of why populations of organizations have the form that they do, how they came to have it, and why they are declining, remaining stable, or growing in size. Natural selection theory shifts the principle of inquiry guiding the formulation of specific research programs from reductionism — a focus on endogenous variables — to a focus on exogenous variables, termed rationalism by Schwab (1960). Our contention is that people cause variations in individual organizations, but that the process of natural selection leads to the form of those organizations that survive and characterize successful populations.

In our view both people and environments are causal agents that organizational scientists must pay attention to. We agree with the subjectivists that patterns of human behavior in individual organizations are idiosyncratic and not amenable to prediction and generalization as called for by the deductive nomological framework of the objectives (Hempel, 1965). Thus we incorporate as a basis of our perspective the findings underlying the subjectivist paradigm of substantial variation.
among individuals in organizations. Explaining these variations, or sometimes the relative absence of variations, is an important scientific activity and eventually may even result in more than the ‘‘faint patterns’’ alluded to by Thompson (1956). At the same time we suggest that findings pertaining to environmental causes of function and form will lead to explanations of organizational success or failure that are generalizable across all members of a population, and explanations of population growth or decline that are generalizable across populations. We see the role of predictive statements as limited, for the most part, to the behavior of a population of organizations during periods of environmental stability, a relatively infrequently occurring state of most environments, we suspect.

**Population Research**

The central point of this paper is to urge that researchers focus research and results around homogenous populations, which, we argue, will increase generalizability and level of explained variance. Such a reorganization puts considerable emphasis on methods of identifying populations and classifying them in relation to each other — highly similar ones, somewhat similar ones, and totally different ones.

Modern classification procedures, whether evolutionist or numerical, are complicated and contain many unresolved issues. It is possible, however, following the random selection methods outlined in McKelvey (1975), to develop an organizational classification scheme without, and in fact by very carefully avoiding, any theory whatsoever about how populations might form and what the significant characters might be. We recommend starting with a population easily identifiable by conventional wisdom or of interest to people outside the field, such as organizations in electronics, fiber optics, railroads, transportation, housing, or medicine. Research can begin on a population-by-population basis, checking, confirming, or rejecting common-sense ideas of populations and slowly developing definitions of populations that are based on classification research.

Previous attempts at empirical classification (Haas, Hall, and Johnson, 1966; Pugh et al., 1968; Goronzy, 1969; Pugh, Hickson, and Hinings, 1969) were not successful because they did not use random methods to carefully avoid poor theories of population speciation and evolution, nor did they develop any good theory that might point them toward selecting a useful set of initial groups or evolutionarily significant characters to study. Successful empirical classification must be based on a robust theory of organizational differences or on methods that are carefully atheoretical — there is no room in the middle.

To develop a theory of organizational differences, researchers beginning any kind of research on any substantive question about organizations should draw an initial grouping of organizations from some group of interest to the research or practitioner communities. Initial groups may be based on conventional wisdom and be of some public policy interest, may be available for public access, and ideally, associated with sources of funding. A broad industry group, such as the electronics industry studied by Ulrich (1982), is a good example. It was of considerable interest to U.S. policymakers, was part of a well-funded research project, and could be studied with pub-
lished data available on all U.S. publicly held organizations. Ideally, selection of characters should be based on stratified sampling from all known categories of characters, such as formal structural, subunit characteristics, workplace conversion processes, or product distribution patterns. Several such lists are presented in Mckelvey (1982: 355–365). These lists can be altered or improved as additional evolutionarily significant characters are found by an evolutionary analysis of the group being studied, its niche, and its broader environment. There is no such thing as a general list of all important characters for all populations. We expect that the list of characters most useful in discriminating among the populations will differ substantially across the populations. Various textbooks present methods and a great many clustering algorithms. Modern practice among systematists is to use combinations of methods, with many studies using all the methods mentioned above. A more detailed outline of the various steps one might follow in working up a classification study is given in Mckelvey (1982: 430–431).

