Fred Emery

Methodological Premises of Social Forecasting[1]

Even if we agree about what ought to be done by way of planning, we are no further advanced with respect to knowing how to detect social developments several decades ahead or knowing what developments we should actually plan for. We need to examine some of the concepts and methods which might help us to determine the shape of the future.

The Perspective of Futurology

A prediction of the future can always be challenged by the argument that we can only know what we have experienced or are experiencing—that is, the future does not yet exist and hence cannot be experienced, cannot be known. This skepticism reduces itself to the position that we can know only what is presently experienced because the past is also nonexistent and we have no way of experiencing it and hence knowing that what we think was experienced was actually experienced. These objections cannot be allowed to rest there. To be consistent one has to define the present. If one insists that past and future do not exist and hence cannot be known, then the present becomes the split second of immediate experience and knowledge; knowers and knowables disappear.

This attitude to prediction is no more useful to understanding what we actually do than is the other Laplacean extreme which suggests that the past and the future are completely given in the present array of matter and energy. Our own experience of successful and unsuccessful prediction is a far better guide to what we might be able to achieve in trying to assess the future requirements for the social sciences. Granting the compelling point that we cannot experience that which does not exist, we are still prepared to agree that we know something scientifically if we know we could, given present conditions, create the relevant experiences—by experiment, test or observation. This copes not only with why we believe that we know something of the past, but also with why we believe we know something about the future. For example, we can experimentally demonstrate that exposure to present conditions will lead to a

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particular set of events at some point in the future. At a trivial level, we can say that, given the numbers taking up sunbathing today, there will probably be many more with sunburn tomorrow.

These latter considerations give us good reason for rejecting a skeptical viewpoint about prediction and accepting the question, more usually asked by Everyman, "how do you know that?" However, we have in our riposte implicitly defined the notion of the present. The present within which we can potentially carry out a confirmatory experiment or collect the ingredients of sunburn is not the immediate conscious present of the skeptic. Is this simply a sleight of hand or are there other grounds for redefining the notion of present, apart from the fact that the immediate present is an impossible, useless concept?

This problem was brought to a head in psychology with Lewin's (1935) concept of contemporaneous causation as applied to the life space of an individual. Subsequently, Chein (1948) suggested that just as much of the present is organized into spatial *gestalten*, so this present is embedded in "overlapping temporal *gestalten*."

Temporal Gestalten

The experience of a melody presupposes experience of a temporal *gestalten*. A sneeze can be part of the present, but so is middle age part of the present of a middle-aged person and the 1970s part of the present of a railway organization. Any person or group is at any instant in many presents, each corresponding to what is a phase of the temporal *gestalten* in which he, she or it is embedded. In dealing with living systems—whether species, population groups or individuals—we have been led to the viewpoint that there are laws corresponding to the whole course of a living process. This is so because we have identified in these processes parts which coexist throughout the duration of the process and, in their mutual interaction and interdependence, generate the causal relations characteristic of that process.

Certain, not all, of the characteristics of events arising within a process or the emergence of phases of a process will be determined—and hence can be predicted—by the laws governing that process. However, by the same reasoning, the phases will possess certain characteristics of their own—hence laws of their own—arising from the mutual determination of their subparts. These characteristics will not be determined by the characteristics of the preceding phases unless these arise from laws of the total process and except insofar as the preceding phases determine the starting point of the phase in question.

Sommerhoff (1950) has stated these propositions in a more rigorous and exact way in his concepts of long-, medium- and short-term directive correlations—corresponding to phylogenetic adaptive learning and behavioral re-

sponses—and of the hierarchies which can arise between them. For our purposes, it is enough to note that it is consistent with the principle of contemporaneous causation to regard certain types of past and present events as causally related to, and predictive of, events which have yet to occur or to be experienced. These are events which arise in the course of the process and which are mutually determined by the laws governing that process. In psychology, for example, the facts of maturation and learning are of this type. The prerequisite for prediction is a knowledge of the developmental laws. In the absence of this knowledge even the meaning of the immediately present facts cannot be understood. The gaining of this understanding through knowledge of every immediately present fact can even be regarded as theoretically impossible. This is the problem of Laplace's super-mathematician and the illusion of some supercomputer schemes for integrated data systems. In addition to a knowledge of the laws governing different classes of living processes, we need a knowledge of earlier facts if we are to know how those laws are operating in a specific individual process and what the effects on later phases are going to be.

So far, I have considered only the case of a single process—temporal *gestalt*, system or directive correlation—and its parts and have implied that the whole burden of causation is within a process. This is, of course, a travesty of reality. Many of the phenomena we observe arise from the interaction of processes that we are unable to treat as if they were parts of a more inclusive process. When such independent processes overlap, a new process emerges and a class of events is generated which has no history prior to that at the beginning of the interaction. There are clearly degrees of independence. The interpersonal life which will emerge in the marriage of a man and a woman from the same culture is probably more predictable than that which would emerge if they came from different cultures. In any case, these hybrid processes seem to entail a special degree of unpredictability. The sufficient conditions for these newly emerged classes of events cannot be found in the prior history of the individual processes.

