

Draft for discussion
September 1986

Comprehension of Appropriateness

A J N Judge

*Project on Economic Aspects of Human Development (EAHD)
of the Regional and Global Studies Division of the United Nations University*

Paper submitted informally to Rome workshop, 10-13 September 1986

Union of International Associations
40 rue Washington, B-1050 Brussels, Belgium

Rendered searchable by OCR, but recognition errors may prevent
this in some cases. See also a PHP version (diagrams, tables incomplete)
<http://www.laetusinpraesens.org/docs/compap.php>

TABLE OF CONTENTS

Introduction

Assumptions

Concrete vs theoretical

Comprehending complexity

Metaphors: a resource for inter-paradigmatic comprehension

Collective comprehension span: the time dimension

Diversity and its comprehension

Diversity of complementary functions: ordering requisite variety

Configuration of modes as a resonance hybrid

Need for insightful metaphors

Comprehending the statuts of the new mode

Patterns of policy cycles

Impotence of appropriateness: the dilemma of nth order modes

Paradoxical strategies

Conclusion

References

Annex 1: Dimensions of comprehension diversity

Annex 2: Communicable insights

Annex 3: Interpretation of cross-cultural information processing
(Implications of Hofstede study)

Figures 1-8

INTRODUCTION

This paper explores certain assumptions associated with the comprehension of socio-economic systems appropriate to optimum human development. It questions the notion which seems to prevail that any desirable alternative is readily comprehensible and that the inherent logic of it can render it credible, whether in scholarly discussion or in the court of public opinion.

In particular, although recognizing the vital importance of such initiatives, the paper questions the status enthusiastically attributed to socio-economic alternatives, such as have been recently articulated in The Other Economic Summit series (London, 1984, 1985) and presented in book form (1). In contrast this paper focuses not on the merits of particular modes of organization (however attractive), but rather on the apparent need to shift periodically between policies or modes of socio-economic organization - as exemplified by the very recent decisions of the Chinese leadership to correct certain inadequacies in their own economic system by switching from an established Maoist mode to "other approaches", where appropriate, including approaches characteristic of modes opposed to theirs (e.g. legalization of bankruptcies, discontinuation of guaranteed job security).

This paper also questions our collective ability to produce a rationally designed response to the global problematique as is, for example, suggested by recent studies emerging from United Nations University projects. In criticizing progress towards a New International Economic Order (2) or in reflecting on the global problematique in terms of "development as social transformation" (3), the authors of these studies believe in the possibility of bringing about some "fundamentally new" mode of socio-economic organization, "but only if we recognize (the NIEO) for what it is and what it means in terms of the fundamental logic of world economy....it is not possible to grasp the wholesomeness of this fundamental logic outside the emerging 'world-system approach' to the study of our contemporary capitalist historic world system."(2, p. x). Whilst the penetration of such studies is highly valuable, it is argued here that their assumptions concerning their own privileged relationship to the new mode fail to embody dimensions vital to the appropriateness of such a mode.

The body of this paper develops work done by the author in the UNU project of Goals, Process and Indicators of Development and published in the Encyclopedia of World Problems and Human Potential (4, especially Sections CM and KD). The Annexes are adapted from work done for the UNU project on Information Overload and Information Underuse (5).

ASSUMPTIONS

The following assumptions are frequently implicit in discussions of alternatives to present approaches to economic and political organization, especially as they impact on or constrain human development in ways which are considered undesirable.

Given recognition of any alternative mode of socio-economic organization that builds on the strengths of what has been achieved, but remedies the factors giving rise to the perceived defects, a set of such assumptions might include:

1. That the new mode is inherently better in some absolute sense and that,
 - conversely, the old mode must necessarily be permanently abandoned as historically outmoded;
 - the defects in the new mode will not eventually prove to be as significant as those under the old mode.
2. That the new mode is equally appropriate to all societies and to all sub-cultures within those societies, especially if adapted to local contexts and requirements.
3. That, if it can be comprehended, represented and discussed within one frame of reference, the mode can nevertheless be of sufficient complexity to respond to the concerns perceived by constituencies preferring other frames of reference.

4. That an appropriate new mode can be readily articulated in its entirety, rather than necessarily provoking a set of partial comprehensions which people, of whatever level of competence, experience considerable difficulty in integrating/reconciling, even if they are motivated to do so.
5. That an appropriate mode can be readily implemented by a consistent pattern of actions, rather than requiring a set of seemingly inconsistent and incompatible actions, each favoured or condemned by some different configuration of constituencies.
6. That the coherence and integrity of an appropriate mode derives from a hierarchical relationship between its components, as opposed to other possibilities with characteristics such as:
 - configurations of incommensurable conceptual or organizational groupings in which the hierarchical dimension, if any, is secondary or implicit;
 - cyclic phases of emphasis over time;
 - alternation between seemingly opposed or contradictory policy modes.
7. That credible articulations of a seemingly attractive approach do not effectively obscure hard realities to which the advocating group may be insensitive (or anxious to avoid discussing in order to further some hidden agenda).
8. That any readily devised approach will not necessarily provoke counter-strategies or strategies which exploit the situation created by the implementation of the new approach, undermining it and eventually rendering it ineffective.
9. That, during the implementation of the appropriate new mode, it is possible for any given constituency to avoid being trapped into recognizing any necessary practical strategy in either a "positive" or a "negative" light, and consequently to be entrained to further or oppose that partial strategy, without consideration of whether such effort is excessive in the light of the contextual mode to which it contributes.
10. That the essence of being human, and of human development, involves processes free from ambiguity, paradox and counter-intuitive phases, permitting an appropriate new mode to be articulated in a manner free of such non-rational characteristics.

The above assumptions do not constitute a tidy set. In fact the last six could be considered as reformulations of aspects or implications of the third.

The intention here is to illustrate the comprehension dilemmas arising from these assumptions, bearing in mind that if the assumptions do not hold, such explorations can only be indicative rather than unambiguous. The object is to highlight the practical implications for the design of an appropriate new mode and how it might be perceived and received. Before doing so, however, it is appropriate to address the dynamic associated with the debate between those emphasizing a "concrete" approach as opposed to those emphasizing a "theoretical" approach.

CONCRETE vs THEORETICAL

The issues raised by such assumptions, and any effort to explore their possible significance, can be relatively easily avoided by taking either a "concrete" position or a "theoretical" position. This can be used as a practical illustration of the dilemma to be discussed subsequently.

For those emphasizing a "concrete" perspective, such questions appear to be a device to avoid getting to immediate grips with pressing problems and devising practical solutions to deal with them. What needs to be done appears obvious and the only difficulties in implementing such solutions are the ones created by those who resist unreasonably the envisaged steps. Because such groups can be defined as unreasonable, they can also be defined as part of the problem which needs to be remedied. The merit of this position is that it can indeed respond effectively to current crises by ignoring subtleties of significance, whether for a wider

geographical area, for a broader social context, or for a longer period of time. The approach to the time dimension is one of intense focus on the present, ignoring longer term perspectives in a spirit of "let us cross each bridge as we come to it". Such effectiveness is effectiveness according to short-term rather than long-term criteria.

For those emphasizing a "theoretical" perspective, the pressing need is seen to be one of understanding the processes involved, in terms of some appropriate model, in order to be able to make an informed appropriate decision at some future time, when sufficient insight has been gained. The question of when that moment will be is avoided, because the commitment is to understanding and not to deciding and implementing particular decisions. Any practical response to the crises of the present are thus avoided, with the possibility of continually postponing the moment of decision by the need to obtain further insight to render it sufficiently appropriate. This perspective solves the problem of other competing schools of thought by declaring their arguments to be poorly formulated, ill-informed, or in some subtle way inappropriate.

Within neither of these emphases is it considered appropriate to envisage the possible inappropriateness of the priorities which emerge from pursuit of that emphasis. Neither can envisage constraints on its own relevance or conditions under which the other may be more appropriate. The fact that both approaches are actively and usefully pursued in society is a result of considerations which neither emphasis could articulate within its own perspective, and certainly could not justify.

COMPREHENDING COMPLEXITY

The remainder of this paper considers the possibility that the appropriate global socio-economic mode of organization is necessarily more complex than is accepted within any particular frame of reference. It is therefore more than probable that it cannot be fully comprehended within any single frame of reference.

The probability is increased in the light of the classic study of axiomatic systems by Kurt Gödel (6). Prior to this a climate of opinion existed among mathematicians in which it was tacitly assumed that each sector of mathematical thought can be supplied with a set of axioms sufficient for developing systematically the endless totality of true propositions about a given area of inquiry. Gödel demonstrated that no system can be comprehensible without being self-contradictory. In doing so he showed that it is impossible to establish the internal logical consistency of a very large class of deductive systems, unless principles of reasoning are adopted which are so complex that their internal consistency is as open to doubt as that of the systems themselves (7).

Care should be taken in dismissing the relevance of such insights to the comprehension of social systems. A recent discussion of their relevance in the Financial Times concludes that although "he was concerned specifically with systems of symbols such as mathematics and other languages... experience indicates that the principle applies to organisational systems too. Its implications are particularly destructive for bureaucratic attempts at management. Their tendency is to lay down systematic rules intended to cover every eventuality and, when they don't, to lay down more rules supposed to close the loophole. Whilst Gödel's principle suggests that any such process is necessarily self-frustrating, almost all bureaucracies seem determined to believe otherwise."(8).

This also suggests the merit of reflecting on the relationship between the political axioms in terms of which attempts are made to govern countries and groups of countries, especially to the extent that they are embodied in political slogans reflecting values which are "axiomatic". Such slogans presumably preclude consideration of modes of organization which are not built directly upon such axioms. But Gödel also showed that there is an endless number of true arithmetical statements which cannot be formally deduced from any given set of axioms by a closed set of rules of inference. The dramatic implications of this has just recently been demonstrated in the world of chess, traditionally referred to as the "Game of Kings" because of the manner in which it simulated the strategic problems of a leader. There are many axioms

governing the different possibilities of winning in a chess endgame situation. To the considerable astonishment of the chess community, a very recent computer analysis of endgames has however demonstrated that there are many other ways of winning, unforeseen by such axioms, and in some cases inconsistent with them (9).

Comprehending appropriateness might be illustrated by the problem of comprehending the nature of an n-dimensional object (e.g. a hypercube) whose elements represent factors in a mathematical model of a socio-economic system. Portions of the representation can be comprehended when they are represented as 2 or 3-dimensional diagrams of cross-sections of the n-dimensional structure. Integrating a set of such representations tends to be a task beyond the current abilities of the human mind.

It could be argued that it is not vital that the n-dimensional object be comprehensible in its entirety, provided the mathematical representation can be proved to be satisfactory. This is the case with the current use of hypercubes as the basis for the organization of new, and more efficient, forms of computer memory. Provided the product finally works, people do not feel that it is necessary to understand it in its entirety. The wiring diagram can be represented, even though it is meaningless to those making the sequence of connections between the parts.

This attitude is not however acceptable in the case of the presentation of some new mode of socio-economic organization, whether at the macro or the micro level. It is one thing for people to have confidence in leaders (or experts) who can claim to comprehend such a mode in its entirety, even though their followers do not. Most social innovations in the past have been implemented on this basis. It is quite another thing when the appropriate mode of organization cannot be fully comprehended by any leader (or expert), especially, as is the case at present, when the motivations of such elites are increasingly considered questionable.

The situation is further complicated by the learning dimension. If the appropriate mode was fully comprehensible, it would then exclude the possibility of a learning dimension. It would permit learning within that mode, but it could not render explicit (and would therefore probably preclude) learning beyond the framework imposed by that mode. It could not permit learning by which the framework itself would be challenged. It would thus be consistent with human development within a framework implemented at a particular historical moment, but opposed to human development arising from insights emerging subsequently. Such a mode would therefore be consistent with human development in a "minor" key but not with human development in a "major" key, namely development requiring paradigm shifts.

A response to this situation is not to expect or require that the appropriate mode be comprehensible in its entirety to any one person or group. It could be expected that different people or groups would be capable of comprehending different features or processes of that mode and would then act to ensure their implementation. But, necessarily, such people or groups would then not comprehend the justification for the activities of other people or groups concerned with other features or processes.

The socio-political situation would then be one in which:

- Constituency A would support strategic components P, Q and R, but would oppose, possibly violently, strategic components I, J and K;
- Constituency B would support strategic components E, F and K, but would oppose Q, J and T;
- Constituency C would support strategic components I, T and R, but would oppose F, G and P.

The difficulty is that, in such a context of partial comprehension, no group (e.g. Group A) would be in a position to distinguish between:

1. A condition in which some other group (e.g. Group C) was acting dangerously, inadequately or irresponsibly in terms of its contribution to the contextual mode, and should therefore be considered as inconsistent with the successful implementation of that mode.
2. A condition in which its own group (Group A) was fulfilling its function, in relation to the contextual mode, by acting in opposition to some other group (Group C), even though that

group was itself fulfilling its function in relation to the contextual mode in an appropriate manner.

In such a situation, for the contextual mode to function appropriately, the groups would act in support or opposition to each other to provide a system of checks and balances that would permit human development to occur in the optimum manner. No group could effectively take a position within this context in support of the contextual mode. It would, because of the necessary partiality of its comprehension, quite validly be perceived as acting to further certain interests consistent with that partiality.

The challenge then is to explore ways of improving comprehension of fruitful patterns of interaction between groups and perspectives which of necessity must function in shifting coalitions in support and opposition to one another.

METAPHORS: a resource for inter-paradigmatic comprehension

Metaphors are a special form of presentation natural to many cultures (10). They are of unique importance as a means of communicating complex notions, especially in interdisciplinary and multicultural dialogue, as well as in the popularization of abstract concepts, in political discourse, and as part of any creative process. They offer the special advantage of calling upon a pre-existing capacity to comprehend complexity, rather than assuming that people need to engage in lengthy educational processes before being able to comprehend. Although frequently used in international debate through which strategies are defined, their strengths have not been deliberately explored to assist in the identification of more appropriate strategies and in the manner of their implementation.

Each development policy may be considered a particular "answer" to the global problematique. And yet no such answer appears to be free from fundamental weaknesses. A shift to an alternative policy becomes progressively more necessary as the effects of these weaknesses accumulate. However, since each such policy reflects a "language" or mind-set whereby a worldview is organized, as indicated above, no adequate "logical" framework can exist to facilitate comprehension of the nature of such a shift or of the process of transition between alternatives (11). But many familiar metaphors of alternation exist through which the characteristics and limitations of such a shift may be understood.

This paper assumes that the challenge to comprehension is such that, just as in the case of fundamental physics, discussion of the subtle complexity of an appropriate new socio-economic mode, and its relationship to human understanding of it, can only proceed forward with the aid of devices such as metaphors which call upon other faculties of the human mind.

COLLECTIVE COMPREHENSION SPAN: the time dimension

In order to be able to base some appropriate new form of socio-economic organization on a new pattern of insights, it is clearly necessary that collective comprehension of that pattern should persist in a coherent manner over a period of time. The length of time required must clearly be at least of the same order as that of any major cycle of processes through which the well-being of that new mode is ensured. By a major cycle is meant one which encompasses the shifts between the alternative paradigms or modes of operation required to correct for deviations or the accumulation of characteristics impeding the long-term development of that society. Since the majority of policy-making is tied to electoral cycles of from 1 to 7 years, and several electoral cycles may be required to compensate for each others excesses, it is probable that collective comprehension of such larger cycles is inadequate, to the extent that it exists at all.

It is interesting that the dimensions of this collective comprehension problem of time cycles can be beautifully illustrated by a metaphor whose features are very familiar to all, namely the circulation of traffic. The movement of traffic of different kinds, of different densities, at different speeds and with different directions, especially in an urban

environment, is (self-) regulated by a range of techniques. These include:

- basic road rules (driving on right or left),
- prohibited actions (no entry, speed limit, no stopping, no waiting, no parking);
- required actions (stop, keep left, yield, turn right);
- limited access (no cyclists); and
- special warnings (dangerous crossing, etc).

Whilst drivers may bend and break such rules occasionally, they recognize the wisdom of them in most situations -- for their own continued survival, if not for that of others.

To improve traffic flow, traffic signals may be used permitting an orderly alternation in direction of movement (e.g. from the right or from the left). These may be phased in various ways to improve flow in an area (e.g. the green phasing for a group of vehicles moving at constant speed along a route through the area). Area traffic control responsive to a range of traffic conditions may optimize flows by comparing current conditions to models based on past experience. Traffic of different types may also be segregated: pedestrians from vehicles, local from long-distance (e.g. on expressways with merging lanes and cloverleaf junctions).

Movement of traffic under such conditions is only possible because the collective comprehension span exceeds that of:

- traffic signal cycles;
- waiting periods at stop or giveaway junctions;
- delays associated with travelling in peak period traffic;
- delays associated with multiple accidents and road blockages.