Not every analyst is interested in conducting a classification study as an end in itself. Most organizational scientists are probably not really interested in classification and do not want to take the time for such a digression. Not many biologists are systematists, either. The problem for the field of organizational science is that well-defined populations have not yet been described. Until they become available from the efforts of systematists, every investigator should expend some extra effort on at least a rudimentary classificatory analysis. The task is not onerous, as indicated by the following guidelines:

1. A clear, common-sense target group should be chosen and the results should be aimed at member-populations of that group.

2. Within the target group, sampling should be narrow and intensive rather than broad, in the hope that the results will be broadly generalizable. It is preferable to study a series of specific populations within a larger group, rather than assorted organizations, scattering the research effort over a number of populations. For example, study populations within the electronics industry rather than a few organizations from each of a number of broad groups such as transportation, electronics, machine tools, mining, medical, unions, or education. Better to produce definite results about a specific population carefully studied than to produce vague results about many different kinds of organizations.

3. Enough of the environment and niche of the target group should be understood to identify at least a small set of environmental, niche, and form variables that might be useful in classificatory and later ecological analysis.

4. In the interim, imperfect and inadequate classificatory studies are better than none at all. Investigators should use whatever resources are available to define empirically the most homogeneous populations possible. One of the advantages of systematic studies is that once homogeneous populations are found, the size of the sample required to represent the population fully is greatly reduced. Investigators may thus pursue the scientific goal of generalizability while still putting considerable research effort into more intensive analyses of the form, function, and processes of organizations, as well as their ecological relations.

In our approach, the classification of the many populations across the organizational field progresses slowly on an incremental basis. The end result is a mosaic of narrow population studies. This will take some time, but if the most important or interesting populations are studied first, the delay will not be of
great consequence. In the interim we would be offering more generalizable findings, within populations, to those working in or with the organizations studied. As classification studies progress, along with substantive analysis of the classified populations, it would be possible to begin to have a better understanding of how many of the findings about a particular population could be generalized to related or similar populations.

Population-Level Applications

One of the criticisms often made of the field of organizational studies is that investigators focus their research too narrowly on the concerns of top-level managers and owners of specific organizations, e.g., in studying organization design or strategy. Several value questions are raised by this narrowing of focus: Do we help managers at the expense of employees or outside constituents? Do we help a particular organization at the expense of more deserving organizations? Should we have a science oriented toward benefitting one particular social class?

One of the advantages of the population perspective is that it emphasizes population-level studies, of use to policymakers, rather than studies aimed at helping individual managers in particular organizations. Many policymakers are oriented toward a population of organizations rather than a single organization. Most government agencies, by law, focus national policy on populations of organizations in the public and private sector. Federal agencies set policy, regulate, and are concerned about the survival of populations of organizations in the health professions, transportation, education, aerospace, defense, and so on. Important policy questions right now are: Is the U.S. maintaining a strategically important capability in key defense industries? Is the trend toward large conglomerate corporations reducing the general level of innovation and productivity, which in the past has been associated with small business enterprise? Is the emphasis on the medical rights of adults, as reflected in the growth of populations of health-related organizations, cutting into the survival of populations of organizations devoted to educating young people? So far the field has offered little toward answering questions about the health, growth, or decline of populations of one or another kind of organization. Identifying populations is a prerequisite task, unless those studying populations of organizations, such as population ecologists, are going to settle for vague or common-sense definitions of populations.

Application of Population Studies

Providing extensive general guidelines on managing organizations would be contrary to the spirit of the population perspective, which places severe limits on cross-species generalizations. Applying population thinking to practical use should lead managers to exercise great caution in heeding the advice of consultants who offer the same solution to problems, no matter what the organizational form. Accordingly, we limit ourselves to general comments about the process of guiding organizational change.

Managers understand the significance of populations better than academics. Because of their academic training, M.B.A. graduates expect promotions to high levels of authority and responsibility fairly quickly, and this is a common complaint.
about them. Managers and executives of organizations often comment that it takes time "to learn the business" and that M.B.A.'s do not know much of specific use to a particular business when they leave graduate schools. Managers usually think the way of doing business in their industry group is different from everyone else's. We think academics will find the population perspective very welcome in practical circles, once managers find teachers, researchers, and consultants beginning to specialize in certain populations rather than claiming expertise about all kinds of organizations.