The main suggestions about the theoretical possibilities and limits for prediction can be spelled out more clearly with reference to simple diagrams. Throughout, I will be concerned with predicting the future of concrete individual processes—for example, that of the United Kingdom or of John Smith. I will not be considering how one builds up predictive knowledge for a class of repeated or repeatable processes, nor will I consider forecasting techniques for processes which display only quantitative change.

Let us assume that the letters *A*, *B* and *C* in Figure 1 represent the scope and temporal extension of three living processes—which could, for instance, be ecological, social or psychological. Let $t\,0$ represent the present and $t--$, $t-$, $t+$ and $t++$ represent the past and future points in time.

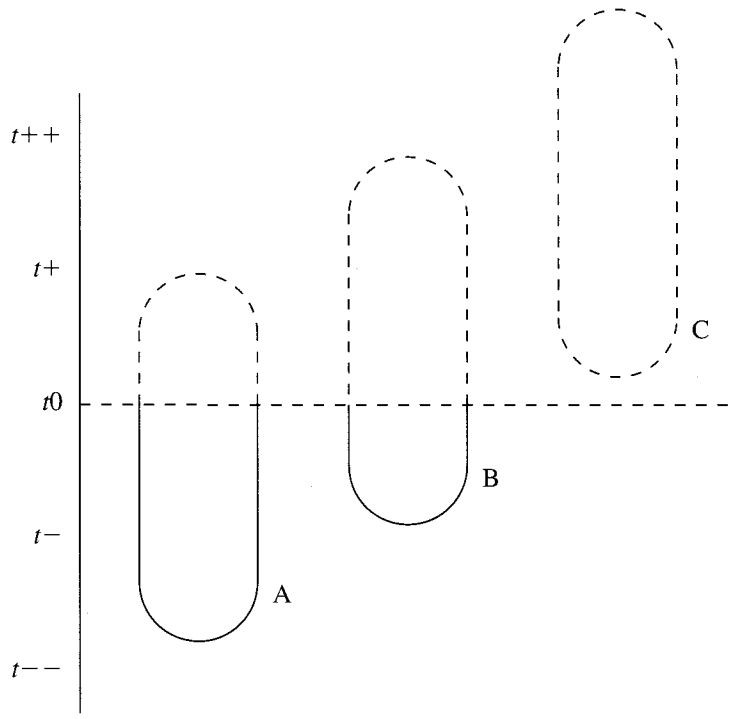

Figure 1. Different processes at different times.

Four Factors Influencing the Predictability of Temporal Gestalten

(1) *Familiarity*. In the situation represented in Figure 1 we would expect to be able to predict the state of A at $t+$ better than we could B at $t+$, provided, of course, that A and B are the same kinds of system. The general principle is simply that for any system there is a minimum number of its component positions that have to be filled by parts before the system is recognizable. In practice, we do find that the more of its course a system has run, the easier it is to understand. On the same grounds, we would regard C as unpredictable at $t0$.

(2) Phase distance. Figure 2 represents a situation in which a and b are phases of A. While some prediction about the future part of a is theoretically possible, there is no basis for predicting the specific characteristics of phase b. Beyond phase a one could only make predictions of the kind discussed with

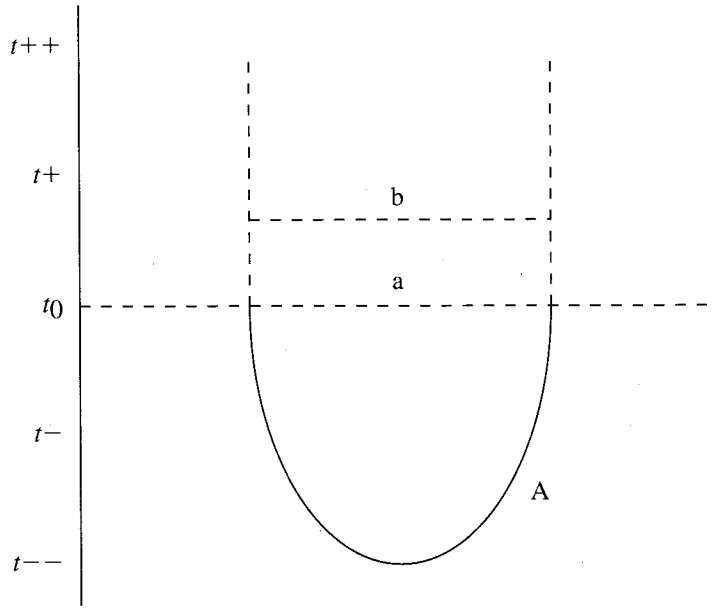

Figure 2. Different phases in the same process.

reference to Figure 1—that is, predictions about the more general features of system *A*.

