# NETWORKING ALTERNATION



This paper discusses a procedure for interpreting the texts the Chinese Book of Changes as a pattern of insights into transformation of organizational policies. The exercise has been applied to the self-management of networks because of the guidelines it apparently offers to counteract the weaknesses currently experienced in network operations. It could equally be applied to organizations, meetings or communities.

The results of the exercise are given in the Annex (pages 217-230). The diagrams on page 210 and 211 provide a map of the transformation and an index to the Annex.

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# NETWORKING ALTERNATION

*– an alternation network of 384 pathways of organizational transformation interpreted for networks in the light of the Chinese **Book of Changes***

**Part I**

## Introduction

This exercise is concerned with change and with the development of better ways of responding to its possibilities in various forms of socially organized activity. The exercise has only been applied to networks but, as will be seen, it could just as well be applied to **groups, organizations, meetings** or intentional **communities,** in each of which very similar challenges are faced.

1. **Networks** Networks and networking have become extremely fashionable over the past decade, even within the intergovernmental community, as a means of circumventing weaknesses perceived in conventional styles of organization. But in practice networks themselves have failed to live up to the hopes placed in them, despite their positive image and the appearance of enthusiastic publications in support of that image (1,2).
An example of such unbridled optimism is the following : « Just as bureaucracy is less than the sum of its parts, a network is many times greater than the sum of its parts. This is a source of power never before tapped in history : multiple self-sufficient social movements linked for a whole array of goals whose accomplishment would transform every aspect of contemporary life... most people don't see them – or think they are conspiracies ». (2, p.236)
The kinds of criticism that can be made are that :
(a) in some cases « network » is merely used as a substitute for what previously functioned with limited effectiveness under the name of « club » or « group »;
(b) networking tends to function by filtering out conflict and opposition and thus is ill-equipped to interrelate a diversity of perspectives, many of which may involve fundamantal disagreements (sometimes manageable by hierarchies in an « objectionable » manner);
(c) the informal strengths of networks have been transformed into weakneses through rejection of any form of compensatory self-discipline; networks tend to become « flabby » and subject to a variety of « networking diseases ». (3)
(d) networks tend to function as temporary vehicles for enthusiasm and are frequently abandoned as soon as unpleasant realities have to be faced;
(e) the networking philosophy is often geared to that of « positive thinking » which negates the possibilitiy of criticism and especially self-criticism, thus hindering collective learning for the development of the network.
The question is then whether there are any clues to ways of « tensing » networks to correct such tendencies (4). **What can be done to prevent the energy from draining out of networks ?** One approach has been discussed under the heading of « tensegrity organization » as a hybrid « marriage » between networks and hierarchies (5).
A related approach is to assume that networks fail to contain problems because they are effectively out-manoevered by the dynamics of such problems. As in the martial arts, a network must swiftly re-order its conceptual and organizational resources to keep up with shape-shifting and hydra-like transformations of the problematique. **The network may need to alternate between several modes of action and conception in order to respond effectively** (6, 7). If this is the case **how can we come to recognize the pattern of transformation pathways of which the network needs to be aware ?**

2. **Groups and organizations :** Clearly groups and organizations also need to be aware of the transformational pathways they may have to use to be able to contain problems effectively. Like networks, which are anyway a more loosely ordered form of organization, they may need to alternate between several modes of action or conception.

3. **Meetings :** Conferences have been usefully perceived as temporary organizations. In many ways they also resemble networks. They too tend to fail to live up to the expectations placed in them, especially with respect to response to the world problematique. As with networks, the significance tends to leak out of them, leaving the problems unaffected. There is little collective awareness of the transfornational and organizational dynamics of the problematique (8).

4. **Intentional communities :** The past decades have seen many attempts to establish intentional communities. Many have broken up because of inability to order their dynamics satisfactorily. Such « alternative » communities combine many of the features of networks, groups, organizations and meetings. As such they are faced with many of the same difficulties.

## Chinese insights

It is debateable whether Western-style organization has reached the limits of its ability to improve its « effectiveness ». Even if this is not the case, it is possible that new insights can be derived from non-Western approaches, as is indicated by the current Western concern with the art of Japanese management. These would have the merit of breaking out of the currently criticized constraints of « eurocentric » modes of thought (9, 10, 11) that have been largely responsible for networking as it is presently known.
For example, the above challenge can be usefully clarified by an exercise in adapting the insights of ***The Book of Changes,*** otherwise known as the ***I Ching*** (12). This has been a major influence on Chinese thinking for 3,000 years, providing a common source for both Confucian and Taoist philosphy. As noted by R G H Siu : « For centuries, the ***I Ching*** has served as a principal guide in China on how to govern a country, organize an enterprise, deal with people, conduct oneself under difficult conditions, and contemplate the future. It has been studied carefully by philosophers like Confucius and men of the world like Mao Tse-tung » (13). For this reason the popularity of its (ab)use as an oracle should not be confused with the philosophy and insight embodied in its structure.
With the benediction of C G Jung (12), it has achieved wide popularity in the West over the past decades, inspiring many who have attempted to develop the practice of networking. Part of the merit of the book, as its title indicates, is that it purports to indicate complete patterns of changes, one of which has 384 **pathways** between 64 **conditions** that are recognizable both in an individual and in society. These insights have hitherto been interpreted in terms of the needs of the individual (of whatever degree of influence in society). Although basically they are addressed to the condition of any social entity, they have not been applied to organizations as such. Thus even though R G H Siu, cited above as one of the commentators on the ***I Ching,*** has managerial interests in addition to his research role as a biochemist at the Massachusetts Institute of Technology (MIT), his commentary is addressed to the individual.
It is interesting to note that not only did MIT publish his commentary, it also published a study by Siu on the nature of « Ch'i » (14). This is the psychic energy that an individual can accumulate according to neo-taoist philosphy. It may also be useful to conceive of it as the kind of « en-

ergy » which leaks out of networks or meetings when they fail to enter appropriately into the dynamics of change and development.

## Interpretative exercise

The structure of the ***I Ching*** is based on 64 **conditions** (dynamic situations, perspectives, challenges, phases, or modes of action or conception) with which an entity may be faced. The underlying scheme is based on sets of 2 or 8 more fundamental conditions. The series could be expanded geometrically to 128, 256, 512 or more conditions. But as Siu notes : « The originators of the ***I Ching*** judiciously stopped at the practical limit of sixty-four. This number constitutes a classification sufficiently fine so as to provide useful types of situations, against which specific cases can be matched. Yet the subdivisions are not so numerous as to be too cumbersome for a single scheme » (13, p. 3). For each of the 64 conditions there are six possible **sub-conditions** (behavioural responses) on which statements are also provided.

The text of ***The Book of Changes*** is often written in a notoriously subtle and poetic style. This in no way precludes an interpretation of its significance for organizations or, more specifically, for networks. Such an interpretation has therefore been undertaken as an exercise in the following pages (*). By making the interpretation specific to networks, there is clearly a loss of generality, but this is compensated by a reduction in ambiguity. Subsequent evaluation will show whether this constitutes an unfortunate degree of distortion of the original insights.

The interpretation given is as faithful to the texts of the Richard Wilhelm translation (12) as seemed feasible. Some of the condition names have been adapted from those suggested by Siu (13). Hopefully this exercise will encourage others to produce a more helpful interpretation.

No extraneous insights have been introduced. In elaborating each statement the basic constraint was that it should be **briefly** formulated with respect to a « network » and that any terms used should be credible in a networking context. It is debateable whether the texts should instead have been focussed on a « group » or « organization » or even a « conference »; although this might have made them of more general interest. A somewhat similar procedure has been used in an exercise in generating a « Universal Declaration of Rights of Human Organization » from the articles of the « Universal Declaration of Human Rights » (15).

The formulation of the statements here can be criticized because the orientation is not always consistent. In some cases they are formulated as injunctions as to what the network « should » do. In other cases they are formulated in terms of explanations as to the probable consequences of the network acting in a certain manner. Or else they are expressed in terms of what the network « could » or « might » do. The original texts place the burden of choosing between such interpretations on the reader.

It is important to recognize that the original text permits a complex of interpretations, encouraged by the nature of the Chinese language. For each condition the central meaning is underdefined, although clearly delimited by a complex of connotations based on terms that « alternate » subtly in meaning between emphasis on : abstract or concrete; operator or operand; noun or verb; action or actor; problem or opportunity. Any word can often be beneficially replaced by a synonym or an alternative grammatical form. Quite distinct conditions may acquire apparent similarity as a result of the specificity of the words finally chosen – a choice that amounts to a « frozen » distortion of the connotation dynamics by which the underlying meaning is embodied (see insert on « Resonance hybrids »). The (undeterministic) significance in fact emerges through alternation of attention between the possible (deterministic) interpretations – in sympathy with the theme of this paper (see also ref. 7 ).