People are prepared to tolerate the priority given to others, knowing that priority will be given to the group of vehicles with which they are currently associated in accordance with the priority of traffic flows at that point. They are prepared to tolerate traffic moving in directions other than their own, knowing that at some time they may find it necessary to be moving in those same directions, perhaps on a return journey.

However, if the time span comprehended was reduced to the same order as that of the traffic signal cycles or less, a very different situation would prevail. A stoplight would be perceived as an unjust deprivation of rights. The traffic able to move at that time would be perceived as having acquired undue privileges, since it is composed of vehicles moving in other (and therefore irrelevant) directions, and especially if relatively few vehicles were travelling in that direction at that time. The sense of pattern would be completely lost. Only the direction of one's current journey would be of any significance. Traffic moving in the opposite direction could quite legitimately be forbidden.

If the appropriate mode of socio-economic organization is to be comprehended in this light, the implication from the earlier arguments is that it is highly probable that the prevailing collective comprehension span is less than that of the cycles by which that mode is to be sustained. Constituencies advocating opposing policies are perceived like streams of traffic coming "from the right" or "from the left" or even "from the opposite direction". Since the pattern of the appropriate mode cannot be comprehended in its entirety, such alternative policies can only be considered as a misguided or dangerous use of resources. The possibility that implementation of the policy favoured by one's group might be temporarily interrupted, to ease the build up in the pressure in favour of another, could only be considered unreasonable.

Use of this metaphor is not intended as a means of rendering existing injustices acceptable. Even in terms of this metaphor, there are some groups that have been waiting at a traffic junction a very long time for a green light to give them some degree of priority. The purpose of the metaphor is to provide a more accessible framework within which the interplay of priorities can be discussed. When should the flow of traffic on an expressway be interrupted to allow traffic from a side road to cross or enter the mainstream? Where is it appropriate to construct merging lane ("cloverleaf") junctions or underpasses? Where is it more appropriate for low frequency traffic to detour to an entry/crossover point? What are the major routes on the road map?

The metaphor indicates a way of thinking about how the progress of groups of different kinds, developing at different rates in complex social environments, could order their conflicting policies with minimal mutual interference. Some form of cycle of signals might be used to enable groups with conflicting policies to progress during alternate periods. Actions of groups of different types may be segregated. The progress of groups with conflicting but interrelated policies may be facilitated by devising means for such policies to filter through each other (as at traffic "roundabouts") rather than cut across each other.

The prevailing approach may be seen, in the light of this metaphor, as one in which groups promoting different policies are given start/stop priority over each other in succession, in order to express their viewpoints. In the case of the alternation of political parties in power, an election is a process through which a decision is taken on the traffic signals. But in general, present policy control in this metaphor can be compared to a procession (or "progress") in one direction with the support of security forces which ensure that all access roads be blocked off and all opposing traffic suppressed. When the procession has petered out, another such "convoy" may be organized, by another coalition of forces, in another direction to cater for the traffic stream blocked by the first. This corresponds to a very primitive traffic control approach. It takes no account of the sophisticated blend of control and delegation of responsibility to drivers which is characteristic of modern traffic patterns.

DIVERSITY AND ITS COMPREHENSION

Various approaches to diversity and its comprehension are presented in Annex 1 (Dimensions of comprehension diversity) and in Annex 2 (Communicable insights). These are based on work presented elsewhere (12).

DIVERSITY OF COMPLEMENTARY FUNCTIONS: ordering requisite variety

The traffic metaphor offers some insights into how the relationships between such contrasting approaches and policies might be regulated, in a largely self-organizing manner. It does not help to understand how such a diversity of functions is necessary to constitute a viable socio-economic organization.

If, as suggested above, the complex of socio-economic functions required to further appropriate human development is such that only portions of that complex are comprehensible or meaningful to any one group, it is to be expected that each such group would build on that feature of the complex which it finds comprehensible. Such clustering of "comprehensions" could well be partially determined by cultural, historical and related factors, themselves possibly engendered by the necessary dynamics of the functional complex.

As an indication of the difficulty of understanding the requisite diversity in such circumstances, the simplest case is that in which a group understands one "half" of the functional complex and builds on that understanding. The other "half" would then necessarily be perceived as incomprehensible or irrelevant, or rejected on some other basis, possibly as dangerously misguided and a threat to that portion accepted as meaningful. There are many examples of policies and systems of organization polarized in this way: centralization vs decentralization, right vs left, industry vs environment, communism vs capitalism, etc. But although such polarized cases appear simple, they clearly arouse such violent dynamics in any situation that it is not possible to expect any creative resolution between them. Their relationship defies comprehension and automatically calls for the elimination of one or the other.

A more complex case, might be one in which four groups each understand a "quarter" of the functional complex and each build systems of socio-economic organization on that understanding. But in this case it is probable that anyone of the groups, although unable to enter into full understanding of the three other perspectives, would at least be sensitive to the functional advantages of certain features of them. They are not rejected so completely or so automatically as in the case of simple polarization. Nuances emerge as is evident in countries with a

diversity of political parties. It remains true however that there is no "meta-perspective" through which the complementarity between these different perspectives can be comprehended. From any one perspective it is not fully apparent what functions the others serve.

It is in this context that it is useful to view the results of Geert Hofstede's multicultural survey of work-related values discussed in Annex 1 and interpreted in Annex 3 (see especially Figures 5 and 6). Each of his four major clusters constitutes an alternative way of viewing socio-economic organization. From any one of them it is possible to generate indicators showing how the others are unsatisfactory on some important dimension. A typical example of this is the Anglo-Saxon/American perception of the inefficiency of "latin" approaches to organization or the utter chaos and incomprehensibility of Asian or African systems of organization. In the light of such a perspective, there would be many to recommend the replacement of such other systems of organization by the so obviously successful American/Anglo-Saxon system. The recent success of such alternative modes of organization as that of the Japanese, makes this case much less credible. Nevertheless any such cluster perceives its own preferred mode of organization as performing functions in a manner superior to that of others -- although that superiority may not be measureable in terms of efficiency.

This raises the question as to whether the alternative cultural perspectives indicated by Hofstede are not necessary to embody the necessary functional diversity for the healthy functioning of the global village. It is not, as is frequently assumed, that there are other, often quaint, modes of socio-economic organization which are simply part of the "rich pattern of life on the planet". In some as yet poorly understood way, it would seem probable that each such perspective has some distinctive, essential functional role to play within the functional complex as a whole. It remains unclear how these functional contributions are to be recognized, especially when decisions have to be made to continue or to terminate certain possibilities. As in the maintenance of an ecosystem, when does the culling or elimination of a species significantly reduce the ability of the ecosystem to survive and develop?

CONFIGURATION OF MODES AS A RESONANCE HYBRID (13)

Although David Bohm's perspective on the nature of implicate order (Annex 2) clarifies the challenge further, it does not say anything about the relationship between the different modes of perception and organization which can emerge, other than in the sense that they can be re-enfolded into an implicate order. Since the challenge is to deal with co-existent, and very different, frames of reference another perspective is also fruitful.

The set of alternative structures, between which alternation takes place in any learning cycle, may be more clearly understood in the light of the theory of resonance. Johan Galtung first explored the possibility of using the organization of chemical molecules to clarify the description of social organization (14). He dealt with fixed structures and not with the transition between alternatives. The theory of resonance in chemistry is concerned with the representation of the actual normal state of molecules by a combination of several alternative "reasonable" structures, rather than by a single valence-bond structure. The molecule is then conceived as resonating among the several valence-bond structures, or rather to have a structure that is a resonance hybrid of these structures.

The classic example of a resonance hybrid is the benzene molecule of 6 carbon atoms for which F A Kekulé introduced the idea of oscillation between two alternative structures. The pattern of oscillation was later extended by Linus Pauling to include three more distinct alternates. The actual configuration is a resonance hybrid of the five forms, which through quantum mechanics has been shown to have an energy less than any of the alternate structures (see Figure 1). This is potentially of great significance for any social structure analogue, in view of the call for a low-energy society. Given the fundamental role of the benzene molecular configuration as the basis for most living structures, it is worth asking (in the light of the sixfold restraint discussed in earlier entries) why it is composed of six atoms. The answer is that it is this configuration which ensures minimal strain on the distribution of the four valency bonds of each carbon atom, thus resulting in a minimal energy configuration. It is worth reflecting on

this model in the light of the research showing that the upper limit for effective committee or task force organization, the basis for social organization, is seven, plus or minus one.

Such structures recall the context of Bohm's arguments concerning unfoldment of explicate forms. The wave function representing a stationary state of a resonance hybrid in quantum mechanics can be expressed as the sum of the wave functions that correspond to several hypothetical alternates. The proper combination is that sum which leads to a minimal energy for the system. Of significance in any social structure analogue is that the higher energy of each alternate is associated with some degree of "distortion" (different in kind in each case), which effectively renders the alternate meta-stable. (Also worth exploring is the contrasting concept of a "resonance particle". This is any exceedingly unstable high energy particle, which may be considered as a composite of several relatively stable low energy particles into which it may decay.)

Place Figures 1, 2 and 3 here

Resonance hybrids could well provide a key to the conception, design and operation of coalitions of people or groups using forms of information or modes of information processing so different that the coalitions could not cohere for any length of time in one single form but could be stable if the coalition alternated between distinct forms. Underlying this possibility, hybrids are also of interest in integrating incompatible perspectives, paradigms and policies without eroding their distinctiveness in some simplistic compromise (see Figures 2 and 3). Whilst the value of using such resonance models may be contested, they do have the advantage of shifting the debate, currently somewhat sterile, to a level at which the merits of particular answers are no longer the sole issue. The need is for investigation of "reasonable" structures, however "unreasonable" they may appear from any particular perspective. They open the way to more fruitful discussions both about how alternation between the contradictory information characteristic of a complex society can be improved and about the kinds of social structures that could be based upon such patterns of alternation.

NEED FOR INSIGHTFUL METAPHORS

It is difficult to obtain coherent patterns of insights from conventional analyses of the implicit languages used in different sectors of society. There is therefore a strong case for exploring metaphors, and patterns of metaphors capable of focussing and highlighting insights concerning the creation, storage and distribution of information.

The difficulty in exploring patterns of alternation between modes of organization is the seeming lack of concrete (as opposed to abstract) examples by which the credibility of such patterns in practice may become apparent. The rotation of agricultural crops is therefore an interesting "earthy" practice to explore in the light of the mind-set which it has required of farmers for several thousand years.

Crop rotation is the alternation of different crops in the same field in some (more or less) regular sequence. It differs from the haphazard change of crops from time to time, in that a deliberately chosen set of crops is grown in succession in cycles over a period of years. Rotations may be of any length, being dependent on soil, climate, and crop. They are commonly of 3 to 7 years duration, usually with 4 crops (some of which may be grown twice in succession). The different crop rotations on each of the fields of the set making up the farm as a whole constitute a "crop rotation system" when integrated optimally. Long before crop rotation became a science, practice demonstrated that crop yields decline if the same crop is grown continuously in the same place. There are therefore many benefits, both direct and indirect to be obtained from good rotational cycles (15, pp. 170-8):

- (a) Control of pests: with each crop grown the emergence of characteristic weeds, insects and diseases is facilitated. Changing to another crop inhibits the spread of such pests which would otherwise become uncontrollable (to the point that some crops should not be grown twice

in succession). By rotating winter and summer crops, the farmer fights summer weeds in the winter crop and winter weeds in the summer crop.

(b) Maintenance of organic matter: some crops deplete the organic matter in the soil, other increase it.

(c) Maintenance of soil nitrogen supply: no single cropping system will ordinarily maintain the nitrogen supply unless leguminous crops are alternated with others.

(d) Economy of labour: several crops may be grown in succession with only one soil preparation (ploughing). For example: the land is ploughed for maize, the maize stubble is disked for wheat, then grass and clover are seeded in the wheat.

(e) Protection of soil: it was once believed necessary to leave land fallow for part of the cycle. Now it is known that a proper rotation of crops, with due attention to maintaining the balance of nutrients, is more successful than leaving the land bare and exposed to leaching and erosion.

(f) Complete use of soil: by alternation between deep and shallow-rooted crops the soil may be utilized more completely.

(g) Balanced use of plant nutrients: when appropriately alternated, crops reduce the different nutrient materials of the soil in more desirable proportions.

(h) Orderly farming: work is more evenly distributed throughout the year. The farm layout is usually simplified and costs of production are reduced. The rushed work characteristic of haphazard cropping is avoided.

(i) Risk reduction: risks are distributed among several crops as a guarantee against complete failure.

The situation is somewhat different in the case of single-species forests where "rotation" is the guiding principle in the special sense of the economic age to which each crop can be grown before it is succeeded by the next one. (For example, on a 100-year rotation required for oak, one per cent of the forest would be clear cut each year, and a further 20 percent thinned out). In total contrast to crop rotation is the "monoculture" cropping system in which the same crop is grown every year. This is possible on a large scale only by the heavy application of chemical fertilizers, herbicides and pesticides. It leads to long-term problems of soil structure and erosion, as well as to the accumulation of pollutants.

Because of the short-term advantages of fertilizers, efforts to design new approaches to crop rotation have been limited. It is only with the resurgence of interest in non-exploitive, non-polluting agriculture that such possibilities are being investigated (16). From an agronomist's perspective, the problem is to strike a balance between harmonizing the three-fold soil-plant-climate relationship and those of the economic constraints of production. Because such threefold relationships are now fairly well understood, rotation cycles can now be considered as a whole in which the order and the plants used are of secondary importance. The problem is to ensure that the soil-plant-climate relationship is in an optimally balanced state at every moment in order to become increasingly independent of its past. The production constraints complicate this evolution and the choices possible, especially when requirements change rapidly without taking into account the recent history of a crop rotation (16).

There is a striking parallel between the rotation of crops and the succession of (governmental) policies applied in a society. The contrast is also striking because of the essentially haphazard switch between "right" and "left" policies. There is little explicit awareness of the need for any rotation to correct for negative consequences ("pests") encouraged by each and to replenish the resources of society ("nutrients", "soil structure") which each policy so characteristically depletes.

There is no awareness, for example, of the number of distinct policies or modes of organization through which it is useful to rotate. Nor is it known how many such distinct cycles are necessary for an optimally integrated world society in which the temporary failure of one paradigm or mode of organization, due to adverse circumstances (disaster) is compensated by the success of others. It is also interesting that during a period of increasing complaints regarding cultural homogenization ("monoculture"), voters are either confronted with single-party systems or are frustrated by the lack of real choice between the alternatives offered. There is something to be learnt from the mind-sets and social organizations associated with the stages in the history of crop rotation which evolved, beyond the slash-and-burn stage, through a 2-year crop-fallow rotation, to more complex 3 and 4-year rotations. Given the widespread sense of increasing impoverishment of the quality-of-life, consideration of crop rotation may clarify ways of thinking about what is being depleted, how to counteract this process, and the nature of the resources that are so vainly (and expensively) used as "fertilizer" and "pesticide" to keep the system going in the short-term. The "yield" to be maximized is presumably human and social development.

COMPREHENDING THE STATUS OF THE NEW MODE

If a more appropriate mode of socio-economic organization is advocated, the question is how it is to be comprehended in relation to those which preceded it. Acting on the belief of continual linear forward progress, its advocates may hope that it will completely replace preceding modes, since their functions are supposedly more satisfactorily performed by the new mode. Advocates of other modes, relegated to the status of historical curiosities, will not of course see things in that light. In which case the new mode must enter into competition and struggle with the older modes. In the dynamics of the social system it is one more mode, which seeks to improve its "market share" of public opinion.

It may however be argued that the appropriate new mode should not be compared to a new species (a more evolved mutation) entering into an ecosystem and thereby modifying the pattern of relationships amongst the species present. Rather it should be compared to the pattern of relationships between the species, namely to the pattern of interdependence itself. In this light the appropriate new mode is a new pattern of interdependence between contrasting modes of socio-economic organization. This corresponds to Gregory Bateson's central thesis: "The pattern which connects is a metapattern. It is a pattern of patterns. It is that metapattern which defines the vast generalization that, indeed, it is patterns which connect." (17, p. 11). And it is in this connection that he warns: "Break the pattern which connects the items of learning and you necessarily destroy all quality." (17, p. 8).

The difficulty, as stressed earlier, is that given that such patterns of interdependence cannot be comprehended in their entirety, any new alternative mode of organization comes to be perceived not at the ecosystemic level but simply as another species. And as such it fails to respond to the need for an alternative of global significance, however much success there is in imposing it as the dominant species.

The argument of this paper is that, in such a situation, there is merit in exploring how the relationships between the existing alternatives are to be understood. Whether or not a new species is introduced, there would seem to be a need to understand what function each of the existing modes performs, under what conditions, and with what characteristic negative effects (which have to be remedied by some other mode). For it is the current spastic alternation between these existing modes which somehow ensures the relative viability of the existing system, not the sole contribution of any one of them (handicapped by the others, as its advocates would assume).