(3) *Inclusiveness.* Figure 3 represents a situation in which *A* and *B* are co-extensive in time, but in which *B* is a part process of *A*. One would expect that predictions about *A* would be theoretically easier than predictions about *B* taken alone. The basis for this expectation is the general property of part/whole relations. *A* sets some of the parameters of *B*; hence whatever one knows of the values likely to be taken by *B*, one knows more if one knows how these parameters might change. The future of *B* is dependent on the future of *A* in a way that *A* is not dependent on *B*. At the same time, predictions about *A* are less specific than could be predictions about *B*.

(4) *Emergent overlap.* In Figure 4 we have two processes which are presumed to interact after some point, $t+$, in the future. If *A* and *B* survive the interaction, some of their system properties may predictably survive. What seems unpredictable are the processes set up by the interaction and the changes occurring in *A* and *B* if they become directively correlated to form a larger inclusive system.

It would be too much to expect that the above mentioned situations constitute a complete set or that the interpretations are all equally defensible. It will

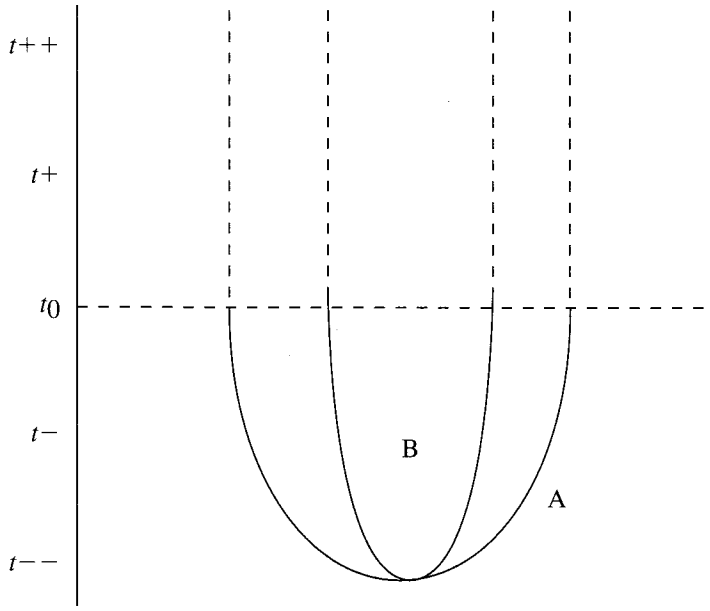

Figure 3. Part-whole relations in time.

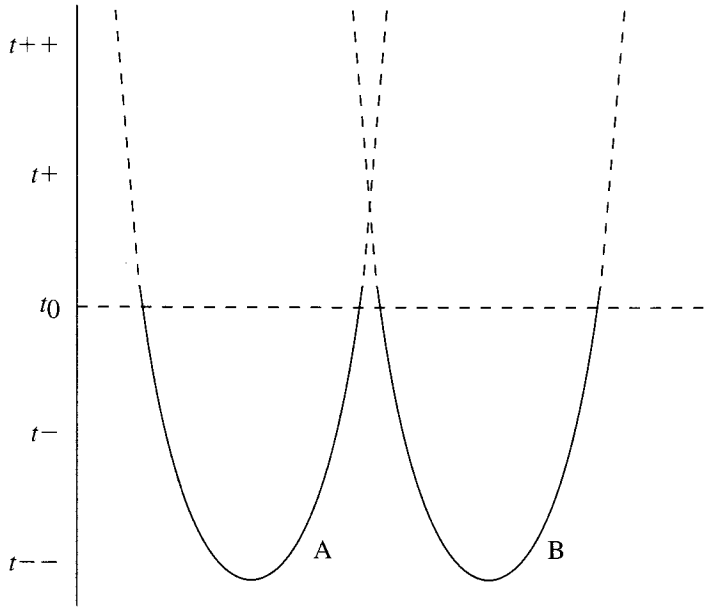

Figure 4. Overlapping processes.

be sufficient to make the point that there are genuine theoretical questions involved in predicting the future—as distinct from methodological ones—and to explicate the assumptions used. These assumptions guide the search for appropriate methodologies and the strategy for identifying future changes.

Forecasting Social Futures as a Problem in Reduction of Complexity

Identifying the System and its Generating Function

Given a conceptual model of overlapping temporal *gestalten*—processes, systems or directive correlations—the general methodological problem is clear: to identify the constructive principle—ends or focal conditions—which characterizes the system or subsystem whose development we are trying to predict. A good methodology will be one which enables us to predict earlier.

There are two aspects to this methodological problem. The first is to identify the system in terms of its components and the dimensions in which they are arranged. This is not simply a matter of counting off to see things which display a sufficient degree of interdependence to warrant being treated as a system. Most systems, particularly in their early stages, are incomplete—open *gestalten*—and hence system identification can only be considered adequate if one can enumerate not only the present members and their relations but, from these, also the unfilled positions in the system and the strains they create. The notion of incompleteness is implied in statements of the sort that political system *X* or *Y* is immature.

Under this aspect we can classify seven of the twelve modes of prediction that Bell (1965) identified as "structural constraints," "requisites," "operational systems" and "codes." These identify major system characteristics and lead to predictions of persistence or decay. Also, here is the mode of predicting from the overriding problem, that is, the goal of the system, the prime mover, the basic starting conditions and phase theories identifying a temporal hierarchy of goals and starting conditions.