We expect the response to natural selection theory and its implications to be less enthusiastic. Current thinking about managerial versus environmental determination of form is expressed in the strategic-contingency theory approach (Child, 1972) and in related approaches stressing the central role of managers in guiding organizations toward effective strategies. Chamberlain (1968: 33–34) described how organizations adapt to, and manipulate, their environments:

Strategic decisions . . . express a firm's purpose, a future state of affairs which it expects to bring into being . . . . Strategic decisions imply a belief in power to control the future, to make it something other than predictable. A choice of objective is involved, and then a controversy of means, and both of these involve an assertion of will rather than responses deterministically derived from what has gone on before, they are purposive thrusts into the future rather than decisions directed by testable logic or continuity of circumstance.

Thinking that one can control the future is heady stuff. Our view is that some conditions or effects, those that comprise the niche, are subject to manipulation by the organization, but that the broader environment is not open to influence. The environment of a particular population is best thought of as consisting of three components: (1) what has happened and is known; (2) what has happened and is not known; and (3) what has not happened. The first component is certain. The second component is also certain, though from a particular organization's point of view it is uncertain simply because it is not known yet. When organizations are slow to learn about such events, we can advise them to increase their intelligence- or information-processing capability (Galbraith, 1973). The third component may be predictable, lending itself to decision making under conditions of risk, or it may truly be uncertain and hence, unpredictable.

The first two components are reasonably well understood. Conventional approaches to decision making under risk when probabilities of future occurrence are high are also well known, and so also need no comment. Decision making under true uncertainty needs more explanation.

A common tendency under conditions of uncertainty is to impose probabilities, no matter how questionable, and then behave as if the condition were truly one of risk. Our question is, in searching for the survival path of an organization in an uncertain future environment, is it not better to design organizations to meet the uncertainty rather than to impose a specious probability and design as though that future had a real probability? McCaskey (1982) pointed out that the behavior required of executives under ambiguous conditions is substantially different from that required under conditions of certainty. Many of McCaskey’s suggestions for managing change and ambiguity
match those we offer below, and the case material he reviewed showed how difficult the task was for managers schooled in the traditional way of managing.

**Application of Principles of Natural Selection**

Many years ago, Ashby (1956) pointed out what he called the law of requisite variety, which held that in order to cope with an uncertainly varying environment, organizations had to have an equivalent amount of internal variety. Organizational scientists have not paid much attention to this law, and textbooks offer little advice on designing organizations to retain requisite variety. Following the four principles of natural selection, while not offering specific answers about surviving under uncertainty, reduces the problem to more manageable proportions.

**Variations.** Is it impossible for organizations to plan to have unplanned or blind variations? Fortunately, organizational control and planning methods are not so advanced as to preclude blind variations. The danger is that the more effective and adapted an organization becomes to present conditions, the more it will reduce its ability to maintain the requisite variety necessary to adapt to the future. Weick (1977) offered a useful plan for enhancing variations. The essence of his plan is his call for effective organizations to be garrulous, clumsy, superstitious, hypocritical, monstrous, octopoid, wandering, and ghoulish. It is well to build in some clumsiness or “galumphing,” defined as “patterned voluntary elaboration or complication of process” (Miller, 1973: 92) instead of designing organizational means that are streamlined, finely tuned, efficient, and inflexibly focused on a specified goal. Galumphing is a way of elaborating means and thereby introducing variations that may offer requisite variety, even though they may be inefficient in the short term. The good thing about superstition is that it is based on ignorance. Actions based on superstition are thus blind and not related to the present, and so result in blind variations. One of the dangers of well-informed, logical, analytical M.B.A.’s is that they are often trained to try to eliminate superstitious behavior in organizations and with it some of the ability to foster requisite variety. We leave the discovery of what octopoid, monstrous, ghoulish organizations are like to the interested reader.