It is clearly easier to deny this probability by arguing that some modes are clearly useful, up to a certain period of historical development, but they, and others, are completely inappropriate beyond that point. The dangers of such an argument become much clearer if the problem is compared to one of determining which species are useful and which should now be "phased out". It is not clear that man has developed sufficient understanding of nature to eliminate species which may be of unrecognized future importance (e.g. the case of medicinal

plants) or in some way vital to the maintenance of food chains on which man and others species depend. In terms of this metaphor, man is still operating on the basis that any species which is in some way a nuisance or a danger should be eliminated. This would lead to the elimination of most carnivores, other animals and plants which endanger man's food supply, together with most insects and smaller species which do not directly serve man's immediate needs. More enlightened understanding of the environment has established that even the most undesirable species (e.g. crocodiles, wolves, spiders, snakes) have important functions to perform in particular environmental niches.

To the extent that it is accepted that any new mode will not be met with universal support, and may well provoke the emergence of other modes to exploit or counteract it, then it can be argued that a major opportunity for significant advance lies in understanding how the dynamics of this ecosystem may be most beneficially "cared for". In this sense the dilemma of man in discovering the most fruitful relationship to the species in the natural environment reflects man's dilemma in discovering the most fruitful relationship to the variety of co-existing modes of socio-economic organization. (This is not a dilemma which the "greens" have solved, or properly addressed, since they have apparently been unable to develop any coherent understanding of either their relationship to competing viewpoints, or of the appropriate "stewardship function" in relation to the pattern of different schools of thought within the green movement itself.)

The challenge of appropriateness may well be less a question of replacing the existing condition as of finding ways of shifting between its sub-conditions in a healthy manner. In arguing for a heterogeneity of epistemologies, Maruyama offers a beautiful metaphor in response to the (homogenistic) question "but which one is correct?" He suggests that in binocular vision it is irrelevant to raise the question as to which eye is correct and which wrong. "Binocular vision works, not because two eyes see different sides of the same object, but because the differential between the two images enables the brain to compute the invisible dimension" (18, p. 84). The brain computes a third dimension which cannot be directly perceived and if we live in a multidimensional space even more epistemological "eyes" are required (19, p.269-272). Reducing such vision to the parts in common provides much less than monocular vision. Each "eye" has its inherent limitations and strengths, and the homogenistic "eye" presumably also has its own vital contribution to make to the process of encompassing (or responding to) the complexity of our collective condition. His work, with Harvey's (20), demonstrates that a minimum of four such "eyes" are required to describe the variety of perceptions of our collective reality.

PATTERNS OF POLICY CYCLES

In the light of the previous sections it is useful to ask whether the characteristics of the appropriate new mode of socio-economic organization are such that it can only be sustained by a cycle of policies, or even a pattern of such cycles. If this were the case then whilst particular policies, such as those of the "left" or the "right" or of other political hues, are necessary during particular phases of such cycles, they are not however sufficient individually to sustain the mode most appropriate to long-term human development.

This question can be related to the dramatic problem, central to social organization, of whether a system of voting can be devised that is at the same time rational, decisive and egalitarian. In the classic analysis of this problem, Kenneth J Arrow advanced five intuitively appealing axioms (including unanimity and universal scope) that any procedure for combining or aggregating the preferences of individuals into collective judgements should satisfy (21).

Treating "non-dictatorship" as a sixth axiom, Arrow demonstrated that no constitution can exist which will obey all six simultaneously. What happens is that when three or more alternatives are faced, majority rule gives rise to voting cycles in which: Alternative A defeats Alternative B, B defeats C, C defeats D, D defeats E and E defeats A, as noted in a recent discussion of Arrow's "impossibility theorem" by D Blair and R Pollak (22). For them: "Thus the designer of voting procedures for legislatures, committees and clubs who accepts these conditions as necessary properties of constitutions is simply out of luck... If society

foregoes collective rationality, thereby accepting the necessary arbitrariness and manipulation of irrational procedures, majority rule is likely to be the choice because it attains the remaining goals. If society insists on retaining a degree of collective rationality, it can achieve equality by adopting the rule of consensus, but only at the price of extreme indecisiveness. Society can increase decisiveness by concentrating veto power in progressively fewer hands; the most decisive rule, dictatorship, is also the least egalitarian."

It is worth noting here that Gheorghe Paun has explored an aspect of this dilemma using fuzzy set theory to demonstrate the impossibility of aggregating a small set of good social indicators to fulfil three natural conditions of a good indicator, namely sensitivity, anticatastrophism and noncompensation (52). This establishes theoretically the noncomparability of certain social issues, which must somehow be "managed" in an appropriate new mode of socio-economic organization.

Blair and Pollak explore the possibility of designing acyclic constitutions which would avoid such voting cycles. The arguments of this paper indicate the value of exploring ways of designing "constitutions" which embody such, seemingly unavoidable, cyclic phenomena, especially since they are evident in the necessary policy changes required to remedy the inadequacies of particular policies. The question is how to initiate such a design process, given the nature of the design required.

In such a context, the process whereby any such particular policy comes into favour, and is subsequently displaced, is an integral part of such a policy cycle. The emphasis on such a cycle is in marked contrast to the prevailing emphasis on the dominance of a particular policy and the desirability of its continuing dominance for the long-term well-being of the society in question. However, by its very nature (as discussed above), no such policy cycle can be planned or programmed, for this would make of it merely another policy competing with other policies in the cycle. It is here that the core of the challenge lies. It is the paradoxical problem of organizing self-organization.

This paper suggests the merit of metaphors in catalyzing the emergence of an awareness of the necessity of policy cycles. It points to the lack of understanding of the nature of policy cycles and patterns of such cycles, especially as they might function in different cultures, resulting in the entrainment, and synchronization, of such cycles between cultures. This is surprising given the considerable research on economic cycles, which presumably call for some understanding of a corresponding cycle of policies to respond appropriately to the changing circumstances. This lack is probably due to the fact that current policies are of such short-term scope that longer-term cyclicity appears irrelevant. Things may be changing however. The Wall Street Journal recently reported on work being undertaken at the prestigious Japan Economic Research Center by Yuji Shimanaka demonstrating the relationship of economic cycles, technological innovation and periods of social conflict to 11-year and 55-year solar cycles; the latter corresponding to Nikolai Kondratieff's long-term economic cycles (23).

As an illustration, consider four contrasting policies currently competing savagely with each other for a larger "market share" of public opinion support. The arguments of this paper suggest that this savage competition contributes to the emergence of an appropriate new mode only to the extent that it ensures successive dominance phases amongst the four policies according to a periodicity or rhythm to which there is, as yet, little collective sensitivity.

Such a pattern might be illustrated, very crudely, by a diagram such as Figure 4. This shows how each policy acquires dominance because of the need to correct for deficiencies resulting from the (necessary) imperfections and excesses of the preceding policy, only to be displaced in its turn. The appropriateness to human development results, ultimately, not from any particular policy but from the extent to which the pattern of policies and the rhythm of their phasing becomes increasingly self-organizing.

Place Figure 4 about here

Understanding how such cycles of contrasting phases accomplish effective transformative work in society may be facilitated by a thermodynamic metaphor. The Carnot cycle of heat and work, basic to the operation of any heat engine, itself involves four successive and contrasting operations (expansion at constant temperature, expansion without change in amount of heat, compression at constant temperature, and compression without change in amount of heat). Any attempt to isolate and prolong unduly the most effective work phase simply jeopardizes the ability of the engine to continue operating. It is then quite inappropriate to view the non-work phases as "inefficient". The operation of a task force (or meeting) of individuals with distinct functions may also be interpreted as involving a cycle of phases in which each function enters and leaves the limelight in turn. This is best illustrated by the results of research by R Meredith Belbin into the roles required for good teamwork. These have been labelled as: chairman, company worker, completer-finisher, monitor-evaluator, plant, resource investigator, shaper and team worker (30). A preponderance of any one role type, especially the "most productive", jeopardizes both the appropriateness of the group's work and its ability to renew itself and continue functioning.

The different levels of attention required in discussing the relationship of distinct policies to policy cycles may be illustrated by the metaphors of walking and dancing. In walking the right and left foot are moved forward alternately, shifting the weight of the body from one to the other. Although in places of difficulty attention may be focussed on one foot to the exclusion of the other, the body can be more satisfactorily moved forward by focussing on the process of walking, namely on the alternation between the two contrasting positions. In a 2-party political process however, there is a necessary struggle between the "right" and the "left", with no institutionalized awareness of what is achieved by the process of alternation between them. There is little recognition of when it is appropriate to relinquish a policy in favour of an alternative and then renew it to fulfil a new role. This may perhaps be more accurately compared to the preoccupation of a drunkard, or a spastic, with the forward movement of one leg (temporarily forgetting the need for the other).

Appropriateness of the 1st order may be compared to movement of a foot, whereas 2nd order appropriateness may be compared to the process of walking. Higher orders of appropriateness may be compared to dancing and to a cycle of dances. It is the movement between the steps, and the manner in which they are ordered, which renders the dance meaningful. Focusing attention exclusively on any individual step prevents the rhythm from emerging and thus obscures the meaning of the dance. It is the rhythm which guides the self-organization of a dance, based on the execution of the individual steps, whose importance can in no way be neglected. The test of the appropriateness of any new mode is whether it embodies a more "seductive" pattern in Attali's sense (24). In terms of 2nd order appropriateness current policy initiatives may be compared to a drunkard's walk, a monotonous dance or, more dangerously, a lock-step march.

IMPOTENCE OF APPROPRIATENESS: the dilemma of nth order modes

Cyclic patterns of policies, of which a very simple form is illustrated in Figure 4, clarify the essential dilemma of any appropriate mode. In any concrete socio-economic context, it is only possible to mobilize people in support of a basically short-term policy in response to the deficiencies of any policies currently dominant in the short-term. And this is indeed what is required to remedy those deficiencies. Such a "new" policy can easily acquire an inherent moral rectitude, implying that any other policy is a dangerous aberration. The difficulty is that such moral rectitude continues to be associated with the policy long after it ceases to be appropriate to that particular cycle of policies.

Policies contributing to a policy cycle may be considered to constitute a 1st order degree of appropriateness. The policy cycle itself may be considered a 2nd order degree of appropriateness. Higher orders of appropriateness, cycles of policy cycles, may in fact be what is required for viable long-term human development. As the arguments of earlier sections have indicated, such higher order forms of appropriateness are increasingly difficult to comprehend. They cannot therefore inspire a sense of moral rectitude and consequently would appear to be necessarily associated with political impotence. Political power is concerned with struggle

within the cycle, not with the movement of the cycle - and yet it is from cyclic movement that enduring social development emerges.

Such difficulties are further aggravated by the constraints of democratic systems in which education and minimal levels of literacy are a continuing problem. This obtains both in industrialized countries, but especially in those developing countries characterized by population explosions. Grass-roots political wisdom, as well as the experience of sophisticated organizers of political campaigns, requires that issues be kept simple and comprehensible. Paradoxically in such circumstances "ignorance is right", at least in political terms. "Information is power" only in the sense of the power of elites to manipulate. But any such manipulation is itself constrained by the political necessity of communicating it in terms comprehensible to the largest constituencies. "I do not understand, therefore I will not vote for you (because I question your motives)", is the ultimate constraint in a democracy.

In complex social systems, such ignorance may also be the result of cultural preferences and background, even amongst the educated, whereby particular policies are viewed as inherently "bad" or "evil". Much political "mileage" may be guaranteed by the process of reinforcing such views and cultivating suitable political scapegoats. But this too is an inherent feature of policy cycles. Each policy acquires dominance to the extent that it can successfully cast other policies in a "negative" light, such that its own "positive" features are enhanced by contrast. The characteristic of any particular mode of organization are such that others must necessarily appear in a "negative" light from that perspective. It is this positive/negative polarization which drives the cycle through a succession of inadequate perspectives which compensate for each others distortions. It also prevents any "purely objective" discussion of which policy is appropriate at which time.

In traditional societies this dilemma was partially resolved by considerable use of metaphors, parables, myths and legends to render comprehensible the need for 2nd and higher order policy responses, justifying counter-intuitive sacrifices in the short-term. This possibility has been neglected in industrialized societies in favour of economic models which are essentially incomprehensible to all but the very few. And it is valid to question whether those who claim to understand their significance are adequately informed about the dimensions of society they choose to exclude from such models.

PARADOXICAL STRATEGIES

The comprehension dilemma may be further clarified by the possibility that paradoxical strategies (inconsistent with conventional policy axioms and accepted values), namely strategies which ostensibly encourage negative or maladaptive behaviour, may constitute a valid policy phase in an appropriate new mode. Paradoxical strategies have been used with great success in psychotherapy, although most therapists have been reluctant to employ them, not only because of their theoretical-clinical complexities, but also because of their inherent unorthodoxy (53). Although such an approach would be necessarily highly controversial on a collective level, it is even possible that certain negative social conditions can only be usefully understood as having been effectively engendered by the society, or its neighbours, as necessary developmental learning experiences for that society. If, after a decade of global modelling, the experts are still "groping in the dark" (54), such paradoxical methods of encompassing counter-intuitive (and essentially paradoxical) situations merit vigorous investigation.

In Leon F Seltzer's extensive review of paradoxical strategies he explores the possibility of a "metatheory" of therapeutic paradox (53). The apparent irrationality of such strategies is such that they "regularly elicit - and in fact are to be associated with - reactions of surprise, confusion and disbelief" (53, p. 10). He notes Omer's argument that the single unifying factor is "symptom decontextualization" whereby, through experiencing a problem from one or more alternative settings, it loses its problematic character because of the modified form that it acquires in a broader experiential perspective. Omer even suggests that the more widespread the dimensions of contextual modification, the shorter the time of treatment required and the greater the likelihood that significant improvement will take place (55).

In this light, at the collective level one merit of policy cycles lies precisely in the manner in which they allow problems emerging through the inadequacy of one policy to be reviewed through other modes of social action. Such a cycle is thus essentially regenerative, or self-healing, in that problems emerging at one point in the cycle are reabsorbed at some other point. It is the cycle which provides the larger context in which societal problems are processed. And, if Omer is correct, the faster the cycle, the greater the probability that the problems will be successfully defused.

CONCLUSION

In exploring the possibility of bringing about a new mode of socio-economic organization appropriate to human development, this paper argues that no single mode is acceptable or is in itself wholly appropriate. Furthermore the appropriate mode by which people are inspired as an ideal is in practice inherently incomprehensible in its entirety, if only in order to function as a form of conceptual genetic pool of requisite variety, but especially since it is natural to prefer not to be consciously aware of the unpleasant realities and remedial measures which are the long-term (or geographically distant) price to be paid for the attractive facets favoured.

The appropriate response to this comprehension dilemma cannot, of necessity, be encapsulated in any particular theory, mode of action or metaphor. Rather the nature of the challenge calls for the use of sets of complementary tools, whether they be theories, modes of action or metaphors. It is through such sets of tools that greater degrees of appropriateness can be approximated, rather than through any particular one of them.

The special feature of this challenge is that the constituent elements of any such sets must of necessity be significantly different from one another, even to the point of mutual incompatibility and beyond. Indeed it would appear that the greater the degree of that incompatibility, containable within the set, the greater the probability that the required appropriateness will be successfully approximated.

Although the nature of such sets may be represented in approximate form by a complex of mathematical functions, their complexity must necessarily render them incomprehensible to most people, if not to everybody. And although the socio-political reality of such a situation may be portrayed as a pattern of struggle between alternative modes of action, the nature of everybody's active or tacit involvement in that struggle obscures any non-partisan understanding of the coherence associated with that pattern.

Whilst the situation may be more fully understood with the aid of particular metaphors, the degree of comprehension required appears to necessitate the use of sets of metaphors. At this point in time, the possibility of developing such sets of metaphors constitutes a significant unexplored opportunity. In the light of the arguments of this paper, the design of such sets amounts to the production of conceptual catalysts whereby the emergence of more appropriate patterns of socio-economic organization can be stimulated from many different perspectives. It is in the light of such sets of metaphors that an improved sense of appropriateness may emerge, both in terms of the ability to distinguish inappropriate, excessive policy initiatives (over-reactions and inadequate responses) and with respect to the timing of complementary policy initiatives (phasing and rhythm).

The challenge in the design of such sets of metaphors lies in discovering fruitful patterns, namely those which are likely to be more "efficient" catalysts for appropriate human development. At this point it would appear that only metaphors of appropriate richness can provide adequate pointers and guidelines for such investigations. Thus metaphors themselves need to be explored to guide the design of appropriate sets of metaphors.

However, to the extent that this paper is perceived as exaggerating the argument for a particular perspective, that perspective requires that it should itself be vigorously dismissed in favour of other perspectives which complement it and counteract its necessary defects.