The second problem is to identify the *characteristic generating functions* (cgf) of the system. The underlying notion here is that, insofar as a system generates its successive phases, it will exhibit some temporal series of behavior which, if quantified, could be represented by a mathematical series. Such a mathematical series has the property that its cgf can be identified from a finite part of the series—even if the series is infinite—and, given the cgf, one can predict from any starting point the subsequent members of the series.

These two aspects of the problem are not always explicitly dealt with in published models of prediction. In the mode that Bell (1965) calls "social

physics," we have had many attempts to postulate the characteristic generating functions of identifiable systems: Marx's concept of the relations to the means of production provides a classical instance. However, in the mode of trends and forecasts, we typically find that the models deal with aspects—for example, economic or political—of a system without explicitly relating these aspects to the behavior of the total system. By taking into account more aspects, as in the U. S. government's attempts to move from national income accounting to social accounting, these models may move closer to predicting total system behavior. This is particularly likely if, as in the quoted case, the selection of new aspects to measure is guided by explicit analysis of the system.

The remaining two of Bell's modes of prediction concern neither identification of system components and dimensions nor their characteristic generating functions. They are techniques which could be used to enrich or test any of the other 10 modes. Thus, construction of "scenarios of alternative futures" is explicitly concerned with identifying the range of end-states which may occur and hence may be chosen as desirable. It is not concerned with identifying the current conditions which might render some futures more probable than others. "Decision theory" has some potentiality for determining the relative "rationality" for a system of the different courses of action which might be predicated by any of the 10 modes of prediction classified above.

Two Difficulties in Complexity Reduction

Bell's concern was with modes of predicting future states of large complex social systems; this is also our concern. Thus, it is relevant to discuss some special difficulties arising from the study of these systems:

- Their complexity is greater than that which we have so far learned to cope with in our separate social sciences.
- The sharing of parts between different subsystems is so great that their subordination to newly emerging processes can be difficult to detect; that is, the parts appear to be still functioning as parts of the established familiar systems, although perhaps a little more erratically.

The rest of this paper will be focused on possible solutions to the first difficulty.

It seems to me that the social sciences cannot hope to cope with the complexities of large, complex social systems unless they take as their unit of analysis something larger than, and inclusive of, these systems. Specifically, the unit must include the system and its immediately relevant environment.

Lewin (1936) and Ashby (1956) both offered general solutions to the problem of representing high orders of system complexity. Both took the system-environment as their unit of study; both recognized that reduction should be to those features which were genotypical—that is, the characteristic generating

functions. These, hopefully, would emerge from use of topology or application of stability theory to differential equations. In developing their general solutions, both found it difficult to avoid reduction of their unit of study to just another large complex system. Lewin's psychological system tended to become encapsulated within the "psychological life space." Ashby's system tended to become merely a part of a more comprehensive system; hence he was back with part/whole relations, not open systems.

That their efforts proved to be premature should not blind us to the daring nature of their proposed solution and its essential correctness. To reduce the complexity of our systems models they proposed to add in the even greater complexity of the environment, with the further complication that the two sets of processes tend to demand incommensurate models drawn from many different disciplines.

What makes sense of this apparently foolhardy approach is the fact that, if reduction is not to yield a misleading caricature of a system's future, it must be a reduction to genotypical characteristics. In living systems, the most fundamental genotypical characteristics are the system-environment relations which determine survival—that is, continued living and reproduction. In populations of living systems capable of active adaptation, each system is part of the environment of the others and, together, they constitute a social field. As one actively adapting system, *A*, becomes sensitive to the potentially critical part that another can play in a given setting, so it becomes sensitive to how *B* might have acted in earlier settings to create the conditions with which it is now faced; how *B* might act in later settings to undo or build on what *A* now does; how some other system, *C*, might act if *A*'s relation with *B* takes a certain course. The multiple short- and medium-term directive correlations which thus emerge constitute an *extended field of directive correlations*—a social field. Such social fields have properties that persist in the absence of any one of their constituent systems and, at the same time, determine critical conditions for adaptation and survival of these systems. The social field includes less than the total environment of a system; however, as a first approximation, it offers more hope of advancing the program of Lewin and Ashby. Subsequent approximations would probably seek to relate the social field to the biological and physical environment—for example, in seeking to make predictions with respect to population growth, resource utilization and pollution. However, even for these successive approximations, the same methodological point is relevant. Prediction of the future states of human populations requires that the unit of analysis include the social field and that reduction should still retain at least the fundamental dimensions of the relation between the two.

If we take this social field as a special kind of superordinate system, then there are two questions which should guide the search for complexity reduction in a complex social system:

- What are the system-environment relations which typically determine survival in this social field?
- What are the system tendencies toward generating such relations?