An exercise of this kind is therefore rather like attempting to « tune » a « semantic piano » in order to distinguish meanings effectively, even though no one tuning system can satisfactorily bring out all the possible relationships between the connotations (*). Longer interpretations may offer greater clarity, as in those of Wilhelm (12) or Siu (13). Needless to say, as an exercise by one person, the results given here for networks call for further « tuning » and should therefore be viewed with reservation. Furthermore, it should be noted that the presentation given here does not do justice to the more sophisticated relationships embedded in the structure of the ***I Ching.***

## Transformation pathways

It is the network of 384 transformation pathways between the 64 conditions into which an entity can supposedly get « trapped » that is perhaps the most interesting feature of this exercise.

In the following pages each of the 64 numbered conditions is briefly described, accompanied in each case by descriptions of 6 possible transformation pathways from that condition. These may also be understood as the possible « levels » of skill with which that condition can be faced. **The number following each transformation possibility indicates the new condition with which the network is then purportedly faced.** It should be emphasized however that these are merely the high probability transformation pathways. Another set of pathways given here is that of the actual sequence of the numbered conditions. The « acausal » reason for each such transformation is given in italics at the end of each condition on the basis of one of the classic commentaries on the sequence (12). Read separately, **the italic text constitutes an interesting acausal cycle,** with many links of immediately comprehensible relevance to current world conditions (e.g. progress-decline-community (35 to 37), adversity-basic need-revolution (47 to 49), or liberation-deficiency-aid (40 to 42).

If in a particular condition the network engages in lower probability multiple transformations the result is not apparent here, although ***The Book of Changes*** does employ a binary coding system from which this can be determined without ambiguity (*).

The range of possible transformation pathways encoded in this way is of great value in the light of contemporary efforts to grasp the nature of change in relation to human and social development.

## Contrasting exercises

As a work of political philosophy, it is useful to contrast interpretations of the ***I Ching*** with an early Western equivalent, namely Machiavelli's ***The Prince*** (16). Both provide recommendations to rulers, but the ***I Ching*** also adapts its recommendations to the initiatives of the ruled. ***The Prince*** has been severely criticized (often inappropriately, given the instabilities of its historical context), because of the distinctly undemocratic values of the princes for whom it was designed. In contrast, built into the ***I Ching*** is the progressive discovery of « superior values », however these are to be understood by the user.

As with Machiavelli's advice, the networking precepts from the ***I Ching*** could prove as valuable to the « ill-intentioned » as to the « well-intentioned ». It would be interesting to compare the precepts given here with those in the network operations manuals of intelligence services and revolutionary groups, given their respective understanding of « superior values ». It is worth noting that another set of 394 Chinese precepts, in Sun Tzu's classic ***The Art of War,*** has received considerable attention in modern military academies (17). It is based on the principle that it is the supreme art of war to subdue the enemy without fighting. Contemporary students of organizational life have also benefited from an adaptation of Machiavelli's insights by Antony Jay to the management of corporations (18).

Organization sociologists do not appear to have had the ambition (or the presumption) to attempt such a transformation map. Although in 1958 March and Simon published a study, now a classic, tracing parts of what might have become such a map (19). This does not appear to have been followed up. Literature reviews have since resulted in the production of « inventories » of concepts for organization effectiveness, as in that of J L. Price (20)

(*) Part II, containing Conditions 35 to 64, will appear in the next issue.

(*) Valuable insights into the nature of this semantic problem, given the possibilities of alternative tuning systems, can be found in the works of E G McClain (31, 32). An earlier experiment focussed on « tuning » interrelated cross-cultural concept sets having from 2 to 20 statements each (33).

(*) Leibniz is reported to have been influenced in the 17th century by the binary code of the *I Ching*, which could therefore be said to have influenced the design of modern computers. The striking relationship to the genetic coding system has also been explored (34).

with 31 propositions, or more recently in that of D H and B L Smith with approximately 400 concrete suggestions, especially for voluntary associations (21).
Of special interest is the exercise of Edward de Bono who has produced an **Atlas of Management Thinking** (see insert). This identifies 200 functions or « complex situations » which bear a striking resemblance to those derived from the **I Ching.**
The Western managerial sciences have given rise to many treatises on problem solving in organizations. One of the originators of systems science, Russel Ackoff, has condensed his understanding of the art of problem solving into 34 « fables » (22). Semi-humorous insights have also emerged in the form of numerous « laws » (Parson, Peter, etc), culminating in their synthesis in John Gall's 32 « axioms » in ***Systemantics*** (23). Another semi-humorous approach, inspired by the holds and positions in the martial arts, is that of Thierry Gaudin who has identified 21 institutional « katas » (24). It is appropriate to note that the control of « ch'i », mentioned earlier, is basic to the Eastern martial arts.
Western efforts to provide (world) systems models of the interrelationships between socio-political conditions fo societies (as opposed to socio-economic conditions) have been modest and of limited success (*), compared to the preferences for lengthy textual discourses of which Machiavelli's is an early form. It is therefore surprising to note that in the East a number of societies have produced religiously-inspired board games with squares denoting value-based psychosocial conditions, linked by a variety of transformation pathways, in a manner similar to systems flow charts. Precepts (possibly embodied in chants) are associated with the definition of each condition and the developmental challenge it constitutes. Examples are : a Tibetan game (72 conditions) with a Bhutanese version (64 + 13 conditions) and a Nepalese version (25); a Korean game (169 conditions) and a Hindu equivalent (72 conditions), supposedly the prototype of Western « snakes and ladders » (26). It has been argued that the similarity between such games provides « the most perfect existing evidence of the underlying foundation of mythic concepts upon which so much of the fabric of our culture is built » (27).
Directly relevant to networking itself is the effort of Network Research (Denver) to produce a basic set of 5 rules of ***The Networking Game*** (28). These reflect the practical recommendations which have emerged from Western insights into the art of at least one form of networking. Academic work on social networks tends to be concerned with descriptive analysis rather than with any attempt to empower such networks to act more effectively. Intergovernmental bodies, such as the United Nations University, with a declared commitment to a network mode of action, have not yet elaborated any such set of guidelines.

(*) For a recent general review, see J M Richardson jr (35), reporting in a special issue on « Models – tools for shaping reality, as well as reference 36.

## Alternation

The vital point that emerges from this Chinese perspective is that it is not sufficient to conceive of organizational conditions in isolation, as is the prevalent tendency among Western networkers. The processes of change in which a network is embedded, or to which it responds, require that the network consider itself in a state of transience within a set of potential conditions. It courts disaster if it attempts to « stick » to one condition such as « peace ». If the dynamics of problem networks are not being contained by present strategies, as would appear to be the case, then organizational self-satisfaction is a recipe for the disaster-prone or the ineffectual. It creates a false sense of security. **Any condition may be right temporarily, none is right permanently (*).**
**A network must continually « alternate » its stance within the network of transformation pathways** in order to « keep on the ball » and « keep its act together ». As with a surfer, a wind sailor, or a sailor on a rocking boat, if it fails to change its stance it will be destabilized, according to the **I Ching,** by one of 64 changing conditions through which it is forced to move in a turbulent environment.
The developmental goal can then be conceived as somehow lying « through » the exit of this labyrinth of traps for the unwary. More satisfactorily, it is perhaps « in » the art of moving through these conditions as progressively clarifying the locus of a common point of reference undefined by any of them (cf, the Sanskrit phrase « Neti Neti », roughly translated as « not this, not that »). It is this art which is extolled in describing the use of the ***I Ching*** or of Eastern board games (13, 26).
A similar notion has recently emerged from theoretical physics through the work of David Bohm (30). He stresses the nature of an underlying « holomovement » from which particularities are successively « unfolded » by our attention, only to be « re-enfolded » once again. The significance is more readily apparent in the case of « resonance hybrids » (see insert).
The problem for a network, an organization, an intentional community, a meeting, or even an individual, is then **how to « network the alternation pathways together »** and **how to « alternate through a transformational network ».** Hence the ambiguous title of this paper : « networking alternation ». Given that understanding of alternation seems only to be well-developed at the instinctual or sub-conscious level (e.g. walking, breathing, sex, dancing), the nature of alternation processes is explored in a separate paper on « alternation metaphors » (forthcoming). Extending the earlier metaphor of the

(*) The situation is somewhat analogous to many team ball games where if a player tries to retain the ball it will be taken from him by the opposing side, or else the team is penalized. Furthermore networks opposing the « team » of world problems find themselves like novices having to deal with an opponent which handles the ball with a dynamism such as that of the Haarlem Globetrotters or a shell-game con-artist. The focus shifts continually and is often where it is least to be expected in order to take advantage of weaknesses.