Another approach to enhancing variations in organizations is given in the following statement by a top-level corporate strategy expert with an internationally famous consulting organization (he must remain anonymous at this time, since the memo we quote from is an internal one not meant for public use):

So what do the great military strategists, like Patton or MacArthur, or the great business strategists, like Walter Wriston or Patrick Haggerty, really do? What are the excellent companies — who talk less, but do more about strategy — really up to? I think the answer is this: First they are experimenting far more than the rest — they are not more prescient than any others; they simply have lots and lots of experiments, trials, and miniature ventures going on at any one time. Second, they are better learners. Because their top managers have first-hand knowledge of all the trials going on in their companies (and perhaps those of competitors) they have first-hand knowledge of what works and what does not work. Third, they do not experiment expensively; they seem to have systems for cutting off the failures and stepping up resources to the apparent successes. That’s it. I submit
that the real strategists are simply better learners who are experiment-
ing more.

A footnote to the memo is obviously in the same line of thinking as Weick’s clumsy organization: “Incidentally, what may be radically wrong with many clients’ strategic processes is that they are too organized. By the time they have defined what they mean by mission, goal, strategy, objective, plan business unit, and the like, they may have so narrowly defined the boundaries as to proscribe experimentation.”

Selection. In the population view, organizational forms develop because organizations generating and retaining beneficial variations survive more frequently than other organizations. While organizations, as variant forms, are selected for or against at the population level, variations also are selected for or against at the organizational level. Many variations are not beneficial to an organization and need to be selected out. Accordingly, selection processes abound in organizations; control systems are the primary place where variations are weeded out. Personnel evaluations and cost cutting programs are examples of other selection processes inside organizations. The risk is that beneficial variations may be selected out, along with the harmful ones, by overzealous control-oriented people. This has oc-
curred in many industries. For example, Brittain and Freeman (1980), in their study of the semiconductor industry, described cases of successful “spin-off” organizations — variations that were not recognized or retained by the companies that spawned them. Informal organizational processes, such as norms against offering suggestions, against experimenting, or against taking initiative, may also select out beneficial variations.

People in organizations need to be continually aware of how internal selection processes are operating and what kinds of variations they are selecting for or against. Further, internal selection processes should be oriented toward population-level selection processes. External selection processes appear to be different for each population, as Ulrich’s (1982) study of the electronics industry indicates, and the processes change over time. Under government regulation, airline costs of fuel, high union wages, and interest rates on loans to buy aircraft could be passed on to the customer by the industry, and thus they were not significant factors in determining which airline organizations survived or what the characteristics of the population form were. Under deregulation, these costs became extremely important almost immediately, and some airlines were slow in bringing them under control. It is possible that needed variations were not present in the failing airline organizations, but it is also possible that beneficial variations were selected against by resistant union, management, or owner constituencies. Survival paths do change, and sometimes quick and strong action is necessary to reorient internal selection processes toward favoring different kinds of variations, given a changed pattern of constraints in an environment. Depending on the environment and what appears to be working for other members of a population, beneficial variations might be of the cost-cutting, efficiency-oriented variety or might result in changed products or services. They might even lead to acquisitions, divestitures, mergers, or interlocking boards of directors.
Retention. The failure of organizations to retain people holding key comps is clearly illustrated in Brittain and Freeman’s (1980) research on the evolution of the semiconductor industry. If resources, planning, executive talent, or experience counted for anything, one would expect that corporations like RCA, Sylvania, General Electric, Raytheon, and Westinghouse, the leading electronic (tube) component manufacturers in 1953, would still dominate the industry. Instead, by 1975 the leaders were Texas Instruments, Fairchild Semiconductor, National Semiconductor, Intel, and Motorola. We are not able, at this time, to offer extended guidelines on how to retain key people. We suspect the answer lies in tuning internal selection mechanisms to complement external selection mechanisms more and toward the ideas we have drawn from Weick and the anonymous quotation about fostering innovations or variations. Of course, many variations are retained through formalization, job-training programs and manuals, and equipment design, all of which persist after the innovators have left.

Struggle. Every management professor has a list of first-mover organizations that stagnated and lost their market share to competitors. The U.S. steel, automobile, and television industries are populations at the top of the list, as is the English motorcycle industry. Individual companies such as Ford Motor, Singer Sewing Machine, Everest and Jennings (wheelchairs), Baldwin-Lima (steam locomotives), Montgomery Ward, Leica (cameras), are just a few well-known examples of first-movers who, if they did not lose out altogether, never regained the position they once had.