These questions will eventually need to be jointly answered. Attempts have been made to give a joint answer. Emery and Trist (1965/Vol. III) proposed an evolutionary schema for social fields such that if the present state of a field could be identified, other phase characteristics could be expected to emerge. See also May, (1972:413–14) and Gardner and Ashby (1970:784). However, the basic work has gone into three general approaches to answering the second question: values as indicators of system tendencies; starting conditions as indicators; analysis based on the leading part.

Values and Starting Points as Indicators of System Tendencies

The demands for survival in a particular environment should place value on certain kinds of preparatory behavior at the expense of others; changes in the conditions of survival should induce changes in these values or goals. The direct study of what is valued should therefore enrich the predictions which could be made from study of survival conditions, alone. Several specific methodologies have been suggested for studying values.

Churchman and Ackoff (1949) have argued that, where we have a reason to believe that some X is a value for a social system, we can test this belief by seeing whether there has been, over an appropriately long period of time:

(a) a tendency to increase the efficiency of the means for pursuing X,
(b) a tendency to greater use of the more efficient means,
(c) an increased conscious desire to achieve X.

Conditions (a) and (b) could be otherwise formulated as an increase in the range and degree of the directive correlation having X as a goal; (c) is a necessary condition because both (a) and (b) could be manifested by a process arising from the accidental overlap of two temporal *gestalten*—as in Figure 4. In the case of warfare, we can certainly see an increase in the efficiency of weapons and a marked tendency for their usage to spread, even among warring Congo tribesmen. The absence of condition (c) gives some grounds for doubting whether the wholesale murder of others is a basic social value. If (a), (b) and (c) are all present, as in pursuit of health in modern human society, we have very good reason for believing that it is a value for that society. By the same criteria, it is doubtful that speed of travel is a valued end-state.

As a methodology, the Churchman/Ackoff proposal seems a particularly promising start. The most desirable elaboration of this method is probably that which will help order the relation between values. For example, for what values are people prepared to sacrifice most? One can readily envisage how this

method might help one predict the longer-term shifts in value which plague the trend and forecast people.

A more popular methodological approach to the same problem is provided by the combination of sample surveys and value tests (Cantril, 1965). This is essentially limited to part (c) of the Churchman/Ackoff model. Hence, for use as a basis of prediction, this approach presupposes some evidence about (a) and (b). Without the latter, one cannot be sure whether the support for a value is, over the long run, declining, stabilizing or growing. A growing conscious desire for religion or law and order might, for instance, reflect concern over the decline in religious institutions or respect for laws.

The second methodological approach to complexity at this level of generality is that of identifying the starting conditions, arising from past adaptive responses, which act as a constraining and guiding influence on subsequent preparative behavior. This has appeared to be the really scientific approach during those past generations when the value-oriented actions of people so frequently produced unanticipated and undesirable consequences—for example, World War I and Vietnam. One marked attraction has been the appearance of a social system in which the vast complexity of past individual contributions has been congealed and crystallized into a much smaller number of formal organizations. This is particularly clear in the economic field. The state of these organizations at any one time seems to be a firm basis for what will subsequently emerge. Combined with a variant of the first method-analysis of the values pursued by organizations, it seems particularly attractive. However, the individual orientations left out of this organizational approach may well nullify this attempt to reduce complexity. Developments such as those of Nazi Germany suggest that these residual nonorganized behaviors are an important condition for what will emerge in a society (Cantril, 1941; Fromm, 1950).

What are seen as the sheer aggregates of individuals who constitute the members of organizations, institutions and societies are in no way like aggregations of noninteracting pebbles. If they have any history of living and reproducing while in communication with each other, they will be the living parts of a social field of directive correlations. Attention of observers will usually be captured by the socially defined roles of politicians, bishops, professionals, administrators and the other organized centers of power, but the aggregates constitute, at all times, the third and basic dimension of social life. When convulsed by ground waves of change, as in Hungary during 1956, China during the Cultural Revolution of 1966–68 and the U.S. ghettoes and campuses during 1967–68, these aggregates may be the dominant and most obvious dimension.

This point should be taken a little farther as it undermines any scientific validity which might attach to a forecasting method that proceeds simply from

identifying the starting conditions, including current stable rates of growth. Social organizations and social roles are differentiated out of the social field carried by the aggregates. They are stable only insofar as their demonstrated purposes are related by public values to the emotional states of the aggregates. Study of what is valued would thus seem to subsume this method.

Both the study of values and of starting conditions appear in practice to achieve less than the necessary reduction in complexity. Almond and Coleman's (1960) model, for instance, would require repeated sampling of several hundred subsamples of organizations. Similarly, the range of values, which can conceivably be supported in a human population is excessively large.

Analysis Based on the Leading Part

This brings us to suggest that there is a methodology intermediate in generality between the Lewin/Ashby model and the two just discussed. The intermediate one concerns the notion of the leading part. In this case, the reduction is not, as it were, a reduction across the board to pick out a key element present in all of the parts. Selecting the leading part seeks to reduce the total complexity by ignoring a great deal of the specific characteristics of all but one part. At its extreme, we have the reduction to a figure/ground relation in which the leading part is considered in relation to all the other parts taken together as its ground—that is, as the internal environment of the total system. Throughout this range of possibilities the method is basically that of establishing which part it is whose goals tend to be subserved by the goals of the other parts, or whose goal achievements at t_4 tend to determine the goal achievement of all the parts at $t+$.