REFERENCES

1. Paul Ekins (Ed). *The Living Economy*. London, Routledge and Kegan Paul, 1986
2. Herb Addo (Ed). *Transforming the World Economy? Nine critical essays on the New International Economic Order*. London, Hodder and Stoughton in association with the United Nations University, 1984
3. Herb Addo et al. *Development as Social Transformation; reflections on the global problematique*. London, Hodder and Stoughton in association with the United Nations University, 1985
4. Union of International Associations. *Encyclopedia of World Problems and Human Potential*. München, K G Saur Verlag, 1986
5. A J N Judge. Review of frameworks for the representation of alternative conceptual orderings as determined by cultural and linguistic contexts. (Paper for the United Nations University project on Information Overload and Information Underuse). Brussels, Union of International Associations, 1986
6. Kurt Gödel. *Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme*. Monatshefte für Mathematik und Physik, 38, 1931, pp. 173-198
7. Ernest Nagel and James R Newman. *Gödel's Proof*. London, Routledge and Kegan Paul, 1958
8. Michael Dixon. *The common laws of organizational stupidity*. Financial Times, 4 Sept 1986
9. Kenneth L Thompson. (Study of computer endgames using Belle chess program; AT&T Bell Laboratories, New Jersey). (Reported in International Herald Tribune, 4 Sept 1986)
10. Metaphors. Section CM (in reference 4)
11. Embodying discontinuity. Section KD (in reference 4)
12. Patterns of concepts. Section CP (in reference 4)
13. Multipolarization. Section TM (in reference 4)
14. Johan Galtung. *Methodology and Ideology*. Copenhagen, Christian Ejlertsen, 1977.
15. T B Hutchinson et al. *The Production of Field Crops; a textbook of agronomy*. London, McGraw Hill, 1936.
16. M Sebilotte. *Les rotations culturelles; approche methodologique d'une politique dynamique*, Bulletin FNCETA, janvier 1968, numéro special.*
17. Gregory Bateson. *Mind and Nature; a necessary unity*. New York, Dutton, 1979.
18. Magoroh Maruyama. *Paradigmatology and its application to cross-disciplinary, cross-professional and cross-cultural communication*. Cybernetica (1974), 17, p. 135-156, 237- 281.
19. Magoroh Maruyama. *Heterogenisitics; an epistemological restructuring of biological and social sciences*. Cybernetica (1977), 20, 1, p. 69-85.*
20. J O Harvey. *Experience, Structure and Adaptability*. New York, Springer, 1966.
21. Kenneth J Arrow. *Social Choice and Individual Values*. Wiley, 1983

22. Douglas H Blair and Robert A Pollak. Rational collective choice. *Scientific American*, 249, August 1983, 2, pp. 76-83
23. Christopher J Chipello. *Wall Street Journal*, 4 Sept 1986
- 24 Jacques Attali. *Les Trois Mondes; pour une théorie de l'après-crise*. Paris, Fayard, 1981
25. Howard Gardner. *Frames of Mind; the theory of multiple intelligences*. London, Heinemann, 1984.
26. W T Jones. *The Romantic Syndrome; toward a new method in cultural anthropology and the history of ideas*. The Hague, Martinus Nijhof, 1961.
27. Magoroh Maruyama. *Mindscapes, social patterns and future development of scientific theory types*. *Cybernetica*, (1980), 23, 1, pp. 5-25.
28. Magoroh Maruyama. *Epistemologies and esthetic principles*. *Journal of the Steward Anthropological Society* (1978), 8, p. 155-167.
29. Kenneth Boulding. *The Image*. Ann Arbor, University of Michigan Press, 1956.
30. R Meredith Belbin. *Management Teams; why they succeed or fail*. London, Heinemann, 1981
31. Edward T. Hall. *The Silent Language*. Garden city, Doubleday, 1969.
32. Edward T. Hall. *The Hidden Dimension*. Garden city, Doubleday, 1966.
33. Edward T. Hall. *Beyond Culture*. Garden City, Doubleday, 1977.
34. Edward T. Hall. *The Dance of Life; the other dimension of time*. Garden city, Doubleday, 1984.
35. Andreas Fuglesang. *About Understanding; ideas and observations on cross-cultural communication*. Uppsala, Dag Hammarskjöld Foundation, 1982.
36. Geert Hofstede. *Cultures Consequences; international differences in work-related values*. London, Sage, 1980.
37. Henry Bourgoïn. *L'Afrique Malade du Management*. Paris, Editions Jean Picollec, 1984 (Collection Perspective 2000).
38. Ron Atkin. *Combinatorial Connectivities in Social Systems; an application of simplicial complex structures to the study of large organizations*. Basel, Birkhauser, 1977.
39. Ron Atkin. *Multidimensional Man; can man live in 3-dimensional space?* London, Penguin, 1981.
40. Ron Atkin. *Mathematical Structures in Human Affairs*. London, Heinemann, 1974.
41. Erich Jantsch. *The Self-Organizing Universe; scientific and human implications of the emerging paradigm of evolution*. Pergamon, 1980.
42. A J N Judge. *Representation, comprehension and communication of sets; the role of number*. *International Classification*, 5, 1978, 3, p. 126-133; 6, 1979, 1, p. 16-25; 6, 1979, 2, p. 92-103
43. A J N Judge. *Patterns of N-foldness; comparison of integrated multi-set concept schemes as forms of presentation (Paper for a meeting on forms of presentation meeting of the UN University GPID project, Geneva, 1980) In: Patterns of Conceptual Integration (Collection of papers presented at meetings of the Goals, Processes and Indicators of Development project of the United Nations University, 1978-82)*. Brussels, Union of International Associations, 1984.

44. Arthur Young. *The Geometry of Meaning*. Boston, Delacort Press/Seymour Lawrence, 1978.
45. Stephane Lupasco. *Le Dualisme Antagoniste*. Paris, Vrin, 1973 (*Du Devenir Logique et de l'Affectivité*, vol. 1).
46. A J N Judge. *Policy Alternation for Development*. Brussels, Union of International Associations, 1984 (Papers arising from work in connection with the Goals, Processes and Indicators of Development project of the United Nations University, 1978-1982)
47. David Bohm. *Fragmentation and Wholeness*. Van Leer Jerusalem Foundation, 1976.
48. David Bohm. *Fragmentation and Wholeness*. Van Leer Jerusalem Foundation, 1976.
49. David Bohm. *Wholeness and the Implicate Order*. London, Routledge and Kegan Paul, 1980 p. 16-25; 6, 1979, 2, p. 92-103
50. Larry Dossey. *Space, Time and Medicine*, Boulder, Shambhala, 1982.
51. Saul Kuchinsky. *Systematics; search for miraculous management*. Charles Town WV, Claymount Communications, 1985
52. Gheorghe Paun. An impossibility theorem for indicators aggregation. *Fuzzy Sets and Systems*, 9, 1983, pp. 205-210
53. Leon F Seltzer. *Paradoxical Strategies in Psychotherapy; a comprehensive overview and guidebook*. New York, Wiley, 1986 (Appendices: Examples of planning and execution; Checklist of symptoms and problems treated paradoxically; 500-item Comprehensive bibliography)
54. Donella Meadows, John Richardson and Gerhart Bruckmann. *Groping in the Dark; the first decade of global modelling*. New York, Wiley, 1982
55. H Omer. Paradoxical treatments; a unified concept. *Psychotherapy. theory, research and practice*. 18, 1981, pp. 320-324

DIMENSIONS OF COMPREHENSION DIVERSITY

This annex presents some evidence for the variety of preferred modes of comprehension which must necessarily be honoured by any appropriate new mode of socio-economic organization, if only to avoid being eventually undermined by one of them.

(a) Frames of mind : multiple intelligences

A measure of intelligence may be considered as a measure of the individual's capacity to process information. There is a long held theory that there is a single measurable intelligence scale along which each individual can be assessed to derive an "intelligence quotient". As part of the recent Project on Human Potential of the Harvard Graduate School of Education, Howard Gardner has reviewed a considerable body of evidence which questions the validity of this theory (25). He argues that the tests do not measure what they purport to, and are valid only for a small Western middle-class minority. This raises the question as to whether the prevailing concept of what constitutes meaningful "information" about any new mode of socio-economic organization is not subject to similar distortion.

Gardner proceeds to demonstrate that there is persuasive evidence for the existence of several relatively autonomous human intellectual competences which he calls "human intelligences" or "frames of mind". The exact nature of and breadth of each intellectual "frame" has not so far been satisfactorily established, nor has the precise number of such intelligences been determined. It is however possible to demonstrate that several such intelligences exist, common to many cultures, each with its own patterns of development and brain activity, and each different in kind from the others. Gardner points out that the many previous efforts to establish independent intelligences have been unconvincing, chiefly because they rely on only one or, at the most, two lines of evidence.

Gardner presents evidence for the following distinct forms of intelligence:

- linguistic intelligence, including: a sensitivity to the meaning of words and their subtle shades of difference; a sensitivity to the order among words and the rules governing such order; a sensitivity to the sounds, rhythms, inflections and meters of words; and a sensitivity to the different functions of language, namely its potential for exciting, convincing, stimulating, conveying information, or simply providing pleasure. Strangely however he makes no mention of competence in languages other than the mother tongue.
- musical intelligence, including: sensitivity to pitch (or melody); sensitivity to rhythm, namely the organization of pitch over time; and sensitivity to timbre or the characteristic qualities of a tone.
- logico-mathematical intelligence, including: sensitivity to possibilities of ordering and reordering objects, assessing their quantity; sensitivity to the actions that can be performed on objects, the relations that obtain among those actions, the statements (or propositions) that can be made about actual or potential actions, and the relationships among those statements.
- spatial intelligence, including: capacities to perceive the visual world accurately, to perform transformations and modifications upon initial perceptions, and to re-create aspects of visual experience, even in the absence of physical stimuli.
- bodily-kinesthetic intelligence, including: the ability to use one's body in highly differentiated and skilled ways, for expressive as well as goal-directed purposes; the capacity to work skillfully with objects, both those involving delicate movements of the fingers and those involving complex movements of the body. (Gardner points out that the tendency to denigrate physical skills, in contrast to skills of the mind, is a Western academic bias not necessarily characteristic of other cultures).

- personal intelligences, including: access to one's own feeling life and the capacity to affect discriminations among those feelings, to label them, to enmesh them in symbolic codes, to draw upon them as a means of understanding and guiding behaviour; the ability to notice and make distinctions among other individuals, especially among their moods, temperaments, motivations and intentions.

Gardner stresses that different forms of intelligence may be more readily accepted in different cultures. Whilst at the same time recognizing that although the logico- mathematical form may predominate in the West (which claims to have originated it), it is nevertheless present in tribal cultures (such as the Kalahari Bushman) in somewhat disguised forms.

Within this context the notion of intelligence that he advances involves the existence of one or more information-processing operations or mechanisms which can deal with specific kinds of input. He suggests that human intelligence might be defined as a neural mechanism or computational system which is genetically programmed to be activated or "triggered" by certain kinds of internally or externally presented information. (25, p. 64). The operations of these mechanisms may be considered autonomous, without the "modules" being yoked together. He points out that exponents of this modular view do not react favourably to the notion of a central information-processing mechanism that decides which module to invoke (25, p.55). (b) Axes of bias

A well-defined characteristic of academic debate is the tendency for different schools of thought to emerge in relation to a topic cluster. Debate within each school of thought develops through unemotional arguments reflecting the best of the scholarly style. In debate between schools or between disciplines, however, where there is a lesser degree of commonality of the conceptual frameworks (or none at all), the arguments formulated within one framework tend to appear more emotional and as less well-founded or even irrational from another. The kinds of information supplied from one framework are then suspect or unacceptable to those operating in an alternative framework and are therefore ignored, to the extent possible. This problem has been explored by the philosopher W T Jones (26) concerned at the tendency for debates around certain topics to remain static and to fail to develop over long periods of time. In particular he noted the tendency for certain positions to be maintained (reflecting a particular framework) despite an abundance of information concerning the validity of some alternative position. To clarify this situation, he demonstrates that the discontinuities can be described in terms of the different positions of the participants (or schools of thought) on seven pre-rational axes of bias. These differences are reflected in aesthetical, theoretical, value, life-style, policy, and action preferences, as well as in the preferred style of discussion. Any difference between people in position "along" an axis gives rise to discontinuity which it is difficult to handle within a rational frame of reference. The axes identified by Jones are:

- (a) Order vs disorder, namely the range between a preference for fluidity, muddle, chaos, etc. and a preference for system, structure, conceptual clarity, etc.
- (b) Static vs dynamic, namely the range between a preference for fluidity, muddle, chaos, etc. and a preference for movement, for explanation in genetic and process terms, etc.
- (c) Continuity vs discreteness, namely the range between a preference for wholeness, unity, etc and a preference for discreteness, plurality, diversity, etc.
- (d) Inner vs outer, namely the range between a preference for being able to project oneself into the objects of one's experience (to experience them as one experiences oneself), and a preference for a relatively external, objective relation to them.
- (e) Sharp focus vs soft focus, namely the range between a preference for clear, direct experience and a preference for threshold experiences which are felt to be saturated with more meaning than is immediately present.
- (f) This world vs other world, namely the range between a preference for belief in the spatio-temporal world as self-explanatory and a preference for belief that it is not

self-explanatory (but can only be comprehended in the light of other factors and frames of reference).

(g) Spontaneity vs process, namely the range between a preference for chance, freedom, accident, etc and a preference for explanations subject laws and definable processes.

(b) Epistemological mindscapes

In a series of articles, Magoroh Maruyama has studied patterns of cognition, perception, conceptualization, design, planning and decision processes (18, 19, 27, 28). His central concern is the role of epistemological types, especially as they affect cross-disciplinary, cross-professional, cross-paradigm and cross-cultural communications. In contrasting his own work with that of previous research in this area, he distinguishes two traditional approaches: the psychological and psychoanalytical bases of individual differences in patterns of cognition, and the cultural and social differences as determined by sociologists and anthropologists.

Maruyama notes the various terms that have been used to describe such patterns, none of which has proved satisfactory: models, logics, paradigms, epistemologies. To these might be added Kenneth Boulding's "image" (29). In Maruyama's more recent work he favours "mindscapes". He provides a very valuable summary of these different exercises in "paradigmatology" and their relation to social organization. Although he no longer favours the term, he defined paradigmatology as the "science of structures of reasoning" whether between disciplines, professions, cultures or individuals (19). He notes that the "problem of communication between different structures of reasoning had not been raised until recently", since scholars tended either to advocate their own approach or describe that of others. Contributing to this neglect is the fact that the choice between logics is based on factors which are beyond and independent of any logic.

Although he carefully emphasizes that there are many possible mindscapes or paradigms, Maruyama argues that "for practical purposes" it is useful to distinguish four main types (19, p. 6). He stresses that these are not meant to be either mutually exclusive nor exhaustive and warns that any attempt at separating them into non-overlapping categories "is itself a victim of a paradigm which assumes that the universe consists of non-overlapping categories" (19, p. 142). Over the years he has continued to struggle with the same attributes, grouping them first into three types (27), extended to four (18), then to five (27) and now seemingly stabilized at four again (28).

The four types are:

(a) H-mindcape (homogenistic, hierarchical, classificational): Parts are subordinated to the whole, with subcategories neatly grouped into supercategories. The strongest, or the majority, dominate at the expense of the weak or of any minorities. Belief in existence of the one truth applicable to all (e.g. whether values, policies, problems, priorities, etc.). Logic is deductive and axiomatic demanding sequential reasoning. Cause-effect relations may be deterministic or probabilistic.

(b) I-mindcape (heterogenistic, individualistic, random): Only individuals are real, even when aggregated into society. Emphasis on self-sufficiency, independence and individual values. Design favours the random, the capricious and the unexpected. Scheduling and planning are to be avoided. Non-random events are improbable. Each question has its own answer; there are no universal principles.

(c) S-mindcape (heterogenistic, interactive, homeostatic): Society consists of heterogeneous individuals who interact non-hierarchically to mutual advantage. Mutual dependency. Differences are desirable and contribute to the harmony of the whole. Maintenance of the natural equilibrium. Values are interrelated and cannot be rank-ordered. Avoidance of repetition. Causal loops. Categories not mutually exclusive. Objectivity is less useful than "cross-subjectivity" or multiple viewpoints. Meaning is context dependent.

(d) G-mindscape (heterogenistic, interactive, morphogenetic): Heterogeneous individuals interact non-hierarchically for mutual benefit, generating new patterns and harmony. Nature is continually changing requiring allowance for change. Values interact to generate new values and meanings. Values of deliberate (anticipatory) incompleteness. Causal loops. Multiple evolving meanings.