Sudden increases in organizational mortality rates (“shake-outs”) do not happen all the time — they are not continuous — but rather happen at uncertain intervals for many populations. Where shake-outs are frequent, organizations are more likely to show an ability to survive against considerable competitive pressure. Sometimes there is little struggle for existence, as in regulated industries, industries with vaguely measured outputs, such as educational institutions or hospitals, government agencies, or military organizations. Only wars bring shake-outs in military organizations, as Argentine military organizations have learned. Only broad-based political pressures seem to bring shake-outs in government agencies (e.g., Reagan’s treatment of the energy and educational agencies). There is much to be said for business cycles because they do cause shake-outs. We suspect it is very hard to maintain a tough competitive edge when one is on top. The best practical message we have is to do anything possible to bring shake-out pressure to bear on organizational units and to place them in competitive postures against other organizational units, or against units outside the organization. One difficulty with a simple application of this strategy is that competitive pressures will drive people toward maximizing in the short term, and this is antithetical to what is necessary to generate variations.

Organizational science, as a field, has traditionally focused on control, decision making, and communication processes (March, 1965). This seems especially true of studies by investigators in management schools and in the design of training programs for professional managers. The intent of these studies and training has been to minimize unplanned variations by emphasizing tightening control systems, strengthening the
logic of decision processes, and reducing breakdowns in the
communication of goals, plans, and policies. These actions
reinforce the application of the selection principle, since deci-
sions are selections from among alternatives, and communica-
tion and control processes assure the implementation and
retention of selections. It would appear, however, that
human-enhanced internal selections, at the expense of varia-
tion, retention, and struggle, will probably not put organiza-
tions in a strong position for survival under conditions of uncertainty.
We do not advocate becoming paralyzed by natural selection, all
the while hoping for favorable selection. Managers should
attempt a balanced emphasis on all four principles as the best
way of increasing the chances of the survival of their organiza-
tion. Such an even emphasis will not guarantee favorable
selection, but at least it will keep a manager from inadvertently
helping the organization more quickly toward failure. The theory
of natural selection explains the effects of a force that cannot
be anticipated or countered in its effect but that can be
understood. Organizations have more ability to adapt than
organisms, we think; they have more ability to alter their niche
space than organisms; and they have the possibility of gaining a
vision capable of steering them away from failure-enhancing
mistakes.

CONCLUSIONS

If we take seriously an organizational level of analysis —
assuming organizations are coherent units with integrity as
units — then theories of organizations should reflect this
assumption. The population perspective is then an extremely
useful approach for studying the process of organizational
change. A theoretically grounded empirical taxonomy would
provide a conceptual framework for describing and understand-
ing the diversity of organizational populations and would iden-
tify populations useful for research on other substantive con-
cerns about organizations.

Adopting the population perspective would transform the field
of organizational science. The distinction between macro- and
micro-organizational behavior would be put on a solid theoreti-
cal footing. Organizational theorists now only partially recognize
that it is as valuable to study organizations as social units as it is
to study classes of their members, such as managers and
decision makers. If theorists begin to take the integrity of
organizations seriously, organizational forms and populations
would become the fundamental units of analysis for the field.
Generalizations and theories about organizations would no
longer be acceptable unless they were qualified by the form(s)
to which they applied.

Research on organizations would be guided by a clear concep-
tion of representative sampling, and investigators would be-
come much more conscious of a priori choices of sampling
frames. Many current studies are based on samples from
probable populations, but they are not well defined, and inves-
tigators have moved too quickly in generalizing their results to
other populations. With explicit recognition of the constraints
on generalizability, much extant knowledge could be incorpo-
rated into the population perspective, particularly the many
studies of specific institutions, such as hospitals, unions, and
schools (March, 1965).
We believe adoption of the population perspective would have its most significant effect on the process of translating research findings into applications. Storage and retrieval of research results — and the accumulation, refinement, and critical analysis of results — would be greatly simplified by the availability of a dependable classification scheme. Consultants, managers, staff, and interested parties could make much more informed choices of tactics and strategies, were they guided by knowledge of where their organization fit in the larger class. Theory and practice would be in much closer harmony than they are now, and this, perhaps, would be the most salutary consequence of all.