### Atlas of Management Thinking (29)

Edward de Bono, founder of the Centre for the Study of Thinking and director of the world's largest curriculum programme for direct teaching of thinking in schools, is renowned for his promotion of « lateral thinking », especially in management situations. He has recently produced an atlas « written specifically for the right side of the brain – the intuitive side ». For him an « atlas is a visual reference system, and although thinking is an abstract subject I believe we can create perceptual maps for its use ».
The problem is that we do not have adequate right-brain images for complex management situations. Hence the tendency to try to treat them through fragmented verbal descriptions lodged in the left brain. What de Bono does is to provide 200 images, each describing one such situation (e.g. confrontation, self-created problems, tolerance, etc). Each image is accompanied by a verbal commentary.

He suggests that the atlas references provide a shorthand notation for such complex situations, enabling people to be much more direct in labelling perceived opportunities and traps. « The clarity with which we see a situation is the basis for any subsequent decision or action ». Such thinking is very different from much of that of the academic or scientific world.

De Bono has coined the term « operacy » (to be contrasted with numeracy and literacy) as the much neglected skill of getting things done, solving problems, discovering opportunities, conceiving ventures, and organizing projects. « It is the more successful organizations that sense the need to develop further thinking skills because they attribute their success to their thinking. The less successful ones see no need because they blame their failure on circumstances ».
The **I Ching** may also be considered as an atlas of right-brain perceptions of complex situations for which an appropriate notation has been developed. Although it has the special merit of using a right-brain context to order the relationships between such situations. Like de Bono's atlas it also makes deliberate use of combinations of memorable « images » to « create a visual meta-language for situations ». The resemblances call for further study.

« semantic piano » however, the challenge for networks is then not simply to try to activate people by monotonous playing of single notes (e.g. « peace », « liberation », « development »), as presently tends to be the case. It is rather to acquire a perspective enabling them to collaborate in improvising exciting, rippling tunes with such notes (each of which is an ***I Ching*** condition) in order to bring out all the musical possibilities of alternation as explored in harmony, counterpoint, discord and rhythm (37).

In this sense **the true potential of networking lies in the transformational possibilities of « playing »** on such instruments. Such an approach could perhaps provide the « requisite variety » by which the world problematique may be tamed, without breaking the spirit it embodies.

A related challenge is then how to represent or map these transformation pathways in a memorable manner so that the range of possibilities becomes clear. In the ***Book of Changes*** a mnemonic system for the 64 conditions is given on the basis of 8 natural features of which people have both an instinctive and a poetic understanding (*). This contributes significantly to dissemination of understanding about relationships between such conditions in contrast to the restriction of interest in such matters in the West to scientific elites. The Eastern board games mentioned above are deliberately used for educational purposes, whereas very few in the West have access to the computer simulation exercises with an equivalent orientation.

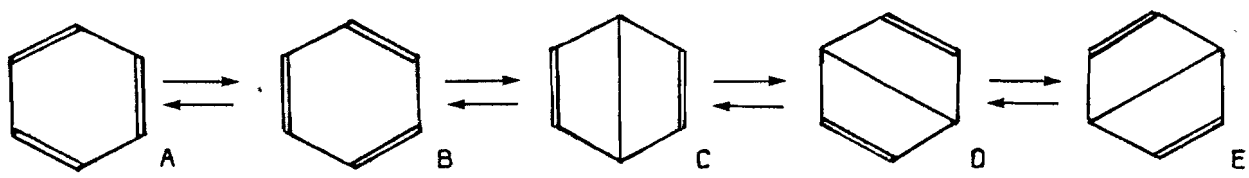
In the final part of this paper some possibilities for producing an adequate general map of the transformation pathways are discussed.

(*) The features include : mountain, lake, wind, thunder, light, ravine, earth and sky. Note the arguments in fevour of some such topographically based mnemonic system given in an earlier paper : « The territory construed as a map » (38).

## Resonance hybrids : an illustration of alternation

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 conceivable/describable structures and is said to be a « resonance hybrid » of them. The classic example is the benzene molecule 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 in fact **alternates between all five forms below** (and as such requires less energy than for any one of them).

This concept could be used in designing/describing/operating organizations, especially fragile coalitions. It may be the key to the « marriage » between networks and hierarchies in tensegrity organizations (5). It could also be used to interrelate alternative definitions (or theories, paradigms, policies, etc.), where none of them is completely satisfactory taken in static isolation. The « undefinable » significance then emerges through the alternation process. The conditions of the **Book of Changes** can be conceived as constituting a resonance hybrid, whether collectively or individually.

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# NETWORKING ALTERNATION

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## Part II

### Challenge of representation

The first part of this paper called attention to the advantages of perceiving change in terms of a network of transformation pathways between 64 conditions of organization derived from the Chinese **Book of Changes** or **I Ching.** The challenge for any organization is then to learn how to « alternate » through such a network rather than get trapped in any particular condition. To facilitate the response to this challenge, ways must be found to map this set of transformation pathways so that it becomes comprehensible as a whole that can be consciously negotiated. This part of the paper discusses some mapping possibilities.

### Elaboration of a circular sequence

Helmut Wilhelm reports (39) that in the Sung period (960-1127) of Confucianism the scholar Shao Yung produced a tabular representation of the **I Ching** elements. This « table » was also represented as a circle which he reproduces (*).

In this traditional representation the transformation pathways are implicit except for the circular sequence itself. It is however possible to render them explicit by simple adding them to the representation. One way of doing this results in a diagram such as Figure 1. The only lines added are for the six « high probability » transformation pathways associated with the six sub-conditions of each of the 64 conditions, as described in the text accompanying this paper (**).

Before commenting further on Figure 1 some basic points must be made about the traditional circular sequence. It is made up of 64 distinct « hexagrams ». The hexagram is the traditional Chinese way of representing a change condition by a binary code of 6 broken or unbroken lines (which can be considered identical to the binary bit-code used in modern computers). But there are at least two fundamental points about any such code, as pointed out in the case of computers by Xavier Sallantin (40) :

- there must be agreement as to what represents « broken » (or « on »), as opposed to « unbroken » (or « off »), or else the code may be mis-read as its own « negative »;
- there must be agreement as to how the hexagram (or computer bit sequence) should be read, whether up-to-down (or right-to-left) or down-to-up (or left-to-right), or else the code may be mis-read in an « inverted » form. The traditional circular sequence does not distinguish between these two possibilities.

The second point as applied to Figure 1 means that in relating the 64 condition names to their traditional hexagram representations a decision has to be taken as to the direction in which a hexagram is to be read. In Figure 1 the decision has been made to read the hexagrams with the « top » of each towards the centre and the numbered conditions have been allocated accordingly. This means that there is an alternative interpretation, Figure 2, in which the bottom of each is towards the centre. Note that the order of the numbered conditions is then quite different. The pattern of transformation pathways remains the same, although the sub-conditions to which they relate are now different. The 3 transformation pathways for each hexagram that were originally indicated inside the circle in Figure 1 are indicated by the lines outside the circle in Figure 2.

### Interpretation problems

The diagrams give rise to three problems :

a) Either Figure 1 or Figure 2 can thus be considered as a very compact map of the 384 high probability transformation pathways. But the existence of two different and seemingly conflicting maps is obviously cause for reflection.
b) Also of concern is their non-evident relation to the numbered sequence of conditions, which itself constitutes a single transformation cycle. This lack of relationship is especially evident when lines are traced between the conditions in that traditional sequence, as in the case of Figure 3 (using the Figure 1 order) or Figure 4 (using the Figure 2 order).
c) In addition, other than the striking elegance of the pattern, it is not obvious why either the order of Figure 1 or 2 should be the basis for an appropriate map.

With regard to the first problem, the existence of two interpretations can be explained as due to the manner in which the **I Ching** perspective is grounded on **alternation between perspectives** rather than being tied arbitrarily to one perspective. If two interpretations are possible there is necessarily an alternation between them according to the Chinese perspective. What then could the alternation between such contrasting interpretations signify ? From the significance traditionally attached to the top and bottom of the **I Ching** hexagrams, it could be argued that in the case of organizations the two contrasting interpretations could relate to an inward global worldview alternating with an outward local worldview. The top-in perspective (Figure 1) would then correspond to a map of consciously interrelated contrasting perspectives on the wholeness in which they are embedded, signalled to some extent by the process whereby leaders of a group « put their heads together » and « share their views ». The « enemy » is recognized as being within the group (« he is us »). The alternative top-out perspective would then correspond to a map of unexplicated solidarity in response to the challenges of the immediately perceived external environment, signalled to some extent by the process whereby group members « stand back-to-back » to face an external « enemy » as he manifests differently to each. To survive the group must to some extent alternate between these contextual and particular worldviews, rather as an individual alternates between right and left-brain perspectives (***).