The above descriptions are brief summaries of extensive listings of characteristics in relation to overall social philosophy, ethics, decision-making, design, social activity, perception of environment, human values, choice of alternatives, religion, causality, logic, knowledge, and cosmology (18, 19, 28). Maruyama considers that the influence of such "pure" types predominates in certain cultures, although in practice the types are quite mixed. Thus the H-type predominates in European, Hindu and Islamic cultures. The I-type develops in certain individuals, such as those of existentialist philosophy. The S-type is characteristic of Chinese, Hopi, and Balinese cultures. The G-type predominates in the African Mandenka culture, for example. H, S. and G characteristics can be distinguished in different streams of Japanese culture.

Maruyama has recently (28) compared his four types with an extensive survey of epistemological data grouped by O J Harvey into four "systems" (20).

System I: (a) High absolutism, closedness of beliefs, high evaluativeness, high positive dependence on representatives of institutional authority, high identification with social roles and status position, high conventionality, high ethnocentrism.

System II: (b) Deep feelings of uncertainty, distrust of authority, rejection of socially approved guidelines to action accompanied by lack of alternative referents, psychological vacuum, rebellion against social prescriptions, avoidance of dependency on God and tradition.

System III: (c) Manipulation of people through dependency upon them, fairly high skills in effecting desired outcomes in his world through the techniques of having others do it for him, some autonomous internal standards especially in social sphere, some positive ties to the prevailing social norms.

System IV: (d) High perceived self-worth despite momentary frustrations and deviation from the normative, highly differentiated and integrated cognitive structure, flexible, creative and relative in thought and action, internal standards that are independent of external criteria, in some cases coinciding with social definitions and in other cases not.

The two authors find that they agree on three types and differ on the nature of the fourth (which Jungian's would presumably consider as corresponding to a partially "repressed function" they have in common). It is much to be regretted that such surveys have not explored the epistemologies in "developing" countries to a greater degree, nor the extent to which different epistemologies are co-present in the same culture, group, individual or life-cycle. Such work would contribute to further understanding of information based on different epistemologies is underused within other epistemological frameworks.

(c) Modal preferences: facets of an appropriate mode

As noted above, the absence of systematic research makes it difficult to clarify the effects of culture on information processing and the implications for any preferred mode of socio-economic organization. A number of practical dimensions of the problem have been reviewed in a series of studies by Edward T Hall (31, 32, 33, 34) and in a seminal review by Andreas Fuglesang (35). Bearing in mind the intimate relationship between culture and language, the matter may be explored by using comparative research on cultures as an indication of the dimension of the problem. Particularly fruitful in this respect is a study by Geert Hofstede : Culture's Consequences; international differences in work-related values (36). This "explores differences in thinking and social action that exist between members of 40 different modern nations".

He argues that people carry "mental programs" which are developed in the family and early childhood and reinforced in the schools and organizations of their respective cultures.

The data used for the empirical part of the research was extracted from an existing database of the results of surveys within subsidiaries of a large high technology multinational corporation -- which might otherwise be assumed to constitute a fairly homogeneous set. The survey was held twice, in 1968 and in 1972, producing a total of over 116,000 questionnaires. This was supplemented by additional data from people on management courses unrelated to that corporation. Hofstede argues that the differences demonstrated in the study "have profound consequences for the validity of the transfer of theories and working methods from one country to another" (36, p. 12). This suggests associated consequences for the use of information generated in other countries. The findings are interpreted on behalf of policy makers in national, but especially in international and multinational organizations, who are confronted with the problems of collaboration of members of their staff carrying different culturally influenced mental programs. The question is whether the implications of this study can be used to offer further insights on the use of information in different cultures, and hence on the manner in which any new mode of socio-economic organization might be articulated.

Hofstede isolated four main dimensions on which country cultures differ:

- power distance, namely the attitude to human inequality. The index developed grouped information on perceptions of an organizational superior's style, colleagues' fear to disagree with the superior, and the type of decision-making that subordinates prefer in a superior. This clearly has implications for the way in which any new mode could be credibly implemented and managed within any particular culture.
- uncertainty avoidance, namely the tolerance for uncertainty which determines choices of technology, rules and rituals to cope with it in organizations. The index developed grouped information on rule orientation, employment stability and stress. This clearly has implications for the degree to which planning is perceived as helpful or rather as an intolerable constraint (a "colonization of the future").
- individualism, namely the relationship between the individual and the collectivity which prevails in a given society, especially as reflected in the way people choose to live and work together. The index distinguishes between the importance attached to personal life and the importance attached to organizational determination of life style and orientation. This clearly has implications for any group's willingness to act in the interests of the community as a whole rather than to further its own interests.
- masculinity, namely the extent to which the biological differences between the sexes should or should not have implications for social activities that are transferred by socialization in families, schools, peer groups and through the media. The index developed measures the extent to which people endorse goals more popular with men or with women. This could well have implications for the manner in which a community deals with major differences and potentially polarized situations.

Hofstede presents an integration of these four dimensions (see Figures 5 and 6). The values of the four indices for the 40 countries are used to form clusters of countries with similar index profiles. The four dimensions satisfy Kluckhohn's criteria for universal categories of culture. Hofstede argues that they describe basic problems of humanity with which every society has to cope, although for each of them there is not just one possible answer, but a range of possible answers. He recognizes that the set of dimensions is not necessarily exhaustive.

Place Figures 5 and 6 here

Of special interest in terms of this paper is that Hofstede indicates, for each of the four dimensions, the consequences for:

- political systems
- religious life and philosophical and ideological thinking
- organizations.

In so doing he comes very close to rendering explicit the implications for information processing and any new mode of socio-economic organization. An attempt at rendering these implications explicit is made in Annex 3. This suggests how Hofstede's four dimensions might be interpreted to throw light on the information processing differences between cultures which would determine how any such new mode might be perceived and received.

Hofstede's approach has served as the point of departure for research at the National Bureau for Professional Training in the Ivory Coast aimed at determining management and organizational models appropriate to African cultures. Henry Bourgoïn, Director of the Bureau, in a study entitled "L'Afrique Malade du Management" (37) notes, in reviewing the forms of management used in African through the colonial period to the present period of "occidental management" that:

"... l'entreprise industrielle que nous connaissons actuellement dans le monde entier s'est surtout développée dans le contexte culturel de l'Europe du XIXe siècle. Une telle organisation, malgré des aménagements en cours dans différents pays, reste fondé sur des "valeurs" particuliers qu'elle continue à véhiculer: productivité, rentabilité, etc. Elle s'appuie aussi sur des "logiques" particulières: planning, ordonnancement, etc. qui intègrent elles-mêmes des éléments, qui, s'ils existent évidemment dans toutes ces cultures, n'y sont pas toujours aussi valorisés" (37, p. 20).

He continues: "C'est pourquoi, jusqu'aujourd'hui, les différentes formes de "culture managériale" importée ont glissé sur notre comportement, comme une goutte d'huile sur une feuille de manioc... Il ne put s'agir ni d'"imiter les Blancs" ni de "faire comme nos ancêtres". Une seule voie, celle du juste milieu, est réaliste, car elle prendra en compte le visage actuel de nos sociétés" (37, p. 20-21).

In a section entitled "Des modèles bien à nous", Bourgoïn considers that valid organizational models invented by African societies must be discovered by research into the traditional political systems adopted by African people.

"On peut en effet les considérer comme le reflet de la pensée du groupe dans les domaines du pouvoir, du commandement et de son organisation interne. Ces structures politiques sont en outre révélatrices des normes sociales élémentaires qui sous-entendaient l'organisation du groupe". (37, p. 21).

Bourgoïn stresses the diversity of traditional African political systems from which organizational models may be derived. These may be divided into two main groups:

Centralized structures

- Pyramidal monarchy: Ashanti, Bemba (Zambia), Xhosas (South Africa), Hayas (Tanzania), Oyos (Nigeria), Balubas (Zaire), Langos (Uganda).
- Associative monarchy: Mandes and Senoufos (West Africa).
- Centralized monarchy: Mossis (Upper Volta), Fipas (Tanzania), Zulus and Swazis (South Africa), Hovas-Mrinas (Madagascar), Fons (Bénin).

Segmented structures

- Classical segmented system: Krous (Libria and Ivory Coast), Ibos (Nigeria), Lobis (Upper Volta and Ivory Coast), Nuers (Sudan), Kikuyu (Kenya), Tallensis (Ghana), Somalis (Somalia).
- Universalist segmented systems: Masais, Kipsigis, Merus (all in Kenya).
- Ritually stratified systems: Ankalis (Uganda), Chillouks (Sudan), Tks (Zaire).
- Autonomous village and city-state: Balous and Bakons (Ivory Coast), Ibibas (Nigeria).

COMMUNICABLE INSIGHTS

(a) The geometry of connectivity

The arguments of the previous section can be clarified and taken a step further using the work of Ron Atkin on q-analysis, namely the theory and application of mathematical relations between finite sets. He has applied this to the analysis of communication patterns within complex organizations. (38, 39, 40).

The perceptual significance of this approach is well-illustrated by visual sensitivity to colours resulting from the three primary hues (red, green and blue). These may be represented on a simple triangle (see Figure 7).

Place Figure 7 here

Here the vertices (O-simplexes) represent the primary hues, the sides are twofold combinations (1-simplexes), and the combination of the three hues makes the central white (2-simplex). The 2-simplex, together with all its faces, forms a simplicial complex $KY(X)$ where X is the vertex set (red, green, blue) and Y is the set of seven perceived colours.

Now to be able to see all the colours, a person's vision needs to have the ability to function in the triangle as 2-dimensional "traffic" on that geometry, moving from location to location adjusting to the complexity of the geometrical structure which carries the visual traffic. It however the person's vision is limited to 1-dimensional traffic, then white could not be perceived because the visual traffic of seeing is then restricted to the edges and vertices only. Similarly, if the person's colour vision is only 0-dimensional, then it is restricted to the vertices. It can only see one vertex colour at a time and never a combination (as represented by an edge). If vision was 3-dimensional, it would allow traffic throughout the geometry, but would perceive other colours as well, calling for a fourth vertex in order to contain the full range of combinations.

If the geometry represents concepts or languages (or modes of socio-economic organization) instead of colours, then it would be expected that some people, in relation to that set, would have 0-dimensional comprehension (i.e. sensitive to isolated primary issues only) and others would have 1-dimensional comprehension (i.e. only sensitive to binary combinations of primary issues). The latter would be unable to maintain attention to three concepts simultaneously in order to perceive the threefold combination (the central, integrated "white" issue). The threefold issue may then be termed a 2-hole in the pattern of communication connectivity amongst those involved. For 2-dimensional traffic however, the issue complex is coherent, comprehensible and well integrated. For the 1-dimensional traffic, it feels less secure as a whole, since the latter may only be experienced sequentially through a succession of experiences ("around the edges") from which the shape of the whole may be deduced but not experienced. For 0-dimensional traffic, the integrated concept does not exist, since experience is disconnected.

"Generally speaking it seems to be confirmed that action (of whatever kind) in the community can be seen as traffic in the abstract geometry and that this traffic must naturally avoid the holes (because it is impossible for any such action to exist in a hole). The holes therefore appear strangely as objects in the structure, as far as the traffic is concerned. The difference is a logical one in that the word "q-hole" describes a static feature of the geometry $S(N)$, whilst the word "q-object" describes the experience of that hole by traffic which moves in $S(N)$ " (38, p. 75).

As an "object" this phenomenon is an obstacle to communication and comprehension and obliges those confronted with it to go "around" in order to sense the higher dimensionality by which it is characterized. Communications "bounce off" such objects. As a "hole" this phenomenon engenders, or is engendered by, a pattern of communication. It appears to function both as

"source" and "sink". Atkin suggests that, in some way which is not yet fully understood, such object/holes act as sources of energy for the possible traffic around them. From the initial research it would appear that such objects/holes are characteristic of communication patterns in most complex organizations. It seems highly probable that they can also be detected in any partially ordered pattern of communication. As such "societal problems", "human needs", and "human values" merit examination in this light from the perspective of different languages and modes of socio-economic organization.

Very concretely, Atkin has investigated situations in which the "vertices" (which could themselves be n -simplexes in a multidimensional geometry) are individuals or offices linked together through various committees. They could also be governments or disciplines. There will then be a lot of 0-traffic and 1-traffic within and between offices due to the details of their intra- and inter-office (bilateral) operations. This traffic will circulate around the holes/objects which they constitute. Any n -level traffic can only be encompassed, or be brought to rest, by an $(n+1)$ -level body (e.g. an executive or a committee). If the latter does not exist, such traffic will continue to circulate around the q -objects in the structure and, according to Atkin, may be defined as noise. An "empire builder" (or any elite), for example, in such an organizational system will carefully create many q -holes underneath him (at the n -level), so that subordinate bodies answerable only to his appointees, are trapped in the flow of noise between them (38, p. 129). Atkin notes that even though the geometry may not have been rendered explicit, such structures generate the feeling throughout a community of some "power behind the scenes" acting to outwit the formal structure. The special value of q -analysis is that it can clarify why action/discussion in connection with (development) issues tends to be "circular" in the long-term, however energetic it may appear in the short-term. As such it shows how social change is blocked by the way in which conceptual traffic patterns itself around the sensed core issue which is never confronted as such because the connectivity pattern is inadequate to the dimensionality of the issue. This would explain why so many issues go unresolved and why the process of "solving" problems becomes institutionally of greater importance than the actual "elimination" of the problem.

The elements of the triangle may also be used to represent different modes of socio-economic organization comprehensible under different conditions. It is possible for a person or an organization to conduct all its communication in terms of one of these modes or frameworks. Communications in terms of other modes or frameworks would be incomprehensible and to some degree inconceivable. It is possible to envisage a different paradigm, corresponding to the 1-dimensional traffic, which would permit movement between the primary modes via intermediate modes. This would correspond to the mind-set of a polyglot or a polymath, for example. Presumably more complex paradigms could also be envisaged. Atkin analyzes much more complex situations in exploring information flows through the committee structure of a complex organization. He is especially concerned with how information on substantive issues gets moved around through appropriate committees without it being necessary to confront core issues or bring them into focus, namely the bureaucratic technique of handling information overload by avoiding use of that information.

Q -analysis gives precision to the recognition that traffic of different degrees of content connectivity finds (or creates) its appropriate level in any psycho-social communication complex, presumably including a language. Communicable insights are level-bound, especially where they are of high connectivity. In other words, at the level within which we can communicate, concepts cannot necessarily be anchored unambiguously into terms and definitions which "travel well". Precision introduces distortion which is only acceptable locally within any communicating society - although "locally" must be interpreted in the non-geographical sense in which all nuclear physicists are near neighbours, for example.

The relation between two personal or institutional structures, conceived as a multidimensional backcloth, carries whatever traffic that constitutes the communication between them. If this backcloth changes by becoming dimensionally smaller, then its geometry loses vertices and the consequent connectivity properties. This is first indicated by the failure of higher dimensional traffic which the geometry can no longer carry. Such 4-traffic, for example, must then move through the structure to some new haven of 4- dimensionality or it must change its nature and become genuine 3-traffic. This process of reducing communication expectations in

order to continue to live within the new warped geometry is the classical problem of compromising. The feeling of "having to compromise" is a painful one. It is the feeling of stress induced by the warping of the communication geometry, namely the direct experience of a structurally induced force, in this case a 4- force (38, p. 146-7). It is the feeling associated with the distortion of an unsatisfactory translation between languages. This approach clearly provides a very precise approach to understanding more subtle forms of structural violence. Atkin has applied it to an analysis of unemployment (38, p. 148).

Such considerations suggest the power of q-analysis in clarifying approaches to human and social development in general. Reducing the dimensionality of the geometry on which a person (or group) is able to live is an impoverishment associated with repressive forces. Expanding the dimensionality induces positive, attractive forces through which a sense of development and enrichment is experienced (38, p. 163). Q-analysis seems to be a valuable new language through which precision can be given to intuitive experiences and their communication, particularly since it provides an explicit measure of obstruction to change.

In the case of social development, it is probable that most continuing societal problems should be seen as holes/objects, especially given the well-established record of unfruitful action in response to them - however vigorous and dedicated. Typical examples are: peace/disarmament, development, human rights, environment, etc. Q-analysis could then provide understanding of why any action tends to be drawn into a vortex of futurity, however much it satisfies short-term political needs for visible "positive" action. The participants in the action find themselves "circulating" around a central concern of which they are unable to obtain an overview due to the geometries of the overlapping conceptual and organizational structures through which they work (or which they somehow engender).

The term "futility" used above is however only appropriate if the sole considerations were the elimination of such problems. In fact the existence of such problems is extremely important to the organization of society, to social development, and to the direct or indirect employment of many people. Just as the "defence" business is vital to the economy of many countries, so is the "social problem" business vital to many sectors of society. Eliminating social problems would be a disaster for many people, especially problem-oriented intellectuals, the employees of problem-solving agencies, or indeed those in need of stimulus and challenge.

In the case of human development, Atkin shows how the individual can be defined in terms of a multidimensional geometry requiring a minimum of four levels (38, p. 111). By relating this geometry to that of society, Atkin introduces an 8-level scheme (38, p. 162) within which the degree of integration or eccentricity of communication can be clarified in terms of developmental or anti-developmental forces.