Practical use of the methods of value study or structural analysis usually involves an implicit assumption about what is the leading part—for example, McClelland's (1961) study of achievement values as a driving force in modern history and the Marxist mode of production theory. The values of the elite or the character of a central organization—or a set of like organizations—can readily form the basis for predictions about the future. There would be a better basis for prediction if the intermediate step of selecting the leading part had an explicit methodological basis. One expected windfall from asking what part acts as the leading part is that major phase changes might be identified. Most studies of developmental phases in individuals or societies seem to identify a change in phase with a change in the leading part.

These suggested methodologies do not add up to an established discipline for study of the large, complex, so-called socio-economic-technological systems. They do indicate that this order of complexity is not an insurmountable barrier and that some progress has already been made.

The Problem of Detecting Emerging Processes

Concealment and Parasitism

The second major difficulty in predicting the future states of large, complex, social systems—that of early identification of emergent processes—poses far more perplexing methodological problems. However, if social life is properly characterized in terms of overlapping temporal *gestalten*, then many of those processes that will be critical in the future are already in existence in the present. If this were not the case, it would be difficult to see how such processes could quickly enough muster the potency to be critical in the next 30 years. Thus, for instance, the conditions for World War I were laid before the end of the nineteenth century and were correctly perceived around 1900 by such oddly gifted men as Frederick Engels and the Polish banker Bloch (Liddell-Hart, 1941).

An obvious question must be asked at this point: is this not the same class of evidence that is the basis for extrapolative prediction? Such evidence does include some evidence of this class, but its most important additional inclusion is of processes that are not recognized for what they are. The early stages of a sycamore or a cancer are not obviously very different from a host of other things whose potential spatiotemporal span is very much less; so it is with many processes in social life.

One suspects that the important social processes typically emerge in this manner: they start small; they grow; and only then do people realize that their world has changed and that this process exists with characteristics of its own. Granted that they are genuine emergent processes—otherwise, why worry about futurology—then we must accept real limitations on what we can predict, and we must also accept that we have to live for some time with the future before we recognize it as such.

Yet, it is not simply foolhardy to think that we may enable ourselves to recognize the future more readily in its embryonic form. There are almost certainly some regularities about these emergent phases. Social processes which in their maturity are going to consume significant portions of people's energies are almost bound to have a lusty growth. They do not, by definition, command human resources at their infancy. Hence their energy requirements must be met parasitically—that is, they must in this phase appear to be something else. This is the major reason that the key emergents are typically unrecognized for what they are, while other less demanding novel processes are quickly seen. A social process which passes for what it is not should theoretically be distinguishable both in its energy and informational aspects. Because it is a growing process, its energy requirements will be substantially greater, relative to what it ap-

pears to do, than the energy requirements of the maturer process which it apes. Because it is not what it appears to be, the process will stretch or distort the meanings and usage of the vocabulary which it has appropriated. The energy requirements may be difficult to detect not only because we lack scale for many of the forms of psychic and social energy, but also because a new process may, in fact, be able to do not only as much as it claims—for example, television, to amuse—but to do it so much more easily as to be able also to meet its own special growth requirements. The aberrations of linguistic usage are, on the other hand, there to see.

In going farther along these lines, I will try first to explain why there are probably significant, although undetectable, processes operating in the present. The explanation, itself, suggests some methodologies which might aid early detection. For reasons of continuity I will discuss these methodologies before tackling the logically prior question of whether there is any particular reason for trying to achieve early detection.

Shared Parts

Complex social systems, like the human body, rely a great deal on the sharing of parts. Just as the mouth is shared by the subsystems for breathing, eating and speaking, so individuals and organizations act as parts for a multiplicity of social systems. Just as there are physiological switching mechanisms to prevent us from choking too often over our food, so there are social mechanisms to prevent us from having too many Charlie Chaplins dashing out of factories to tighten up buttons on women's dresses. I think that it is this sharing of parts which enables social processes to grow for quite long periods without detection. If they could grow only by subordinating parts entirely to themselves, then they would be readily detectable. However, if their parts continue to play traditional roles in the existing familiar systems, then detection becomes difficult indeed. The examples which come to mind most readily are the pathological ones of cancer and incipient psychoses. Perhaps this is because we strive so hard to detect them. In any case, healthy changes in physical maturation, personality growth and social growth typically follow the same course. Once we are confronted with a new fully fledged system, we find that we can usually trace its roots well back into the past in which it was unrecognized for what it was.