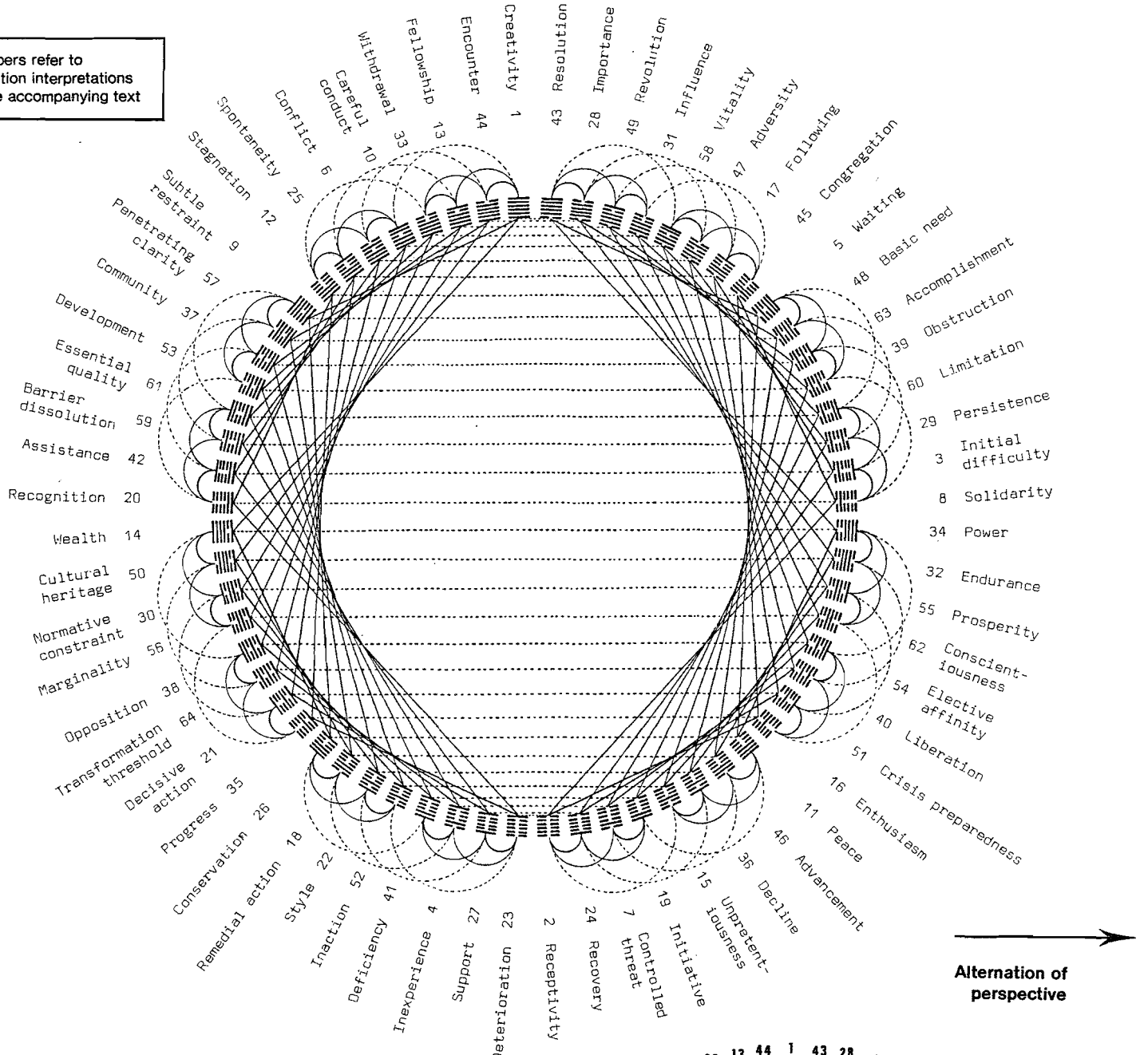
With regard to the second problem, using Figure 3 or 4, inspection will show that the continuing alternation between « global inwardness » and « local outwardness » forces every second hexagram in the numbered sequence into its opposite form (e.g. 3 in Figure 1 becomes 4 in Figure 2; 5 becomes 6; etc) and back again. Only the hexagrams 1, 2, 27, 28, 29, 30, 61 and 62 are not « driven » through the numbered sequence by this alternation process (which here acts in a manner reminiscent of the effects of current alternation in the coil windings of an electric

(*) It was Shao Yung's scheme which so excited Leibniz in the course of his reflections on the binary system (41).

(**) Conditions 1 to 34 are described in the first part of this paper (Transnational Associations, 1983, 4, pp. 176-181). The description of Conditions 35 to 64 accompanies this part (see pages 253-258).

(***) Lama Govinda notes that hexagrams are traditionnally read from bottom-to-top to represent the sub-conditions of individual life, in contrast to the top-to-bottom direction for more fundamental or universal transformations (42, p. 136).

Numbers refer to condition interpretations in the accompanying text




| Transformations (curves) | | Transformations (straight lines) | |
|---|---|---|---|
| (- - -) | 3rd sub-condition | (- - -) | 6th sub-condition |
| (long) | 2nd sub-condition | (long) | 5th sub-condition |
| (short) | 1st sub-condition | (short) | 4th sub-condition |

**Figure 1 - Map of transformations between global, « heads-together » networking conditions** (« top-in »)

The conditions are denoted by hexagrams in a traditional circular order (each facing its negative image). The 6 transformations shown interlinking these conditions are those described in the accompanying text (in which only one line of each hexagram code is modified; see Figure 5 for multiple line modifications).

The hexagram code is read here with the **top line closest to the centre** (in contrast to Figure 2), thus determining the condition numbers added. Note that a 7th transformation from each condition is that to its negative across the circle; an 8th is to its inversion, in the equivalent position in Figure 2.