Concerning such levels, the question arises as to whether their hierarchical order is fixed. Preoccupations associated with Schumacher's "small is beautiful", for example, may well modify the order. The ordering may be a question of orientation in which the "top" and "bottom" elements selected depend on the preferred concept and direction of development (e.g. "top-down", "bottom-up"). This would be more consistent with the concept of order as an (existential) choice as discussed above in connection with the various fourfold "languages".

In such a multidimensional geometry it is clear that, whether in the case of an individual, a group or society as a whole, it is not possible to eliminate "underdevelopment" as associated with low dimensionality. Such a geometry will necessarily continue to have traffic of very low-level connectivity co-present with that of increasingly higher level connectivity. The simplest illustration arises from the continual birth of infants who will, when resources permit, continue to be educated through to the level of connectivity to which they can respond. But there will always be communication at both low and high- connectivity levels, especially about socio-political issues. The question is then how such learning communication between these different levels of connectivity can weave itself together within a social structure.

It is the status of the holes/objects in relation to development which could provide an interesting point of departure for further investigation. As noted above, it is not a question of attempting vainly to eliminate such holes, especially when some of them may arise from

alternative concepts of "development". Rather it is a question of how configurations of holes can be identified and/or designed. It is such configurations of holes which provide the minimum structure (and communication dynamics) to stabilize and give form to the co-presence of the differing "answers" to the challenge of development.

In effect such holes exist at a lower connectivity-level than the "macro-hole" of higher connectivity constituted by the world problematique at this time. This macro-crisis hole "absorbs" the development initiatives of society by engendering the immense volume of action/communication traffic around the hole so defined. This draws attention to the developmental implications of the probable presence of holes of yet higher dimensionality than can be readily sensed or made the subject of acceptable public (consensual) communication.

How then are "better" holes to be engendered within such configurations? Now from one point of view it is necessary to avoid introducing an element of evaluation, because from each hole the perception of other holes will be distorted so that no communicable assessment can be usefully formulated. On the other hand, it may prove to be the case that, at the level of the configuration as a whole, more than one such configuration can be identified/designed in order to interrelate the perspectives associated with the set of holes. And at this level, without privileging any particular hole, more adequate interrelationships between the elements making up the holes can be identified.

Expressed differently, introducing evaluative judgements into the relationships between the holes within a particular configuration can only contribute to the dynamics between such holes in terms of perceived advantage/disadvantage. Excessive emphasis on this runs the risk of tearing the configuration apart. The identities associated with the holes can be respected in each of the configurations in a series constituting progressively more adequate or richer formulations of the relationships between "developments". There is consequently a multiplicity of concepts of development operative in society. Individuals and groups may "progress" from one to another, possibly with a general tendency towards those of higher connectivity. But other individuals and groups will emerge and find the concepts of lower connectivity more meaningful before moving on, if they do, to those of higher connectivity. (In this sense the "ontogenesis" of an individual tends to repeat the "phylogenesis" of his/her society). Society in this sense is the arena within which individuals and groups refine their concept of development.

(b) Frameworks as frozen portions of learning cycles

In different ways the previous sections suggest that it might be fruitful to consider the apparent isolation of languages or modes of socio-economic organization as being due to an inability to understand how to move between such frameworks. Although each framework constitutes a rich learning environment, it becomes a trap if no way can be found to exploit the advantages of other frameworks when they may be more appropriate. In a sense each framework provides a mode of information processing which is effectively a frozen portion of a larger learning cycle. Each such portion, just as with an organ in the human body, processes certain kinds of information in a manner significant for the whole, but within the prevailing paradigm there is no means of transferring the significance extracted to other contexts within the whole where it may be of value.

In the West part of the difficulty lies in the conception of learning as a linear process resulting in a shift in comprehension from A to B. It is only in the insights of Western poets that there is any recognition that, as stated by T S Eliot : "The end of all our exploring will be to arrive where we started and know the place for the first time". Gregory Bateson does however makes a strong case for the essential discontinuity of the learning process as a "zigzag dialectic between form and process" (17, p. 194). If the zigzag is considered as occurring around a learning cycle however, marrying in the Eastern bias towards recurrence, this cycle can then be subdivided into sufficiently detailed elements to be of significance for organizational operations. Jantsch discusses cyclical organization in terms of the system logic of dissipative self-organization:

"Hypercycles, which link autocatalytic units in cyclical organization, play an important role in many natural phenomena of self-organization, spanning a wide spectrum from chemical and biological evolution to ecological and economic systems and systems of population growth. The cyclical organization of a system may itself evolve if autocatalytic participants mutate or new processes become introduced. The co-evolution of participants in a hypercycle leads to the notion of an ultracycle which generally underlies every learning process". (41, p. 15)

The question then becomes how many discontinuous phases (Jantsch's "participants") it is useful to distinguish in the cycle. Too few and the incompatibilities between them are too fundamental, too many and the distinctions between them are too subtle. The operational significance of this conceptual constraint has been explored in earlier papers from which it is apparent that significance is lost if more than about 7 categories are used (42), unless the total breaks down into sub-sets based on simple (e.g. 2,3,5) factors (43).

A novel approach to the learning cycle in relation to action has been taken by Arthur Young (44) as a consequence of his experience as the inventor of the Bell helicopter (whose three-dimensional movement is notoriously difficult to control. He established the vital learning-action link through a new interpretation of the operational significance of the set of 12 "measure formulae" through which material phenomena are observed, acted upon and controlled in physics and engineering. These he portrays as corresponding to a series of phases in a learning-action cycle. Of special interest for the development theme is the significance he attaches to the sequence of movement around the cycle: one direction involving essentially unremembered experience-without-learning, the other involving conscious-learning-action. His approach has been adapted and modified to further emphasize the action-learning significance (Section KD, 1). It is interesting that the philosopher Stephane Lupasco also attaches importance to the analysis of such measures in terms of the polarities they constitute and the types of energy with which they are associated (45, p. 26).

Place Figure 8 here

This approach clarifies how portions of such a cycle are vulnerable to institutionalization (as specialized, independent answer domains, or habitual responses) to the extent that there is no learning bridge across the discontinuities. The problem of (social) integration is thus intimately related to the functioning of (collective) learning cycles. It seems probable that needs (and their satisfiers) also relate to different portions of such cycles, as would ranges of incompatible development goals or alternative visions of desirable futures. In each case the point to be emphasized is that such seemingly incompatible fragments are "frozen" portions of a cycle with which individuals or groups identify. None are of lasting significance in their own right, especially insofar as they hinder the collective learning process which must take place through them.

The facilitative and obstructive factors to further learning (i.e. successful "struggle" in marxist terms) at each stage in the cycle are probably linked to patterns of complementarity and incompatibility between the stages according to their memberships of (2,3, or 4-member) sub-sets in the cycle (e.g. preceding and succeeding stages in the cycle are in conflictual relationship since they would correspond to thinking of the opposite hemisphere). Answers given from any part of a cycle are of course "questionable" as perceived from other parts of the cycle.

A single cycle is probably not a sufficiently concrete representation of the complexity to be encompassed by an adequate meta-language. Where several cycles interlock to form a sphere, the nodes are effectively combinations of cyclic phases. The relationships of challenge and harmony between such nodes have been discussed in earlier papers concerning Fuller's tensegrity concept.

The acid test of learning cycles however, is whether they can encompass the discontinuities between the major political tendencies by which the world community is seemingly divided. Any such relationship posited must necessarily be highly controversial, but the controversy should

be patterned according to the aspects of the learning challenges involved. This has been explored elsewhere (11, 46)

(c) Wholeness and the implicate order

The previous sections consider how various essentially complementary frameworks might be fitted together, in effect a "bottom-up" approach. Further insight into the information processing problem may be obtained by assuming that it is biases in man's current mode of thought (especially in the case of Western man) which cause such frameworks to be perceived as separate in the first place.

As a theoretical physicist, David Bohm is concerned with the illusory nature of fragmentation (47, 48) and the manner in which distinct fragments emerge from wholeness in movement (49). He sees the perceptual problems with which he deals as being as relevant to a more healthy response to psychosocial fragmentation as to the problems of fundamental physics. The value of Bohm's perspective for understanding healthy individual development has in fact been recently stressed by a physician Larry Dossey (50).

For Bohm: "the widespread pervasive distinctions between people (race, nation, family, profession, etc.), which are now preventing mankind from working together for the common good, and indeed, even for survival, have one of the key factors of their origin in a kind of thought that treats things as inherently divided, disconnected, and 'broken up' into yet smaller constituent parts...considered to be essentially independent and self-existent." (49, xi).

Attempting to live according to the notion that the fragments are really separate is then what leads to the growing series of extremely urgent crises with which society is confronted. "Individually there has developed a widespread feeling of helplessness and despair, in the face of what seems to be an overwhelming mass of disparate social forces, going beyond the control and even the comprehension of the human beings who are caught up in it." (49, p. 2). And yet the seeming practicality and convenience of the process of divisive thinking about things supplies man with "an apparent proof of the correctness of his fragmentary self-world view."

Basing his investigations on insights from the current state of physics, Bohm focuses "on the subtle but crucial role of our general forms of thinking in sustaining fragmentation and in defeating our deepest urges toward wholeness or integrity". (49, p. 3). He arrives at the conclusion that "our general world view is itself an overall movement of thought, which has to be viable in the sense that the totality of activities that flow out of it are generally in harmony, both in themselves and with regard to the whole existence." (49, p. xii). This view implies that "flow is, in some sense, prior to that of the 'things' that can be seen to form and dissolve in this flow". (49, p. 11). Thus the "various patterns that can be abstracted from it have a certain relative autonomy and stability, which is indeed provided for by the universal law of the flowing movement". (49, p. 11).

Of special relevance to the question of human and social development, is that the above-mentioned desirable harmony "is seen to be possible only if the world view itself takes part in an unending process of development, evolution, and unfoldment, which fits as part of the universal process that is the ground of all existence." (49, p. xii). This has the merit of grounding the concept of development in movement from which appropriate conceptual and social forms temporarily arise, rather than, as is presently done, starting from some "thing" (e.g. a society, a community, or a person) which has to be stimulated into a process of movement and change that is then called "development" (under certain conditions).

Bohm cautions against the expectations of quick remedies: "To ask how to end fragmentation and to expect an answer in a few minutes makes even less sense than to ask how to develop a theory as new as Einstein's was when he was working on it, and to expect to be told what in terms of some programme, expressed in terms of formulae or recipes...What is needed, however, is somehow to grasp the overall formative cause of fragmentation, in which content and actual process are seen together, in their wholeness". (49, p. 18).

As he notes, this confronts us with a very difficult challenge: "How are we to think coherently of a single, unbroken, flowing actuality of existence as a whole, containing both thought (consciousness) and external reality as we experience it?" (49, p. x). The approach he suggests requires looking at the challenge in a new way. Instead of aiming for some reflective correspondence between "thought" and "reality as a whole" the process of thinking about reality as a whole can more usefully be thought of as a kind of "dance of the mind" (determining, and being determined) which functions indicatively. (49, p. 55-6).

Bohm explores the implications of quantum theory as an indication of "new order". The questions he raises are also relevant to the emergence of any new psychosocial order. He demonstrates that in the past recognition of new patterns of order has involved attention to "similar differences and different similarities" (49, p. 115), namely the "irrelevance of old differences, and the relevance of new differences" (49, p. 141). The radical transformation of understanding brought about by quantum theory, for example, results from recognition of the way in which modes of observation and of theoretical understanding are related to each other.

For Bohm, however, comprehending the new order bears some resemblance to artistic perception. He uses Piaget's distinction between assimilation (understanding, render comprehensible) and accommodation (adaptation, fitting to a pattern) as the basic modes of intelligent perception. This artistic perception then begins by "observing the whole fact in its full individuality, and then by degree articulates the order that is proper to the assimilation of this fact." (49,p.141) Thus it does not begin with abstract preconceptions as to what the order has to be, which are then "adapted" to the order that is observed.

Bohm uses the differences between a lens system (in measurement processes) and a holographic system to show how by use of the former "scientists were encouraged to extrapolate their ideas and to think that such an (analytical) approach would be relevant and valid no matter how far they went, in all possible conditions, contexts, and degrees of approximation."(49,p.144). The advances in relativity and quantum theory imply, however, an undivided wholeness in which such "analysis into distinct and well-defined parts is no longer relevant." This is best illustrated by the hologram in which a whole pattern is somehow encoded into each part, no matter how small. The new order appropriate to our time could then be conceived as contained as a totality, encoded in some implicit sense into each region of space and time (49,p.149).

He elaborates an entirely new way of understanding order as "implicate", or enfolded, which he contrasts with "explicate" forms that are commonly observed and sought. The simplest example he gives is of a television image, carried by a radio wave in an implicate order, and then explicated by a receiver.

In more general terms, Bohm argues that the underlying wholeness in movement (the "holomovement"), noted above, acts like the radio wave to "carry" an implicate order. Under certain circumstances particular things (objects, phenomena, people, nations) can then be unfolded from this dynamic totality by a perceiver, but the holomovement is not limited in any specifiable way at all. As such it does not conform to any particular order and is essentially undefinable and immeasurable. This means that no single theory can capture or contain phenomena on a permanent basis. Rather, each theory will abstract a certain aspect that is relevant only in some limited context, lifting it temporarily into attention so that it stands out in relief (49,p.151). Furthermore, any new order within which a multiplicity of such aspects are "integrated" is itself not a final goal (as in efforts at "unified science"), but rather part of a movement from which new wholes are continually emerging (49,p.157).

This approach is very helpful in opening up ways of conceiving development and new forms of social order. In providing a mathematical description of implicate order, for example, Bohm makes a useful distinction between: transformation, as a geometric rearrangement within a given explicate order, and metamorphosis, as a much more radical change (such as between a caterpillar and a butterfly) in which everything alters, although "some subtle and highly implicit features remain invariant"(49,p.160). The former characterizes much development thinking, whereas the subtlety of the latter has hitherto made it appear non-operational or equivalent to catastrophe.

Given Atkin's use of simplicial complexes to describe social organization, it is also interesting that Bohm suggests the extension of this technique in terms of "multiplexes" (49,p.166-7). His argument that phenomena need to be perceived as projections of a higher-dimensional reality for which appropriate algebras are required (49,p.188), relates to Thom's concerns with mathematical archetypes (49).

The challenge of Bohm's arguments lies in the manner in which they strike at the very root of the meaning of human and social development. His arguments highlight the extent to which both the physical and social sciences continue to rely on a Cartesian framework (if only in the familiar tabular/matrix presentations characteristic of social science papers) at a time when inherent weaknesses in the thinking behind such frameworks have been demonstrated. His most basic point is that the phenomena such as those which are the preoccupation of "development" (peoples, ideologies, groups, societies) are essentially derivative. "The things that appear to our senses are derivative forms and their true meaning can be seen only when we consider the plenum, in which they are generated and sustained, and into which they must ultimately vanish". (49,p.192) In this light, the basic flaw in present development thinking is the a priori recognition of certain distinct social entities which it now seems desirable to "develop".

It is precisely this conception (as argued on different grounds by the world-system theorists) which reduces development to "sterile" transformative operations and prevents any metamorphoses (to use Bohm's terms). For it is development which precedes and underlies such explicate social entities as a movement from which they have been unfolded: "what is movement" (49,p.203). Metamorphosis thus calls for ways of unfolding new, currently implicate forms from this holomovement, and enfolding into it those which are currently explicate, but are inadequate to the time. This is far removed from mechanistic efforts to "eliminate" undesirable structures and to "build" new ones from their components.

It should not be assumed that this implicate order is an inaccessible theoretical abstraction. Bohm argues that consciousness itself operates by enfolding and unfolding and that "not only is immediate experience best understood in terms of the implicate order, but that thought also is basically to be comprehended in this order". (49,p.204). This creates the possibility for "an unbroken flowing movement from immediate experience to logical thought and back" thus ending the fragmentation characteristic of the absence of any awareness of such movement (49,p.203). He argues that movement is itself sensed primarily in the implicate order and that Piaget's work "supports the notion that the experiencing of the implicate order is fundamentally much more immediate and direct than that of the explicate order, which...requires a complex construction that has to be learned" (49,p.206).

Different languages may thus be understood as different ways of unfolding the implicate order. Atkin's work suggests ways in which the intuitively sensed differences between such unfoldings may be articulated in mathematical terms which are highly relevant to the problems of information transfer in modern society.