REFERENCES

Aldrich, Howard E. 1979 Organizations and Environ-

Aldrich, Howard E., and Susan
Mueller 1982 “The evolution of organiza-
tional forms.” In Barry M. Staw
and Larry L. Cummings (eds.),
Research in Organizational Be-
havior, 4: 33–87. Greenwich,
CT. JAI Press.

Ashby, W. Ross 1956 An Introduction to Cybernetics
London: Chapman & Hall

Bailey, Kenneth D. 1973 “Monothetic and polythetic
typologies and their relation to conceptualization, measure-
ment and scaling.” American Sociological Review, 38:
18–33.
1975 “Cluster Analysis.” In David R.

Benson, J. Kenneth 1977 “Organizations: A dialectical

Biggart, Nicole Woolsey 1977 “The creative-destructive pro-
cess of organizational change: The case of the Post Office.”

Blau, Peter M. 1974 On the Nature of Organizations
New York: Wiley

Blau, Peter M., and Richard A.
Schoenherr 1971 The Structure of Organizations.

Bougon, Michel, Karl Weick, and
Din Binkhorst 1977 “Cognition in organizations: An
analysis of the Utrecht Jazz Or-

Brittain, Jack W., and John H.
Freeman 1980 “Organizational proliferation and density-dependent selec-
tion. Organizational evolution in the semiconductor industry.” In J. R. Kimberly and R. H. Miles
and Associates, The Organiza-

Cafferata, Gail Lee 1979 “Member and leader satisfac-
tion with a professional associ-
ation: An exchange perspec-
tive.” Administrative Science Quarterly, 24: 472–483

Campbell, Donald T. 1969 “Variation and selective reten-
tion in sociocultural evolution.” General Systems, 14:
69–85

Carroll, Glenn R., and Jacques
Delacroix 1982 “Organizational mortality in the newspaper industries of Argen-
tina and Ireland: An ecological approach.” Administrative Science Quarterly, 27:
169–198

Chamberlain, Neil W. 1968 Enterprise and Environment. The Firm in Time and Place

Chandler, Alfred 1977 The Visible Hand. Cambridge,
MA: Belknap

Child, John 1972 “Organization structure and strategies of control: A replica-
tion of the Aston study.” Admin-
istrative Science Quarterly, 17:
163–177.

Corning, Peter A. 1974 “Politics and the evolutionary process.” Evolutionary Biology, 7:
253–294.

Daft, Richard L., and Norman B.
Macintosh 1981 “A tentative exploration into the amount and equivocality of information processing in or-
ganizational work units.” Ad-
ministrative Science Quarterly, 26:
207–226.

Darwin, Charles 1859 On the Origin of Species by Means of Natural Selection. London: Murray (A Facsimile of the First Edition with an In-
truction by Ernst Mayr Cambridge, MA. Harvard University
Press, 1964.)

Dodd, Richard A. 1969 “A numerical taxonomy of vol-
untary associations.” Unpub-
lished Ph.D. dissertation, Uni-
versity of Kansas

Freeman, John H. 1982 “Organizational life cycles and natural selection processes.” In Barry M. Staw and Larry L.
Cummings (eds.), Research in Organizational Behavior, 4:
1–32 Greenwich, CT. JAI
Press

Frost, Peter 1980 “Toward a radical framework for practicing organization sci-
ence.” Academy of Manage-
ment Review, 5: 501–507

Galbraith, Jay R. 1973 Designing Complex Organiza-
tions. Reading, MA: Addison-
Wesley.


Geertz, Clifford 1973 The Interpretation of Culture.
New York: Basic Books

Glaser, Barney G., and Anselm L.
Strauss 1967 The Discovery of Grounded
Theory. Chicago: Aldine
Populations, Natural Selection

Kimberly, John R.