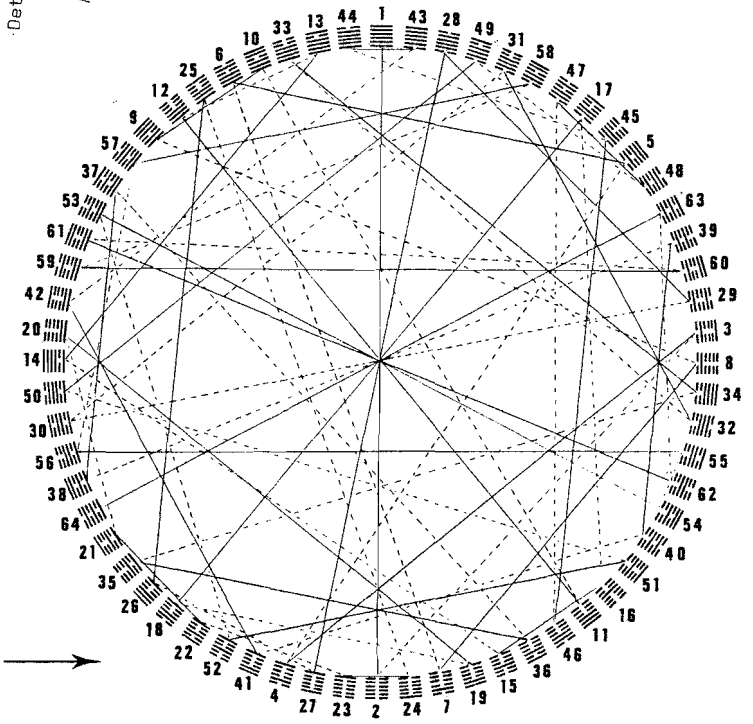
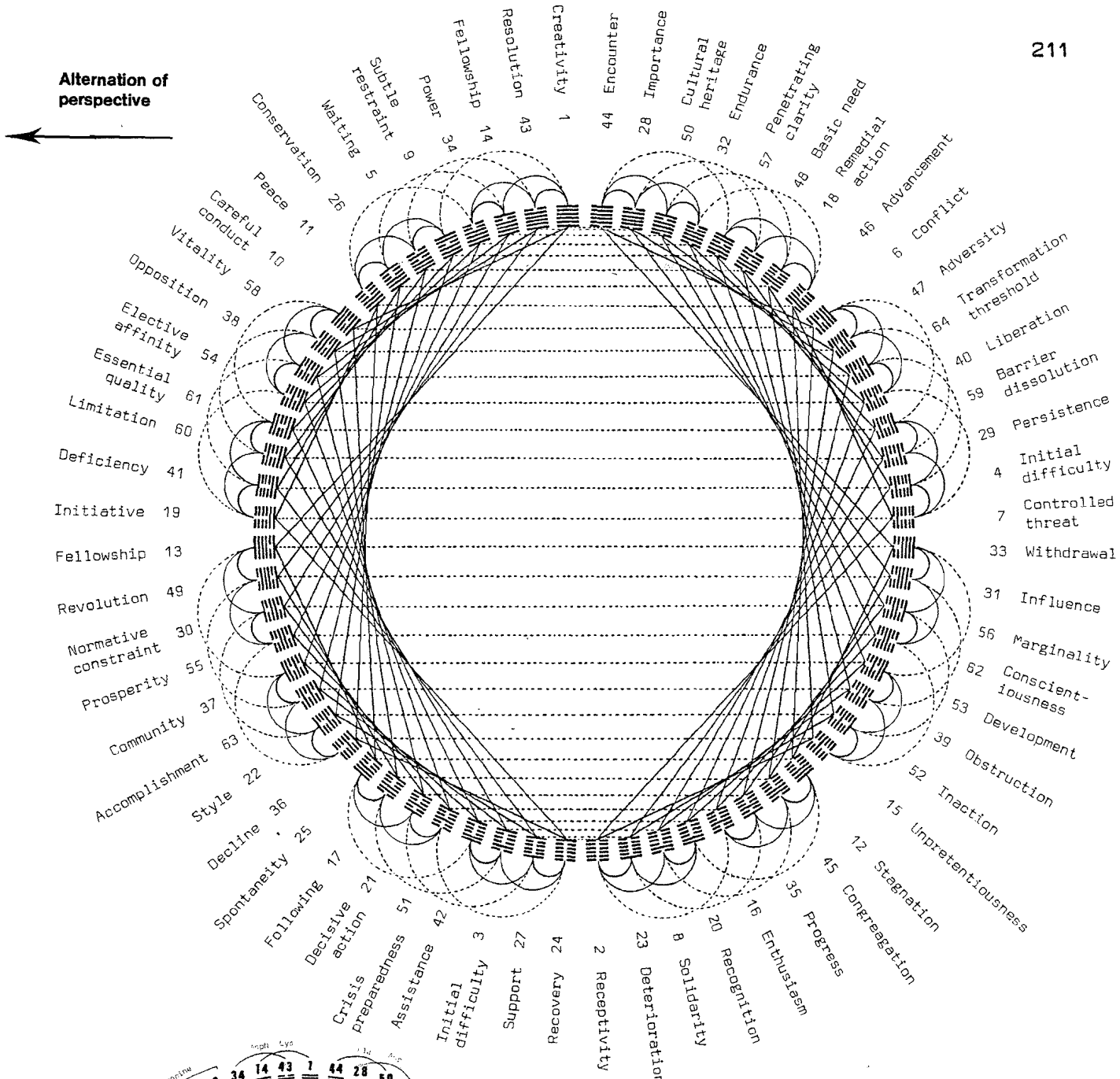
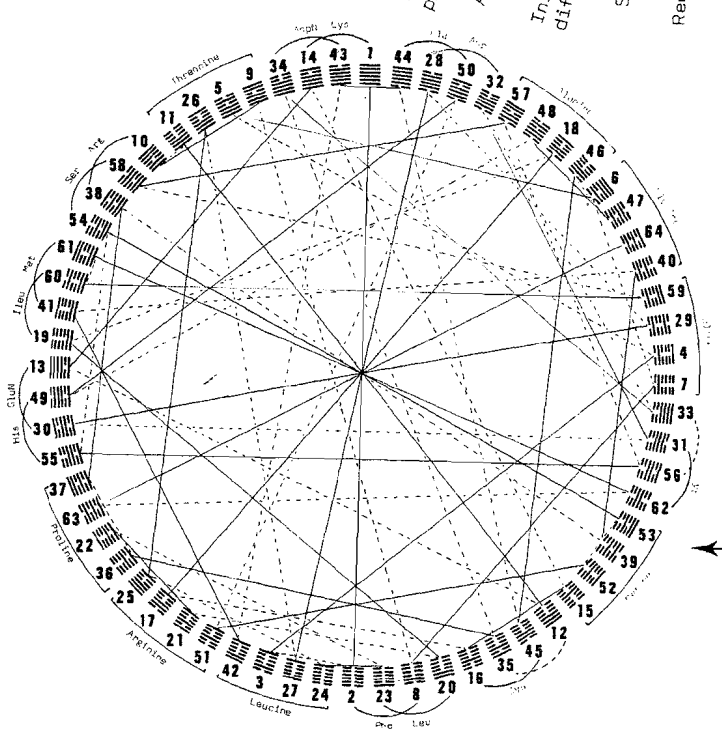



**Figure 3 - Transformation sequence through conditions in numerical order using Figure 1 hexagram positions**

Odd-to-even transformations indicated by unbroken lines.



| Transformations (lines) | | Transformations (curves) | |
|---|---|---|---|
| (- - -) | 1st sub-condition | (- - -) | 4th sub-condition |
| (long) | 2nd sub-condition | (long) | 5th sub-condition |
| (short) | 3rd sub-condition | (short) | 6th sub-condition |

**Figure 2 - Map of transformations between local, « back-to-back » networking conditions** (« top-out »)

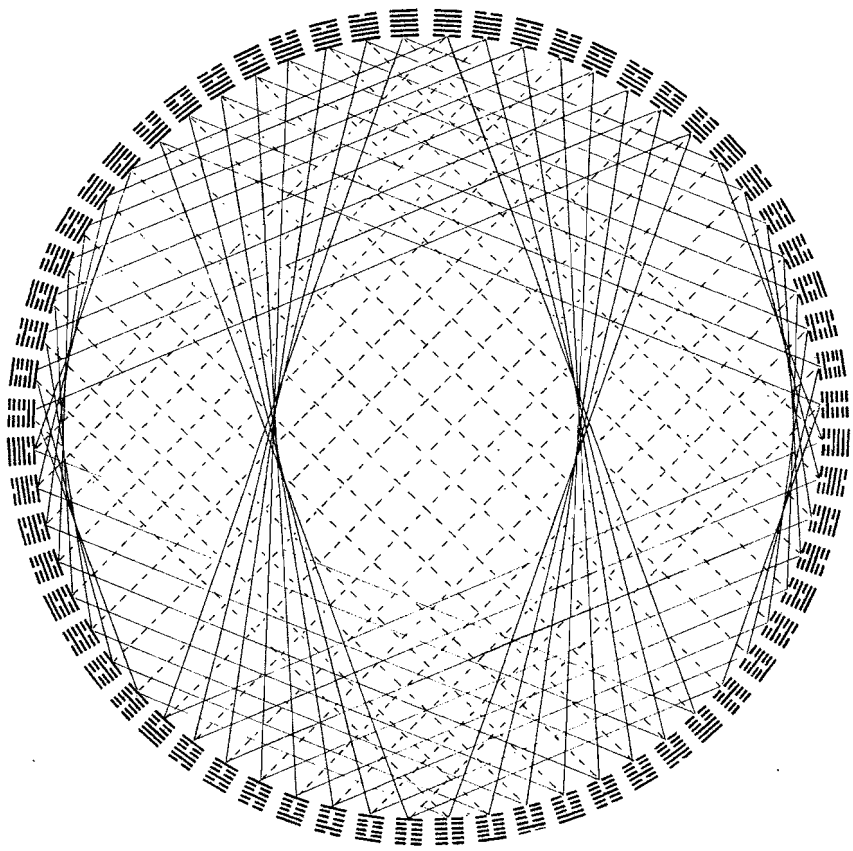
The hexagram codes appear here in the same order as in Figure 1, but because each code is read here with the **bottom line closest to the centre** (in contrast to Figure 1), the codes represent different numbered conditions in many cases. Only conditions 1, 2, 27, 28, 29, 30, 61 and 62 do not change position.

**Figure 4 - Transformation sequence through conditions in numerical order using Figure 2 hexagram positions**

Odd-to-even transformations indicated by unbroken lines. The hexagrams bracketed together around the circumference are those described as denoting the 20 basic amino acids in the genetic code (34). In the Figure 1 order, these are denoted by the long transformation lines (5th sub-condition).

**Figure 5 - Map of selected complex transformations between network conditions**

Using the same circular order as for Figures 1 to 4, transformations are indicated between hexagrams for cases where **two** lines of the hexagram code are modified (see Figures 1 and 2 for single line transformations). The transformations selected are for different combinations of the **inner** three lines of each code (since those for the outer three link neighbouring hexagrams in a pattern similar to that around the circumference of Figures 1 and 2). Other combinations do not appear to result in significantly different patterns. The hexagram codes may be read either in terms of the Figure 1 (« top-in ») or the Figure 2 (« top-out ») orders from which the corresponding numbered conditions may be obtained.



motor). The map is a map of alternation **dynamics** and cannot be appropriately understood as a conventional map of **static** structural elements.

With regard to the third problem, the « logic » of the circular representation is that every condition denoted by a hexagram is conterbalanced by its « opposite » across the circle. In effect the broken lines are converted into unbroken lines and vice versa (thus partially containing the variations in significance of broken and unbroken lines noted above). In addition to the six high probability transformations from (and to) each condition, there is therefore a seventh transformation through the numbered sequence (by inversion of the code reading direction) and an eighth transformation into its opposite (through « negative » code bits of a hexagram acquiring a « positive » connotation and vice versa).