**INTERPRETATION OF CROSS-CULTURAL INFORMATION PROCESSING
IMPLICATIONS OF HOFSTEDE STUDY (36)**

Reproduced from (2)

LOW POWER DISTANCE

HIGH POWER DISTANCE

Consequences for information systems

- pluralistic information ("hundred floors blooming")
- involving patterns of information of relatively stable nature
- weak polarization of schools of thought
- stress on equal access to information
- information systems organized to ensure maximum dissemination
- specialized information producers organized for pragmatic purposes

- highly ordered information rapidly categorized
- sudden changes in the manner by which information is ordered
- highly polarized schools of thought, if such polarization is tolerated
- access to information restricted and determined by right to know
- information systems designed to conserve the advantage of the information rich
- if specialized information producers are permitted to organize their organizations tend to be ideologically based and involved in the politics of information.

Consequences for creativity hypothesis formation and paradigm change .

- success of hypotheses stressing equality
- paradigm implying power equalization
- non-reductionist theories
- stability through information exchange

- success of hypotheses stressing stratification
- paradigm implying power polarization
- reductionist theories
- stability through information control

Consequences for organization of information

- less centralization
- flatter category hierarchies and category networks
- smaller proportion of information gate-keepers
- smaller differences in satisfaction from information processing
- high qualification of lower strata of information processors

- more centralization
- deeper category hierarchies
- large proportion of information gate-keepers
- larger differences in satisfaction from information processing
- low qualification of lower strata of information processors

LOW UNCERTAINTY AVOIDANCE

HIGH UNCERTAINTY AVOIDANCE

Consequences for information policies

- | | |
|---|--|
| <ul style="list-style-type: none">- slower information explosion- weaker boundaries between disciplines- less aggressiveness towards other disciplines- less cohesive bodies of knowledge- stronger recognition of individual information processing competence- more tolerance of dissenting and "alternative" theories- positive administrative attitudes towards information policies- ad hoc approach to methodological issues | <ul style="list-style-type: none">- faster information explosion- well-defined boundaries between disciplines- more aggressiveness towards other disciplines- more cohesive bodies of knowledge- greater dependence on authorities for information processing- less tolerance of dissenting and "alternative" theories- negative administrative attitude towards information policies- more elaborate methodology |
|---|--|

Consequences for creativity, hypothesis formation and paradigm change

- | | |
|--|---|
| <ul style="list-style-type: none">- either no general paradigm or more defacto tolerance of alternative views- pragmatic or introvert, meditative paradigms- relativism- practical contributions to knowledge- empiricism in social sciences- pragmatic information fashionable | <ul style="list-style-type: none">- paradigm more intolerant of dissenting views- activist paradigms- search for absolutes- theoretical contributions to knowledge- theoreticism in social sciences- ideological information fashionable |
|--|---|

Consequences for organization of information

- | | |
|--|---|
| <ul style="list-style-type: none">- less structuring of information activities- power explicit rules- more generalists or amateurs- variety of approaches to organization of information- information managers more involved in strategy- information managers more flexible in style and willing to make individual and risky decisions- high turnover in information processors- more ambitious information processors- less power through control of uncertainty- less ritual behaviour in relation to information | <ul style="list-style-type: none">- more structuring of information activities- more explicit rules- larger number of specialists- preference for standardized organization of information of uniform style- information managers more involved in detail- information managers more consistent in style and less willing to make individual and risky decisions- lower turnover in information processors- less ambitious information processors- more power through control of uncertainty- more ritual behaviour in relation to information |
|--|---|

Consequences for creativity, hypothesis formation and paradigm change

- | | |
|--|--|
| <ul style="list-style-type: none">- collective conversions to a new perspective- empathy for the flows and patterns of information in the environment- emphasis on traditional perspectives, and approaches to information | <ul style="list-style-type: none">- individual conversions to a new perspective- individualistic personal reaction to the information context- encouragement of the independent information operator and innovator |
|--|--|

Consequences for information organization

- | | |
|--|--|
| <ul style="list-style-type: none">- individuals associated with information organization primarily for moral reasons- individuals expect to be supported permanently within the information context or discipline environment to which they give their loyalty- the organization of the information context has great influence on the individuals sense of well-being | <ul style="list-style-type: none">- individuals associated with information organization primarily for opportunistic reasons- information contexts are not expected to provide permanent support for individuals operating within them- the organization of the information context has only moderate influence on the individual's well-being |
|--|--|

LOW POLARIZATION

HIGH POLARIZATION

Consequences for information policies

- emphasis on a polarized perspective is neither socially nor materially awarded
- adaptation-oriented educational system
- greater benevolence toward the disadvantaged, including the third world
- preservation of balance of perspectives perceived as of greater importance than the advancement of most productive perspectives
- small-scale information projects fashionable
- polarized perspectives presented and developed within the same information context
- polarized perspectives can be equally productive
- less segregation of polarized perspectives within information contexts
- successful enhancement of one polarized position at the expense of the other is rewarded
- performance-oriented education system
- less benevolence toward the disadvantaged, including the third world
- advancement of most productive perspective perceived as of greater importance than balance perspectives
- large-scale information projects fashionable
- polarized perspectives presented and developed within different information contexts
- in the case of polarized perspectives, one is viewed as productive and the other as supportive or decorative
- in the case of polarized perspectives, some information contexts only consider one of the perspectives admissible.

Consequences for creativity, hypothesis formation and paradigm change

- conceptual innovation accepted as resulting from either pole of a polarized perspective
- empathy with subtle patterns of thinking
- recognition of complementary value of opposing perspectives
- moderated expression of repressed perspectives
- conceptual innovation normally expected to result from the dominant pole of a polarized perspective
- empathy with strong and uncompromising perspectives
- greater value accorded to the dominant position in a polarized perspective
- aggressive expression of repressed perspectives

Consequences for information organization

- perspectives, whether asserted or not, are not necessarily expected to have a significant impact and do not expect to be viewed as a failure if they do not
- the information context is not expected to interfere with the development of individual perspectives
- in the case of a polarized perspective both are expected to occupy positions of significance in the information context
- less conflict between perspectives
- the appeal of reorganization of information is perceived to lie in the increased integration of the range of perspectives so grouped.
- any perspective asserted is expected to have a significant impact on the information impact on the information contrast or be viewed as a failure
- the interests of the information context are a legitimate reason for interfering with the development of individual perspectives
- in the case of a polarized perspective, the non-dominant perspective is not expected to occupy many positions of significance in the information
- greater conflict between perspectives
- the appeal of reorganization of information is perceived to lie in the additional opportunities offered to individual perspectives

LOW INDIVIDUALISM

HIGH INDIVIDUALISM

Consequences for information policies

- information ordered for user-community
 - stimulus to information production in information rich societies
 - unbalanced distributions of information
 - less mobility between bodies of knowledge
 - unequal benefits in different sectors from information processing
 - more restrictions on public information and the media
 - potentially repressive information policies
 - organization of information producers
 - individuals expect to be protected and defended by the information context to which they adhere
 - policies and practices based on loyalty and sense of duty to the information context
 - access to positions of greater power within the information context dependent upon seniority within that context
 - less concern with fashionable approaches to information organization
 - policies and practices within the information context adjusted to the circumstances of the individual
- information ordered for society at large
 - reduced information production once a certain information threshold has been reached
 - balanced distributions of information
 - greater mobility between bodies of knowledge
 - equal benefits in different sectors from information processing
 - fewer restrictions on public information and the media
 - dissemination of socially disruptive information
 - disorganization of information producers
 - individuals are not expected to depend on the information context to protect their interests
 - policies and practices allowing for individual initiative in relation to the information context
 - access to positions of greater power within the information context dependent upon competence and not restricted to those within the context
 - sensitive to fashionable innovations in approaches to the organization of information
 - policies and practices applied without adjustment for special cases

FIGURE 1

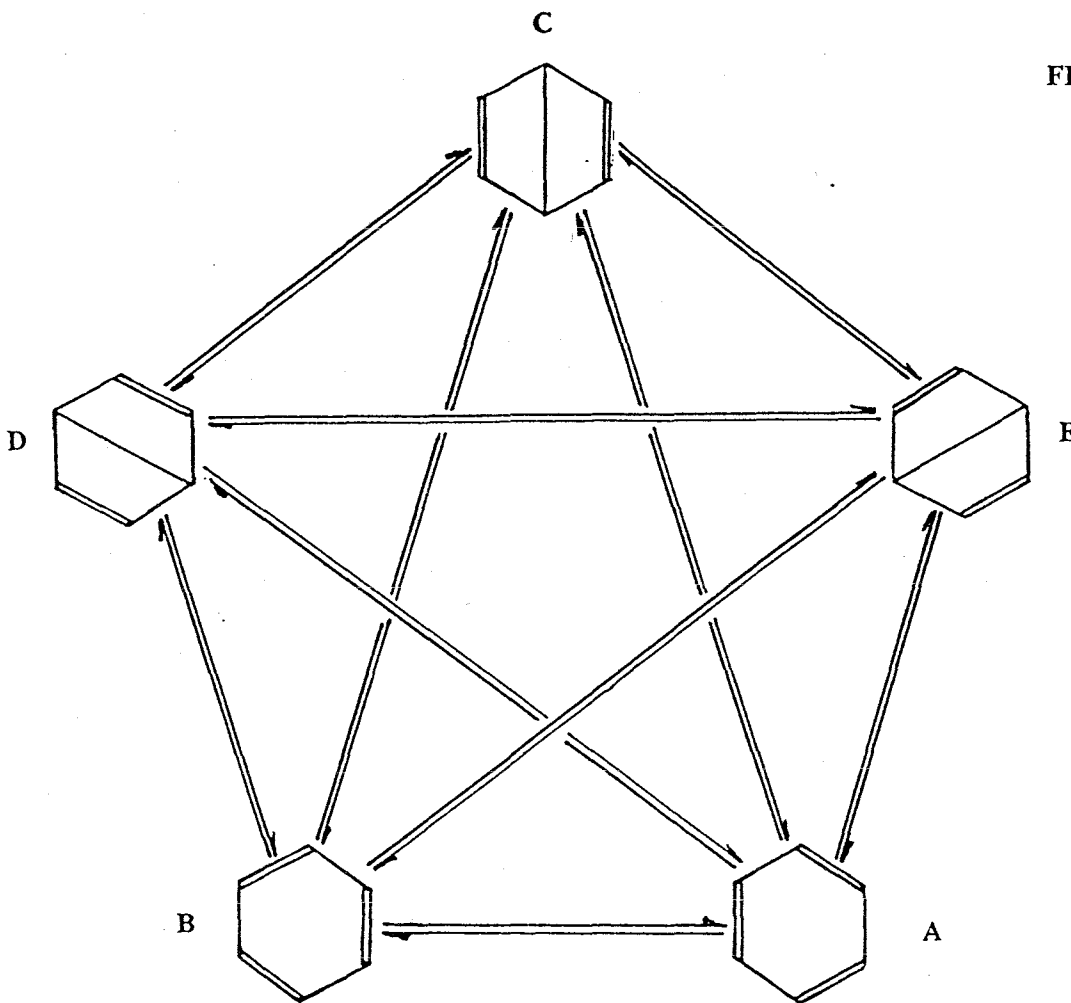


Figure 1. Resonance hybrid: an illustration of variable organizational geometry.

Some chemical molecules cannot be satisfactorily described by a single configuration of bonded atoms. The theory of resonance is concerned with the representation of such molecules by a dynamic combination of several alternative structures, rather than by any one of them alone. The molecule is then conceived as "resonating" among the several structures and is said to be a "resonance hybrid" of them. The classic example is the benzene molecule (represented above) with 6 carbon atoms. This is one of the basic components of many larger molecules essential to life. Its cyclic form only became credible when Kekulé showed that it oscillated between structures A and B. Linus Pauling later showed that it is fact alternatives between all five forms above (and as such requires less energy than for any one of them alone).

This concept can be used in designing, describing or operating organizations, especially fragile coalitions or volatile meetings. It may provide a key to the "marriage" between hierarchies and networks. It could also be used to interrelate alternative definitions (or theories, paradigms, policies, etc), especially where none of them is completely satisfactory in isolation. The underlying significance then emerges through the resonance between the set of alternatives.

In one of three sets of alternatives in Figure 3, for example, each individual alternative can be usefully perceived as dynamically related to the others in the set. The set thus constitutes a resonance hybrid. Each alternative embodies an aspect of the significance of the whole, but more fundamental significance is embodied in the pattern of transformations between them, as exemplified in inter-species relations in the natural environment.

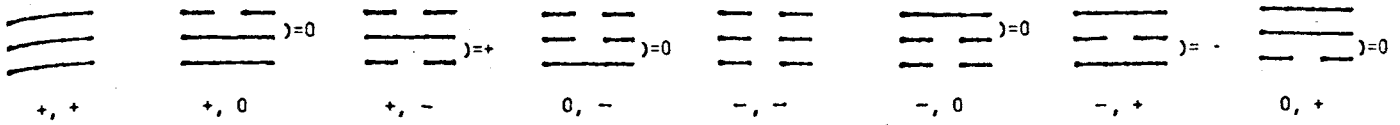
Some organization management implications of similar conceptual structures have been explored in practice by Saul Kuchinsky who, for example, indicates the management significance that can be attached to each of the arrows in such a diagram (51, p.14).

(Reproduced from Encyclopedia of World Problems and Human Potential (4).)

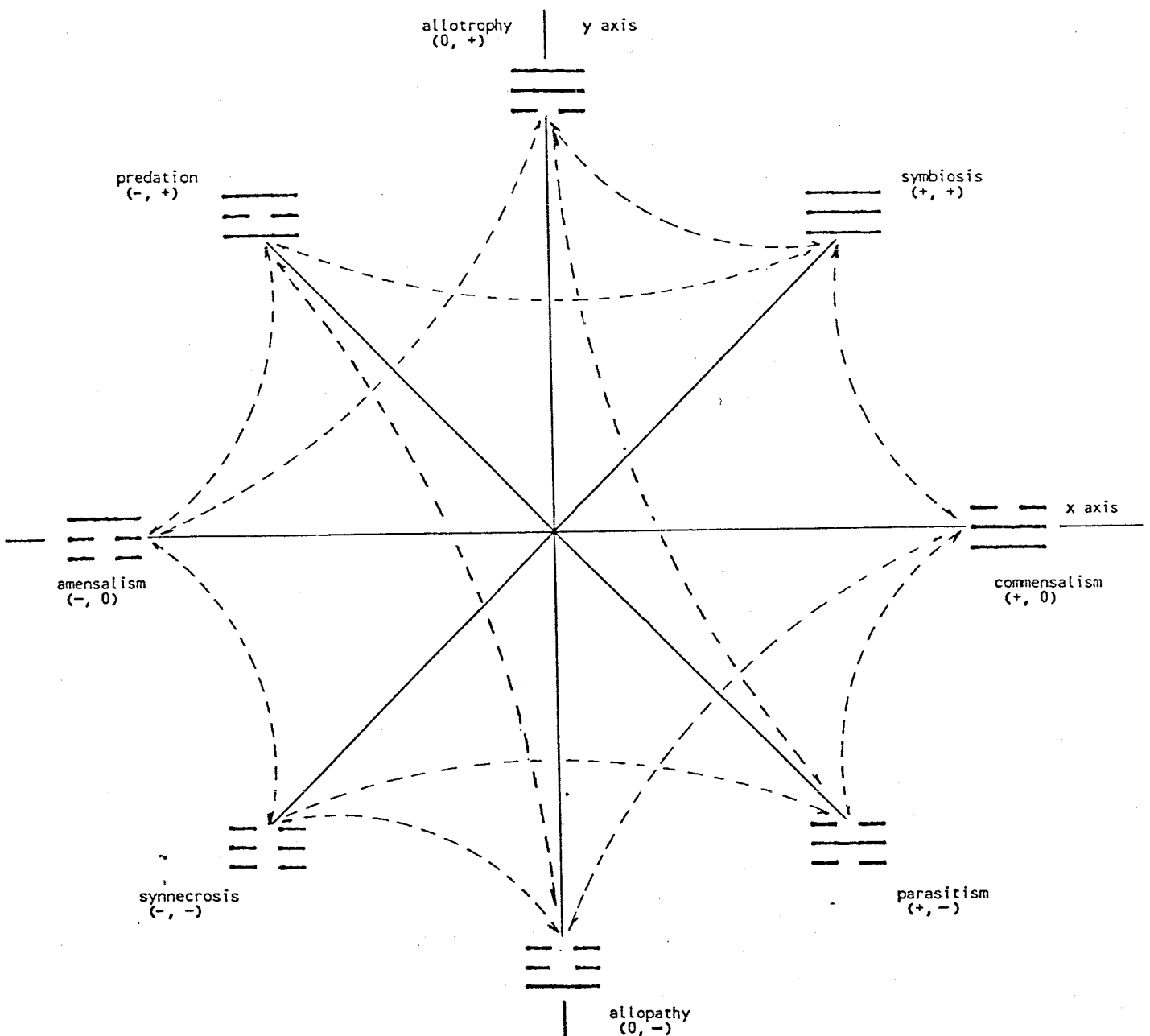
FIGURE 2

Figure 2. Relation between distinctions established with a Cartesian coordinate (x, y) system and a Chinese trigram system, namely between a typical Western linear coding system and a typical Eastern holistic system. Dashed lines in the figure indicate transformation pathways between different conditions involving minimal change (i.e. one trigram line only).