Kuhn, Thomas S.
1970 The Structure of Scientific Revolutions Chicago University of Chicago Press

Lammers, Cornelis J., and David J. Hickson

Lawrence, Paul R., and Jay W. Lorsch

Leatt, Peggy, and Rodney Schneck

Leblebici, Huseyin, and Gerald R. Salancik

Lewontin, R. C.

Likert, Rensis

Litchfield, Edward H.

March, James G. (ed.)
1965 Handbook of Organizations, Chicago Rand McNally

March, James G., and Herbert A. Simon

Mayr, Ernst

McCaskill, Michael B.
1982 The Executive Challenge: Managing Change and Ambiguity. Boston: Pittman

McKelvey, Bill


Meyer, Marshall W.
1979 Change in Public Bureaucracies. London: Cambridge University Press


Mezlich, Juan E., and Herbert Solomon

Miles, Matthew B.

Miles, Robert H.

Miller, Stephen

Morgan, Gareth, and Linda Smircich

Niv, Armitai

Oldham, Greg R., and J. Richard Hackman

Ouchi, William G.
1981 Theory Z, How American Business Can Meet the Japanese Challenge Reading, MA Addison-Wesley
Parsons, Talcott
1956 "A sociological approach to the

Perrow, Charles
1970 Organizational Analysis: A

Pfeffer, Jeffrey, and William L. Moore
1980 "Average tenure of academic
department heads: The effects of paradigm, size, and depart-

Pfeffer, Jeffrey, and Gerald R. Salancik
1978 The External Control of Organiza-

Pianka, Eric R.
1978 Evolutionary Ecology, 2d ed.
New York: Harper & Row

Porter, Michael

Pugh, D. S., D. J. Hickson, C.
Hinings, and C. Turner
1968 "Dimensions of organizational

Pugh, D. S., D. J. Hickson, and C. R.
Hinings
1969 "An empirical taxonomy of
structures of work organizations." Administrative Science Quarterly, 14: 115–126.

Ritzer, George

Roos, Leslie L., and Roger I. Hall
1980 "Influence diagrams and orga-

Rosenbaum, James E.
1979 "Tournament mobility: Career

Rossi, Jerry, and Kenneth R. Ferris
1981 "Interpersonal attraction and
organizational outcomes: A field examination." Administrative Science Quarterly, 26: 617–632

Schulz, Alfred
1967 The Phenomenology of the So-
cial World. Evanston, IL: Northwestern University Press

Schwab, Joseph J.

Scott, W. Richard
1981 Organizations: Rational, Natu-
ral, and Open Systems. En-
glewood Cliffs, NJ: Prentice-
Hall.

Shetty, Y. K., and Newman S.
Perry, Jr.
1976 "Are top executives transfer-

Sneath, Peter H. A., and Robert R.
Sokal

Susman, Gerald I., and Roger D.
Evered
1978 "An assessment of the scient-

Stern, Robert N.
1979 "The development of an interorganizational control net-
work: The case of intercol-
legiate athletics." Administra-
tive Science Quarterly, 24: 242–266.

Swidler, Ann
1979 Organization without Authority. Cambridge, MA: Harvard Uni-
versity Press.

Thompson, James D.
1956 "On building an administrative

Ulrich, David O.
1982 "United States and Japanese electronics industries. Descrip-
tion, taxonomy, and selection " Unpublished Ph.D. disserta-
tion, University of California–Los Angeles.

Van Maanen, John (ed.)
1979 Special Issue on Qualitative Methodology. Administrative Science Quarterly, 24: 519–
671.

Van de Ven, Andrew H., and W.
Graham Astley
1981 "Mapping the field to create a
dynamic perspective on organi-
zation design and behavior " In A. H. Van de Ven and W. F
Joyce (eds.), Perspectives on Organization Design and Be-

Warriner, Charles K.
1980 "Organizational Types: Notes on the Organizational Species
Concept." Mimeographed paper, Department of Sociol-
ogy, University of Kansas, Lawrence.

Weick, Karl E.
1977 "Re-punctuating the problem." In P. S. Goodman, J. M. Pen-
nings and Associates, New Perspectives on Organizational Effective-
1979 The Social Psychology of Or-
ganizing, 2d ed. Reading, MA: Addison-Wesley.

Zucker, Lynn G.