Given the striking relationship already noted by Schönberger between the **I Ching** 64-hexagram code and the genetic 64-codon code (35), the fundamental nature of the circular representation may also be illustrated by using it to map the 20 amino acids basic to biological organization. In Figure 1 these are denoted completely by the set of (long) transformation lines linking quarters of the circle. For example, according to Schönberger, asparagine is denoted by (the transformation between) the hexagram pair 34-43, the more complex amino acid threonin is denoted by (the symmetrically balanced transformation lines) 11-5 : 26-9, and the « stop » codes amber and ochre are denoted by the individual hexagrams 56 and 33 respectively. In the Figure 2 map the hexagrams denoting each amino acid, rather than being equidistant, are brought **together** side-by-side, as is illustrated around the circumference of Figure 4. Whether this suggests that certain well-defined transformation processes are as essential for the life of an organization or network as those 20 amino acids are for biological organization, is a question for further investigation.

## Transformation cycles

A striking feature of Figure 1 (or 2) is the manner in which the transformation pathways of different types differentiate the circle so clearly into :

(a) 2 halves of 32
(b) 4 quarters of 16
(c) 8 groups of 8
(d) 16 groups of 4
(e) 32 groups of 2
(f) 64 groups of 1

In the light of current interest in the distinct functions of right and left brain perspectives, group (a) can be considered an interesting representation of the limited number of pathways linking such halves and the manner in which the halves are each separately integrated. In the light of Jungian investigation of the four basic psychological functions (sensation, feeling, intellect, intuition), group (b) can be considered an interesting representation of the transformation pathways by which these are linked and separately integrated as semi-independent functions. The 4 masculine and 4 feminine archetypal versions of these functions distinguised by Jungian psychoanalysts can in turn perhaps he usefully represented by group (c).

The question that now emerges is whether it is possible to elaborate some kind of typology of transformation « cycles » for organizations or networks. Such a typology would clarify the different kinds of way that, for example, the two functional halves, or the four functional quarters are interlinked. For it is highly probable that organizations or networks can « survive » by using the simplest possible transformation cycles that enable them to renew themselves, but that richer and more effective networking is only possible when more complex transformation pathway cycles are used. It is therefore to be expected that some organizations only manage a 4-transformation cycle linking four functional quarters but are quite incapable of handling the subtler functional transformations between an 8-condition cycle, or one with an even larger number of transformations. Many organizations probably get stuck in cyclic « traps » because they cannot enrich the transformative cycles on which they depend.

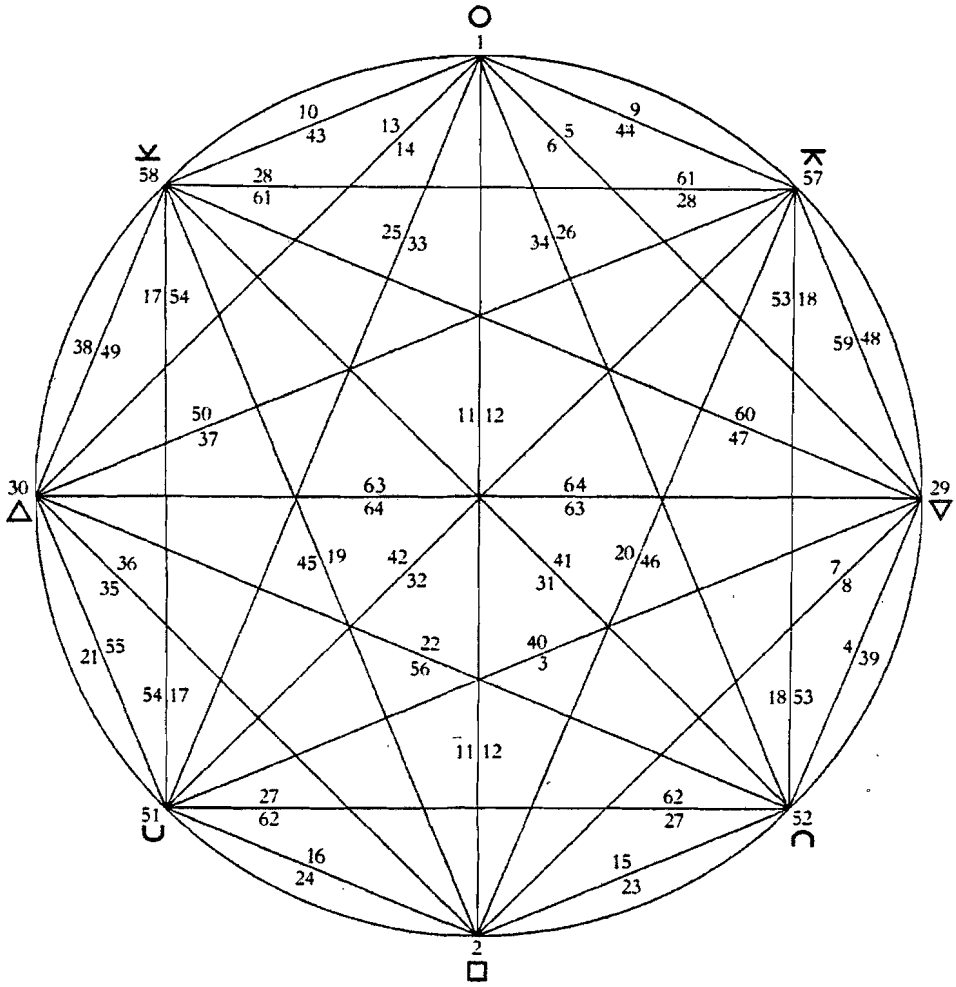
In addition to what has been termed the « high probability » transformations, based on the modification of a single line in a hexagram denoting a network condition, some other transformations of lower probability are shown in Figure 5. These too may form part of transformation cycles.

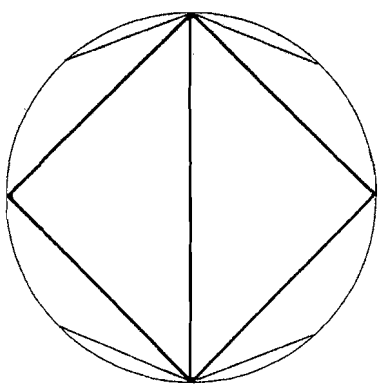
## Circular representation : inner structure

A different approach to circular representation forms part of the conclusion of an extensive study by the renowned Buddh-

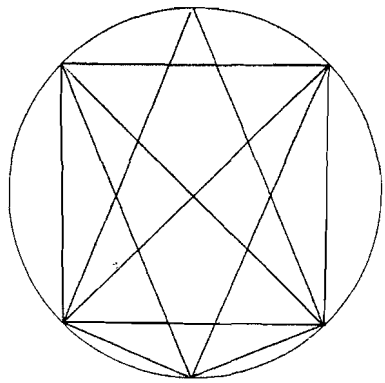
**Figure 6 - Projection of all conditions (hexagrams) onto a circle** (Reproduced with the kind permission of Lama Anagarika Govinda, author of the **Inner Structure of the I Ching; the Book of Transformations** (42)).

In Figures 1 to 5 the transformations between conditions are indicated by lines and curves (whether broken or unbroken). In Figure 6 those transformations are all represented as occurring within the 8 points around the circumference, whereas the lines represent the dynamic conditions denoted by the individual hexagrams positioned in a circle in Figures 1 to 5. Each line in Figure 6 indicates two possible conditions of change (just as each line in Figures 1 to 5 indicates two possible directions of transformation). The order of the 8 points around the circumference of Figure 6 corresponds to the order of the same points around the circumference of Figure 2 (« top-out » interpretation).



**Network conditions 1 to 16**



**Network conditions 17 to 32**

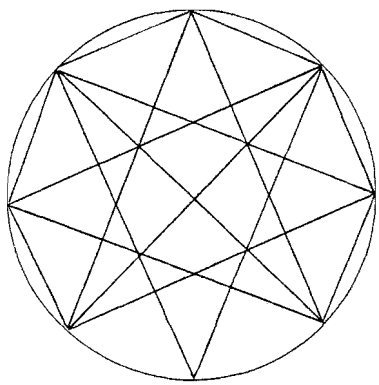
**Figure 7 - Sub-patterns of networking conditions extracted from Figure 6** (Adapted from diagrams of Lama Anagarika Govinda (42)).

The numbered sequence of 64 conditions is split into 4 groups in numerical order. The patterns for each group are shown in the relevant diagram as a part of Figure 6. This establishes a relationship between the numerical sequence and an abstract order (which is the basis for Figures 1 to 5).