Phasing in the State of Competing Systems

If, in fact, most—or even some—important social processes are not detected for this reason, methodological approaches are suggested. Despite the redun-

dancy of functions the parts tend to have with respect to the roles they play in any open subsystem, one must expect some interference in the existing systems as a new one grows. Angyal (1966) from his analysis of competing psychological systems within an individual, has suggested a general classification which can serve as a basis for analyzing social systems. This is as follows:

(1) When the emerging system is relatively very weak, it will tend to manifest itself only in the parasitical effects it has on the energies of the host system—that is, in symptoms of debility. The host systems will find it increasingly difficult to mobilize energy—people—for their functions and there will be a slowing down of their responsiveness to new demands. The balance of forces may oscillate so that these symptoms occur in waves and make the functioning of the existing social systems less predictable.

At any given time, a social system experiences a fair amount of uncontrolled variance—error—in its operations. The reasons for an increase in this variance—of the kind being discussed now—will typically be sought within the system itself; measures may be taken to tighten up the system's integration. The unpredictable oscillatory effects are likely to encourage a wave of experimentation with new modes of system functioning. All these symptoms have behavioral manifestations and hence are open to study. The methodological strategy of operational research is that of proceeding via analysis of the variance of systems, and this would seem particularly appropriate here.

(2) When the emerging system is stronger, but still not strong enough to displace the existing system, we can expect to see symptoms of *intrusion.* Social phenomena break through as in the case of the ghetto and student riots of 1967–68; clearly these breaks are not simply errors in the functioning of the existing systems. At the same time, because of the relative weakness of the emerging social systems, they will usually only break through because they have short-circuited or distorted the functioning of the existing systems. Their appearance will not obviously reveal the shape of the emerging system. However, if we are aware of the possibility that these phenomena can arise from emerging systems, it should not be beyond our ingenuity to develop appropriate analytical methods—as has been done in psychology for detecting the existence of competing psychological systems from slips of the tongue.

(3) When the emerging system has grown to be roughly in balance with the existing systems, there may be *mutual invasion.* At this stage it should be obvious that there is a newly emerging system, but mutual retardation and the general ambivalence and lack of decisiveness may still lead the new system to be seen simply as a negation of the existing system—for example, as a counterculture. The methodological task is to identify, in the chaotic intermingling of the systems, characteristics of the new system which are not simply an opposition to the old.

The fact that early detection may be possible does not in itself make it a

worthwhile pursuit. The fact that early detection increases the range of responses and hence the degree of control a system has over its development does interest us. There are facts about the growth of social change which suggest that each unit step in the lowering of the detection level will yield a disproportionately greater increase in the time available for response. Put another way, early detection would yield a disproportionately richer projection of the future from any given time.

The Sigmoid Character of the Growth Process

I wish to make the next points by referring to Figure 5. Let lines *A* and *B* represent two courses of growth over time. If social processes typically grew in the way represented by curve *A*, then we might well feel that early detection was not a pressing problem. At this steady rate of growth, we might expect that when the scale got to the level of ready detection (*D* on the vertical axis) we would still have the time (*d*–*a* on the horizontal axis) in which to aid, prepare

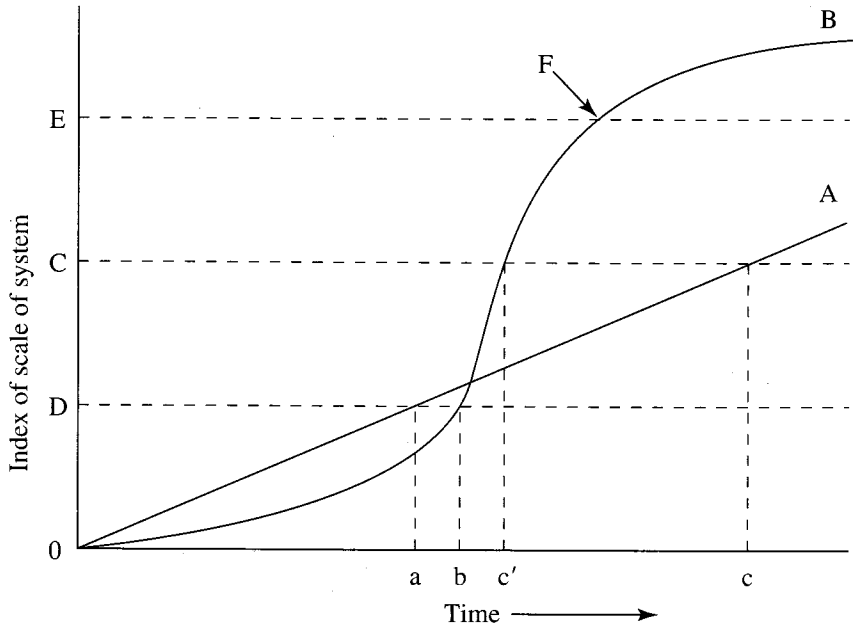

Figure 5. Contrasting growth curves.

for or prevent the new systems getting to critical size (*C* on the vertical axis). All of this is simple enough; the assumptions do not seem unreasonable because so many of the changes in the physical world and in our physical resources do grow in something like this manner.