(Reproduced from Encyclopedia of World Problems and Human Potential (4).)



- Convention: (a) y = dependent variable = superior line; x = independent variable = inferior line;
 (b) full line = positive value; broken line = negative value;
 (c) when superior line and inferior line are of different value, middle line neutralizes value of the line which is of opposite value;
 (d) when superior line and inferior line are of same value, different from middle line, the value of the middle line takes precedence over the inferior line.



- Applications: (a) Cybernetic system: x = work function; y = control function;
 (b) Ecosystem: x = subordinate species; y = dominant species;
 (c) Cognitive consonance/dissonance: x = communicant; y = communicator

When applied to the relationships between languages to represent consonance/dissonance at 3 levels, the component lines have the following significance:
 superior line = semantics/intent; middle line = style/concept; lower line = syntax/form

FIGURE 3

Figure 3. Relation between distinct approaches as applied to organizations.

(Reproduced from Encyclopedia of World Problems and Human Potential (4).)

		Constructive or Positive image ("A")	Destructive or Negative image ("Not-A")	Alternatives distinguished
Symbol		—	— —	
2-LINE SYMBOL	Superior line — "A"	Consensus, unity, order, agreement, integration, coordination, solidarity, harmony, centralization ("A")	Excessive order, conformity, rigidity, exclusiveness, dogmatism, intolerance, monopoly, etc. ("Neither A nor Not-A")	4 alternatives (as indicated)
	Inferior line — — "Not-A"	Diversity, creative variety, coexistence, mutual tolerance, cross-fertilization, exploration of alternatives ("Both A and Not-A")	Disagreement, fragmentation, chaos, dissent, revolt, duplication, dissipation of effort, etc. ("Not-A")	
3-LINE SYMBOL	Superior line	Integrated objectives or worldviews	Fragmented objectives or worldviews	8 alternatives (obtained by combining positive or negative possibilities for each of the three lines. See Figure 1)
	Middle line	Integrated policies or methodologies	Fragmented policies or methodologies	
	Inferior line	Integrated practices, actions or institutional structures	Fragmented practices, actions or institutional structures	
6-LINE SYMBOL	Superior line pair — — —	Creatively integrated objectives or worldviews	Rigidly integrated objectives or worldviews	64 alternatives (obtained by combining together one of the four possibilities for each pair to make a 6-line symbol) e.g. —)= Complement. objectives)= Unrelated)= policies)= Coexistence)= of action alternatives
	Middle line pair — — —	Creatively integrated policies or methodologies	Rigidly integrated policies or methodologies	
	Inferior line pair — — —	Creatively integrated actions or institutional structures	Rigidly integrated actions or institutional structures	
	Superior line pair — — — —	Complementary independent objectives or worldviews	Chaotically unrelated objectives or worldviews	
	Middle line pair — — — —	Complementary independent policies or methodologies	Chaotically unrelated policies or methodologies	
	Inferior line pair — — — —	Complementary independent practices, actions, structure	Chaotically unrelated actions practices and structures	

FIGURE 4

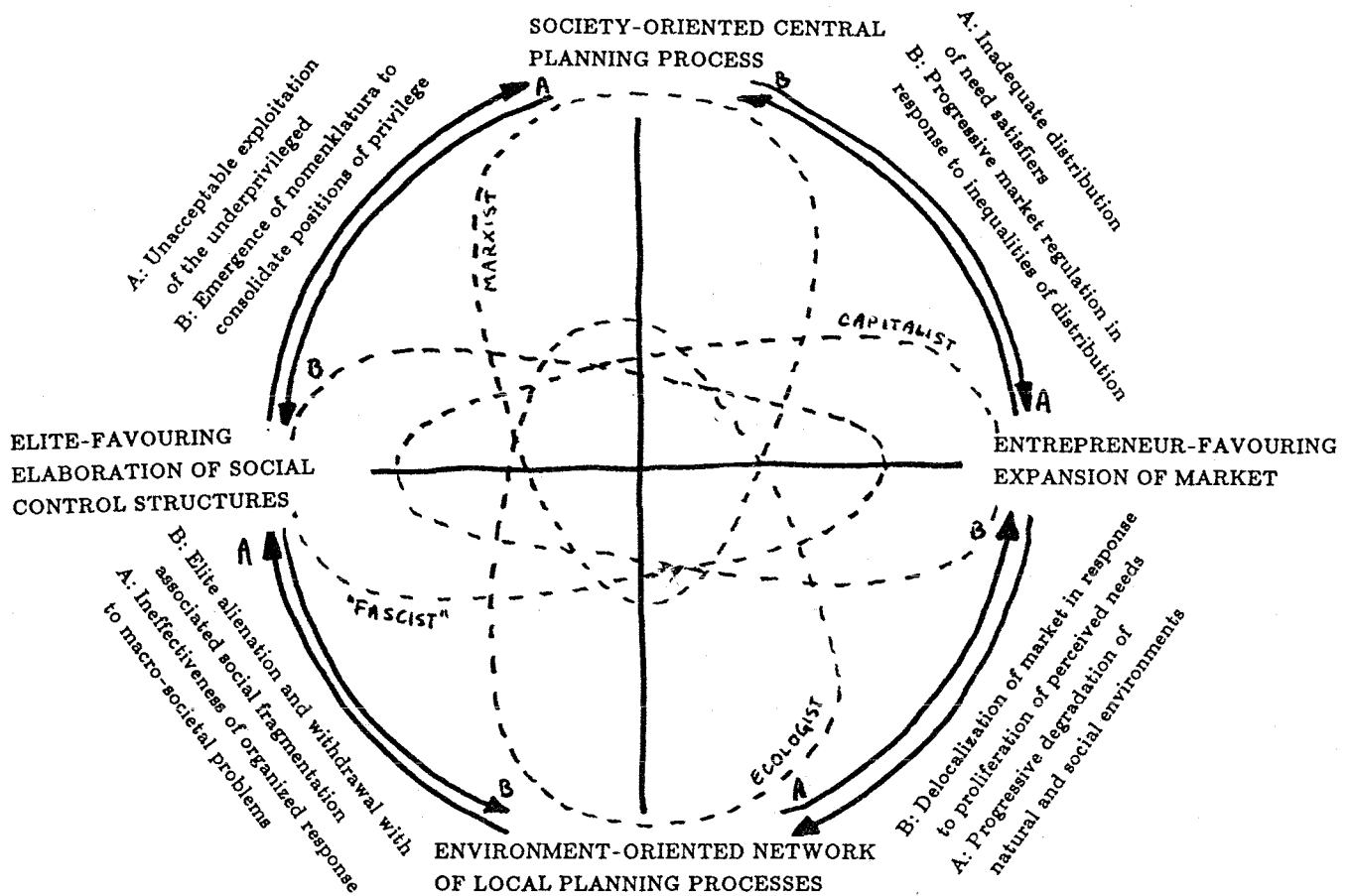


Figure 4. Simplistic 4-phase model of counter-flowing policy cycles

Phases characterize extreme policy options. An indication is given of destabilizing dilemmas from which each arises and to which each is continually vulnerable. A "comprehensive" policy must necessarily respond to these dilemmas one after the other in the characteristic crisis-management mode of politics. In the art of politics this is achieved by appearing to shift priorities so as to "please all in turn", if only in the short-term to get through the crisis. The cycle of such token shifts might be usefully indicated by the broken-line ellipse shown for each extreme policy. The eccentricity and orientation of such an elliptical orbit then indicates the extent to which it appears to embody the concerns of the other policy extremes. The shape of such priority orbits could be used as an indication of the relative amount of recognition accorded to corrective policies required at each stage in the cycle in order to ensure the continuity of a coherent policy. Such orbits are necessarily meta-stable and unable in the long-term to counteract the inherent weakness of the policy extreme on which they are based. Long-term development then results from societal learning transitions to new priority orbits based on a different portion of the overall cycle of extant policies. The appropriateness of such development may increase to the extent that the number of policy phases increases (e.g. 5 or 12 possible policy emphases), to the extent that the priority orbits become less eccentric, and to the extent that a more complex rhythm orders the transition between the phases.

(Adapted from an earlier version in (46).)

Figure 5. Position of 40 countries on scales of "Power distance" and "Uncertainty avoidance".

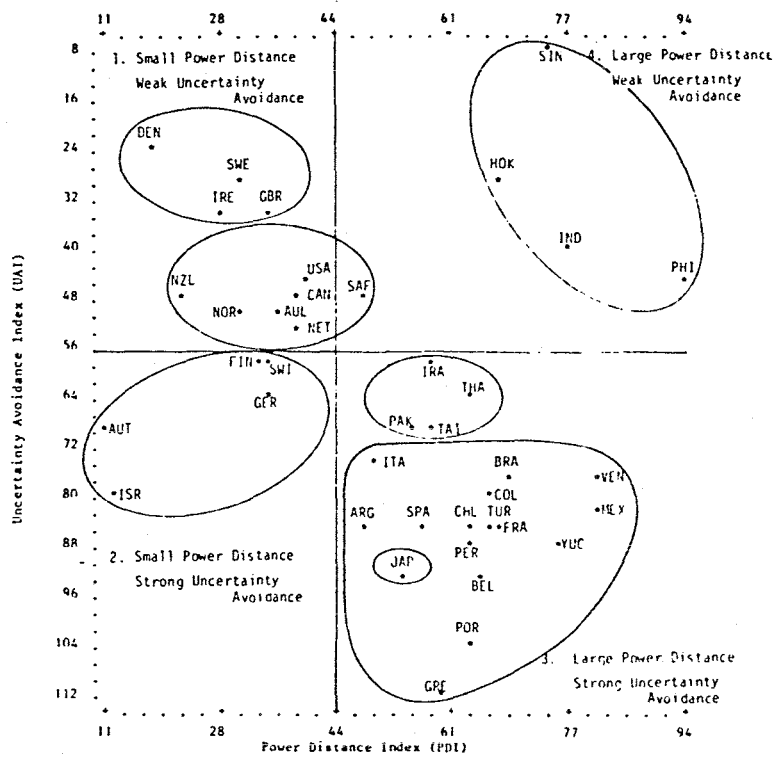
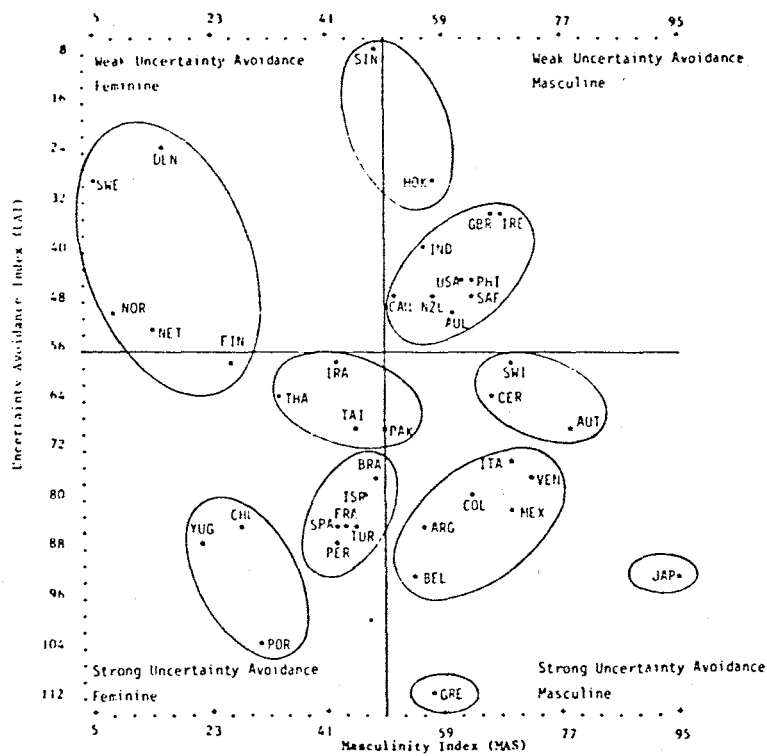


Figure 6. Position of 40 countries on scales of "Uncertainty avoidance" and "Masculinity".

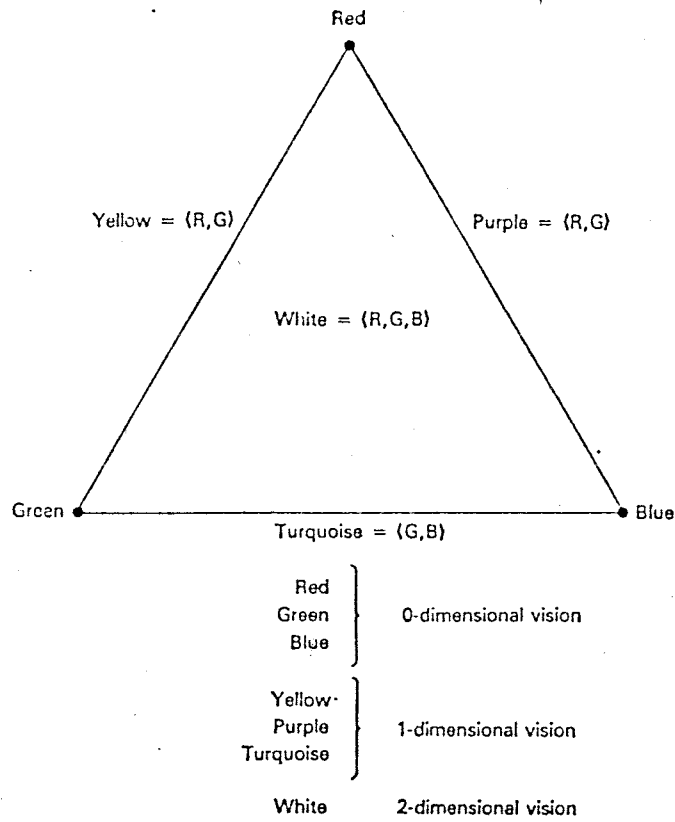


(Reproduced from Geert Hofstede: Cultures' Consequences: international differences in work related values (36).)

FIGURE 7

Figure 7. Colour triangle illustration of relationship between different languages and between languages capable of handling different degrees of complexity.

(Triangle reproduced from Ron Aitkin: *Multidimensional Man* (39).)



Time-binding learning Space-binding learning		Unconscious (In-volution)	Unconscious registration of information	Homeostatic equilibrium Unconscious adaptation	Auto-catalytic response Self-impulsion	Uncoordinated action Victim of discontinuity
		Conscious (Re-volution)	Timeless awareness Non-duration	Conscious adaptive response Awareness	Comparison with norms or memory of previous experience Self-awareness	Comparison with previous comparisons Awareness of self-awareness Transcended discontinuity
Unconscious (In-volution)	Conscious (Re-volution)	Symbol	T^0	T^{-1}	T^{-2}	T^{-3}
Unintended shift of - perspective - position - reference Displacement of focus	Intentional shift of - perspective - position - reference Range of conscious attention span "Distance" from object of focus	M^0L Acts Abstract Schematic	L Observation; act of considering; position determination; reactive learning based on immediate registration of phenomena; assessment of distance; "sizing up"	L/T Adaptive change; reaction; passive adaptation or change of position in response to changing circumstances	L/T^2 Spontaneous initiation of transformative action; commitment to a new course of action,	L/T^3 Control of transformative action
Unconscious impression of significance	(See MLT^0)	ML States Motivated Considered	ML Recognition of moment(ousness), relevance (as related to leverage), significance (as in "matters of great moment") weight of facts; bringing matters into focus	ML/T Recognition of the momentum (of an issue) resulting from a change, namely the consequential transformation of awareness or perspective	ML/T^2 Forcefulness engendered, experienced or embodied as a result of transformative action; constructive (or disruptive) action potential; enhanced sense of being	ML/T^3 Establishment of disciplined pattern of response; consolidated or harmonious control of action potential; holding forces in check
Subject to an unintended shift of perspective	Projection of an intended shift of perspective into reality	ML^2 Relationships Application Follow-through Commitment	ML^2 Faith in current paradigm or perception of reality; unexamined or habitual commitment to a process projection, or understanding, irrespective of inconsistent disturbing factors	ML^2/T Decision or impulse to act or initiate a process determining the future	ML^2/T^2 Achievement of a desired result by application of understanding (and adjustment of implicit beliefs) in response to external factors; working action on reality	ML^2/T^3 Power of acquired knowledge know-how; integrated or embodied experience; capacity (including that of not acting); non-action
Unexplained problems Imponderables External constraints	Mass of information Amassed experience Internal constraints Mass of evidence "Matter of fact"	M				

Figure 8. Tentative characteristics of phases in 12-phase learning/action cycles.

(Reproduced from Encyclopedia of World Problems and Human Potential (4).)

(Adapted and developed from Young (44).)