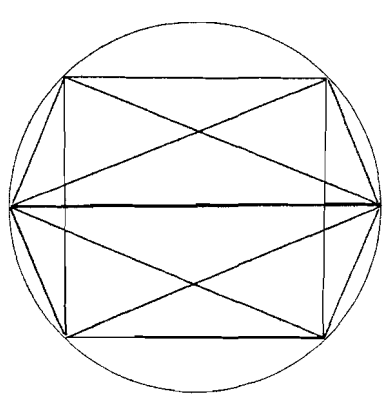
Note that the reconstruction of this arrangement is only possible as a result of recognition, from internal structural evidence, of the error noted below.

N.B. In producing Figure 6 from the elements of Figure 7, Lama Govinda concludes (42, pp 145-147) with Richard Wilhelm (12), that the traditional numerical order of the hexagrams in current works is slightly in **error**: 35 and 36 should replace 3 and 4; 21 and 22 should replace 35 and 36; and 3 and 4 should be inserted between 56 and 57.

This **does not affect** the patterns in Figures 1 to 5, with the exception of the broken lines in Figures 3 and 4. It **does affect** the « logic » of the italic sequence of text linking the conditions. The explanation given for the error is that the Chinese original was on loose-leaf pages of which some were misplaced.



**Network conditions 33 to 48**



**Network conditions 49 to 64**

ist scholar Lama Anagarika Govinda in a recent book entitled : **The Inner Structure of the I Ching : The Book of Transformations** (42) (*). His preference for « transformation » in the title is to be compared with the conventional translation as « change ».

The special interest of this study, in contrast to the many studies of **I Ching** commentaries, is that it focuses on the structure of the **I Ching** itself as a system of signs in which « two values were alternated and finally combined into eight symbols, which by replication yielded sixty-four hexagrams » (42, p. ...).

Lama Govinda concentrates on the problem of the relationship between two traditional representations of the set of transformations. The first is the « abstract order » of Fu Hi which essentially determines the order of balanced polarities from which Figures 1 and 2 were derived. The second is the « temporal order » of King Wen which emphasizes the developmental sequence of phenomena. In order to make the movements from one condition to another graphically visible the author concludes that it only seems possible to find a unifying principle in the Fu Hi system.

His detailed investigations lead him to propose Figure 6. This shows the position of all 64 **I Ching** conditions projected onto a circular diagram. A unique feature of his focus on the « inner structure » is that this diagram results from the interplay between the 8 fundamental conditions from which the 64 are derived. The 8 are each denoted by a half-hexagram, namely a trigram. Depending on the order in which any given pair of trigrams is read, one of two hexagrams is thus defined. It is the condition numbers of these alternatives which are indicated on the straight lines within the circle. Each line thus represents two transformative movements. The eight conditions around the circumference represent those cases when the two trigrams are identical. Thus the straight lines denote transformations governed by the relationship between the 8 fundamental conditions denoted by each doubled trigram on the circumference.

What then is the relationship between Figure 6 and Figures 1 to 5 ? As noted above, in Figures 1 to 5 the circle of hexagrams may be split into eight parts in each of which the trigram on the inside is identical. One of the hexagrams in each part also has the outside trigram equal to the inside one. It is these eight (1, 2, 29, 30, 51, 52, 57 and 58) that are positioned around the circumference in the « top-out » order of Figures 2 and 4. Comparison with these Figures will show that the transformations from any numbered condition are here indicated by the lines (or points) to which it is connected through these fundamental positions, whether one *or more* hexagram lines are modified. In this sense Figure 6 is a much more compact representation than Figures 2 and 5 (**). In graph theory terms, Figure 6 is a « dual » of Figures 2 and 5 combined, in that the transformation *lines* in the latter correspond to the transformation *points* in th former. It could be argued that even in this representational convention there is advantage in alternating between both forms.

Also of great interest is Lama Govinda's very detailed investigation of sub-patterns of transformation (**) connecting groups of 8 conditions traditionally called « houses ». These patterns provide an important basis for any further investigation of the typology of transformation cycles called for above. It also enables him to clarify the relationship between the numerical sequence and the abstract order of Figure 6 by determining in Figure 7 the four symmetrical sub-patterns from which Figure 6 is Constituted.

## Elaboration of a spherical map

One interesting approach to this is to consider how Figure 6 would be transformed if it were to correspond to the alternative « top-in » order of Figures 1 and 3, instead of the « top-out » order of Figure 2. In effect the square formed by conditions 51, 52, 57, 58 in figure 6 is simply rotated about the axis of conditions 1, 2; Conditions 1, 2, 29 and 30 do not move. The new sequence around the circumference is then 1, 58, 29, 51, 2, 52, 30, 57, as in Figures 1 and 3. If conditions 1 and 2 are considered as fixed « poles », a continuous rotation between the fixed positions 29 and 30 may be seen as transforming the circular representation into a spheric one. This dynamic model would need to be interpreted in terms of lines of force, as in the analysis of an electric motor or dynamo.

For reasons discussed in earlier papers (38), there are advantages in seeking a representation whose completeness is highlighted by basing it on an approximation to a spheric surface. The question then becomes how to cut up that surface into 64 units which will be assumed firstly to take the form of regular areas and secondly to be of identical form. (Other approaches are of course worth exploring.)

Since the 64 phases (hexagrams) result from a conceptual system based on an eightfold complexification of 8 fundamental phases of change (trigrams), the problem can initially be reduced to one of representing the latter on a spherical approximation. The simplest such polyhedral approximation is the regular octahedron with eight triangular facets (see Figure 8). In allocating the 8 phases to these facets it would obviously be advantageous to do so such that their three high probability transformation pathways are highlighted.

Returning to the 64 phases, the problem can now be defined as one of how to divide up each of the triangular facets of the octahedron into eight equal parts so that eight phases can be represented within each such triangle. This can be done as shown in Figure 9. In this way the 64 phases can each be given a unique location on a polyhedral structure which can be easily projected onto the surface of a sphere.

There remains the problem of how to order the eight phases within each facet in Figure 8 so that within the completed figure the six high probability transformation pathways of the 64 phases are highlighted. It would seem, as with the standard problem of geographical map projections onto a two-dimensional surface, that there are a number of approaches to be explored. Each would be based on a different convention and would lead to a different arrangement with different advantages. Some possibilities are discussed in the inset.

## Conclusion

The **Book of Changes** is recognized as striking a remarkable balance between logical, structural (left-brain) precision and intuitive, contextual (right-brain) nuances of comprehension. For 3,000 years it has proved to be a unique achievement in relating the qualitative to the quantitative in a manner which is both practical and poetically appealing. These are qualities to be sought in any blueprint for a new world order.

In the exercise for this paper, most of the poetic appeal has been sacrificed. It does demonstrate that it is possible to interpret the insights of an Eastern classic into the jargon of Western management, however much of a « profanation » this may appear to those who know the original. An important consequence of the elimination of metaphor is the loss of vital mnemonic keys with which the original is replete with good reason. Much of value has therefore been lost, as in any interpretation, despite the seeming advantages to be gained from the precision of the alternative presentation. Clearly some of the distortion is due to the alternative framework, whilst much is due to the limitations of the interpreter. Hopefully other interpretations will be produced that will strike a more graceful balance between jargon and insight.

The acid test is of course whether this interpretation is useful to those engaged in networking. Is it possible to relate the conditions described to the practical experience of networking ? Can networkers use or adapt the maps of transformation pathways reproduced here ? The answers are for the future. But the precision of the framework of the **Book of Changes,** linking such contemporary topics as « development », « liberation », « peace », « revolution », with what have here been termed « basic need », « deficiency » and « cultural heritage », offers an intriguing chal-

(*) My attention was drawn to this book (after the first part of this paper had gone to print) by Zentatsu Baker Roshi, Abbot of the San Francisco Zen Center, who contributed the preface. He pointed out the resemblance between Figures 1 and 2 and diagrams in Lama Govinda's book. I wish to express my gratitude to him for this information and to the Zen center for furnishing me a copy across the Atlantic at miraculous speed.

(**) There is an intriguing resemblance between some of Lama Govinda's other diagrams of transformation between trigrams (represented by « curves » and « lines ») and aspects of the structure of Figures 1 and 2.

lenge to reflection and comprehension. The topics recall many of the concerns of the Goals, Processes and Indicators of Development project (1978-82) of the United Nations University.

With regard to the important problem of representation, it is appropriate to note that schematic diagrams of similar form have already been produced in combining Eastern insights and a Western management emphasis. A striking example is that of Figure 10, from **Zen and Creative Management** by Albert Low (43), Erich Jantsch, in his wide-ranging synthesis of self-organizing systems and their implications for policy-making and human development, draws attention to metabolic transformation cycles such as the carbon cycle shown in Figure 11 (44). Indeed, given the fundamental nature of the representation system and its relationship to the basic amino acids (34), it is worth investigating to what extent the set of interconnected metabolic cycles and pathways does not illustrate the kinds of transformation pathways which need to be identified for organizations. The map of metabolic pathways could prove to be a very provocative challenge to organizational sociologists of the future (45).