In fact, a great many of the growth processes in social systems appear to be more like that represented by curve *B*. These growth curves are common enough in all living populations—and some physical systems—in which each part has powers of multiple replication, but in this case, we are primarily concerned with recruitment of existing parts to a new social system. What appears to contribute most to the prevalence of type *B* growth curves in social systems is the fact that these possess the property of highly developed symbolical communication. What is absent—because it is past, distant or as yet only anticipated—can be represented by one part to the other parts. Their mutual coordination and regulation is vastly extended and, as a result, so is the contagion of changes. One important implication of this is that a new system may, after a long period of slow and undetectable growth in the interstices of the society, suddenly burgeon forth at a rate which produces a numbing effect on the society or at least drastically reduces the range of responses to the new system. The general notion may be explicated by again referring to Figure 5. If the point of critical size is somewhere near the one I have marked as *C*, then it is in the nature of the type *B* curve that there will be less time between detection and the critical size than would occur with a type A growth curve; that is, $T(c-b) < T(d-a)$.

Although I have concentrated on the early detection of emerging systems in this section, the present line of argument has implications for the fate of rapidly growing systems. The sort of growth which occurs between detection at point *D* and point *E* in Figure 5 can only too easily be seen as a Type A growth. Even if the growth up to point *D* is reconstructed, the curve *O* to *E* may be seen as a pure exponential growth curve which will continue on at an increasing rate of growth toward point *F*. This has been well illustrated by Price (1961). Bringing together statistical evidence on the growth of science he shows that it has the characteristic of the curve *O* to *F*. This characteristic seems to underlie the recent scientific growth, resource consumption and population growth. However, he argues that the next stage of growth will be like the curve *F* to *B*, not a continuation of the curve from the intersection with *D* to *F*:

> It is indeed apparent that the process to which we have become accustomed during the past few centuries is not a permanent feature of our world. . . . The normal expansion of science that we have grown up with is such that it demands each year a larger place in our lives and a larger share of our resources. Eventually the demand must reach a state where it cannot be satisfied, a state where civilization is saturated with science. . . . For science in the United States, the accurate growth

> figures show that only about *thirty years* must elapse between the period when some few percent of difficulty is felt and that time when the trouble has become so acute that it cannot possibly be satisfied. . . . We are currently in a period in which the onset of a manpower shortage is beginning to be felt. (1961:115–16)

To this I can only add the obvious point than the method of study proposed by Price should include our preceding proposals. The decline in growth rate may occur not only because there is a limited supply of suitable recruitable parts, but also because new systems are competing for existing parts. The analysis of values, like the analysis of symbols and linguistic usage, offers a radical reduction in the complexities with which we would have to deal. In each of these, we would be using people themselves as a filter of what is important.

The analysis of linguistic usage is at one level a commonsense way of sensing the way a person is developing or the way people are tending to go. The very way in which people are speaking about things is often a valid indication of changes in the way they are looking at the world, even though they insist in all honesty that they have in no way changed their views. This method is a basic ingredient of psychiatric practice. At the social level, it has been applied to the content analyses of films and women's magazines and, more intuitively, to tracing out the subtle shifts in the meaning of key concepts such as work, leisure and justice. Marcuse (1956) has given us a profound analysis of the relation between experience and linguistic usage. He sets the methodological goal of linguistic analysis as that of

> analyzing ordinary language in really controversial areas, recognizing muddled thinking where it *seems* to be least muddled, uncovering the falsehood in so much normal and clear usage. Then linguistic analysis would attain the level on which the specific societal processes which shape and limit the universe of discourse become visible and understandable. (1956:195)

Drawing on the empirical study of Karl Kraus, he specifies some of the features of the method:

> For such an analysis, the meaning of a term or form demands its development in a multi-dimensional universe, where any expressed meaning partakes of several interrelated, overlapping and antagonistic "systems." For example, it belongs:
>
> (a) to an individual project, i.e., the specific communication (a newspaper article, a speech) made on a specific occasion for a specific purpose;
>
> (b) to an established supra-individual system of ideas, values and objectives of which the individual project partakes;

> (c) to a particular society which itself integrates different and even conflicting individual and supra-individual projects. (pp. 196–97)

Note that these are methods of gathering information about the different levels of system competition which we presented as the general model for early detection.

I mentioned earlier than these methods offered a reduction in the complexity with which we had to cope, because people will, if acting unwittingly, tend to symbolize the relevant changes and in so doing filter out for themselves the relevant changes. If acting consciously, they will typically see things through the ideologies of their times. This is, however, only a relative reduction. A profound reduction may occur with a Blake or a Joyce. However, this may be of little use. How do we recognize a Blake or a Joyce in our midst or understand what they are saying when they probably do not understand themselves? If these methods of analysis are to be effective, we shall still have to deal with samples of data that are very complex relative to our current analytical tools. It has been recognized that modern computers may bring us within reach of the point where the predictions of highly perceptive individuals, such as McLuhan (1964), Marcuse (1956) and Neumann (1966), can be converted to testable hypotheses. Stone's (Stone et al., 1966) General Inquirer program is a step in this direction but it would still be necessary to identify the kind of system which one suspects is emerging. In other words, these methods complement the perceptive, intuitive mind.

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