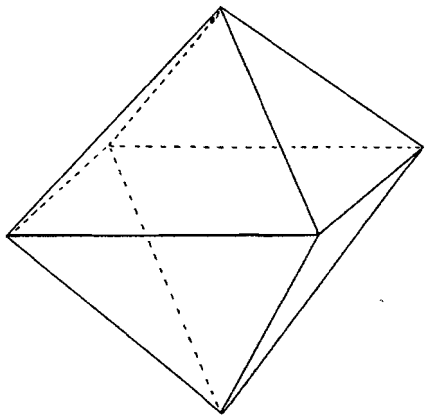


**Figure 8 - Octahedron as basis for mapping 8 fundamental networking conditions onto a sphere**

The 64 networking conditions are derived from 8 fundamental conditions (represented by the doubled hexagrams indicated on the circumference of Figure 6). Each of the 8 may be denoted by one triangular facet of the octahedron. The allocation of the conditions, and the transformational relationships between them, can then be mapped onto the geometry of the octahedron (as one of the simplest polyhedral approximations to a sphere). This is discussed in the inset (below).

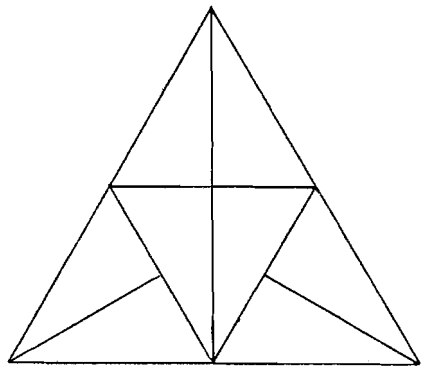


**Figure 9 - Eightfold subdivision of the triangular facet of an octahedron.**

In order to represent all 64 networking conditions on an octahedron (Figure 8), each triangular face can be sub-divided into 8 equal areas as shown. Some of the possible conventions concerning the allocations of sub-conditions to the triangle, and the transformational relationships between them, are discussed in the inset (below).

## Some possible approaches and conventions

The approaches listed below are split into three groups. The first focuses on the ordering of the eight facets of an octahedron. The second focuses on the ordering of the eight facets within each triangular face of an octahedron. The third identifies some conventions which merit further exploration.

### 1. Octahedral facet ordering

1.1. Primary arrangement : if it is assumed that this arrangement is in some way more fundamental, then use can be made of the « Primal Arrangement » given in the commentaries to the **I Ching.** Here the stress is on pairing opposites across the centre.
1.2. Sequential arrangement : the alternative to the previous approach is to use the sequential arrangement which traditionally suggested the temporal relationship between the phases.
1.3. Transform juxtaposition : the three phases into which a given phase has a high probability of transforming can be allocated to the three triangles which surround it on the octahedron.
1.4. Circular transform pathways : an octahedron is partially defined by the interlocking of three great circles through its points of symmetry. Each circle may be considered as a transformation pathway linking the facets it crosses.

### 2. Ordering within octahedral facets

2.1. Primary arrangement : a form of the traditional primary arrangement may also be adapted within the triangular facets.
2.2 Sequential arrangement : a form of the traditional sequential arrangement may also be adapted within the triangular facets.
2.3. Transform juxtaposition : various approaches to juxtaposing intertransforming facets are possible. They draw attention to the problem of how such solutions transform across the boundary to other facets of the octahedron.
2.4. House arrangement : one traditional arrangement groups the 64 phases into 8 « houses », where each house would be equivalent to an octahedral facet. The arrangement of the houses and the order within each house calls for further investigation (see especially reference 42). This approach has the advantage of de-emphasizing the boundaries constituted by the octahedral facets.

### 3. Possible conventions

3.1. Triangle boundary single signifier : each side of a triangle represents one line of the trigram represented by the enclosed area. Sides are therefore denoted either by unbroken or by broken lines. Sides are common to neighbouring triangles.
3.2. Triangle boundary double signifier : as for 3.1., except that sides are not common to neighbouring triangles. Each inter-triangle boundary is denoted by two signifiers (broken or unbroken in parallel lines), one for each of the two contiguous triangles.
3.2.1. Inter-triangle like-to-like bonding : triangles can be bonded as neighbours if they have identical signifiers on a common boundary (either broken or unbroken lines).
3.2.2. Inter-triangle like-to-unlike bonding : triangles can be bonded as neighbours if they have different signifiers on a common boundary.
3.3. Line ordering : three alternative conventions are possible for ordering the sides of a right angle triangle to correspond to the lines in a trigram.
3.4. Triangle transformal relationships : more complex relationships may be considered between proximate triangles where the type of transformation is governed by the types of line (of the right angled triangles) which are contiguous. These include various inversions and reversals of the trigrams represented.
3.5. Variable lines : given the fundamental significance of resonance bonding and hybrids in organic chemistry (eg. Kekulé and models of the benzene molecule as noted in the first part of this paper), it is work considering a representation based upon alternation of triangle side signifiers between broken and unbroken forms. The representation then becomes a shifting pattern in which particular phases emerge and disappear at different locations.

It is also tempting to see the 6 (+ 1) basic transformations from each condition (in Figures 1 and 2) in terms of catastrophe theory, as qualitative equivalents to the 7 characteristics kinds of catastrophe to which natural conditions are subject.

This paper began with a concern with how to reduce the drain of « energy » and significance from networks, organizations and meetings. There are conditions described in the **I Ching** interpretation for networks which pinpoint some of the less satisfactory forms of « networking ». It is appropriate to note that in the current fundamental research on nuclear fusion the key problem is how to « contain » the nuclear plasma in order for a self-sustaining reaction to occur and produce a controlled release of energy (46). The key indicator is known as the « confinement parameter ».

The configurations used to contain the plasma, whether within a torus or using a « tandem-mirror » approach with the aid of « yin-yang » magnets (47) bear a tantalizing relation to the kinds of representation that might be used to interrelate the conditions of a network. It is unfortunate that networking enthusiasts fail to recognize the advantages to be gained from networking discipline and limits in order to master the collective energy they have to offer (48). Possibly organizational sociologists of the future may find a correspondence between the current problems of « integration » for controlled release of social energy and those of plasma control for nuclear fusion.

Inherent in the structure of the **I Ching** is a recognition that the fundamental conditions or principles of change complement, reinforce or erode the situations to which they give rise. Their sequence arises from the manner in which one is undermined by the next. In one traditional symbolization of change in the **I Ching** in terms of five « elements » : « Wood, for instance, penetrates and breaks up Earth. In this respect it proves itself the stronger element. But Earth is stronger than Water, because it absorbs it. Water is stronger than Fire, because it can extinguish it, and Fire melts Iron (or other metals), whereas Iron cuts Wood » (42, p. 44). These cyclic insights 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 (49).

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 (50). 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 manipulability 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 ».

Blair and Pollak explore the difficulty of designing **acyclic constitutions for organizations** which would avoid such voting cycles. The Eastern insights from the **I Ching** suggest that it might be more valuable to look for ways of designing **cyclic constitutions** to permit an organization to alternate through such a network of alternatives, each of which exerts a **dominant influence for a period of the cycle,** before in turn being overthrown or undermined by a succeeding alternative in that cycle (7).

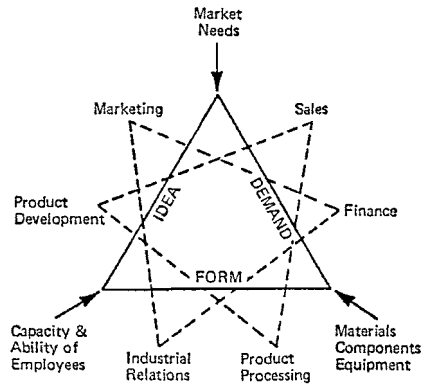



**Figure 10 - Interrelationship of economic functions in management systems.**

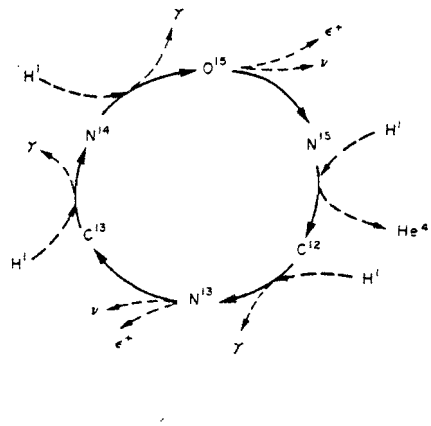


**Figure 11 - Carbon cycle as a detail of metabolic pathways.**

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