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Enhancing the Quality of Knowing through Integration of East-West metaphors

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Introduction

Abstract: The paper briefly contrasts the commodification of knowledge, with its embodiment, its expression in relationship, or as a worldview. This is used to raise the possibility of forms of knowledge that may be relatively incomprehensible or incoherent to western-style science. Some social implications of knowledge organization are reviewed in the light of 'field', as an agricultural metaphor basic to knowledge work that helps to clarify issues of fragmentation, monoculture and integration. This metaphor is then used to clarify knowledge issues further in relation to: intellectual property and its possession; dispossession and resettlement; movement between fields; and embodiment. This framework introduces the challenge to science of set organization and comprehension, notably as a vehicle for identity and provision of coherence. Metaphors for understanding dynamics within sets are then presented as conceptual scaffolding, with 'global' offered as a cognitive challenge and 'crop-rotation' in fields as an example of a higher level of ordering set elements. Attention is drawn to the richness of eastern cultures as a source of relevant metaphors, emphasizing the use of 're-reading' as a metaphorical method. Some fundamental cognitive challenges are reviewed to which science eastern-style might therefore offer insights: polarization, territoriality and globality (using the *I Ching* as an illustrative metaphor); subjectivity vs objectivity; relationship and community (based on richer patterns of relationship between knower and known, notably in the light of eastern sexual metaphors); use of archetypal knowledge objects in computers in support of such insights; as well as questions of succinctness and comprehensibility in a period of increasing information overload and underuse. Ultimately the challenge is to design containers for meaning more appropriate to the challenges of society.

This paper proceeds from the assumption that there is something missing in the current pursuit and articulation of knowledge. It is however far from clear exactly what is missing. In the light of the conference theme, it might be referred to as some form of "missing link" **between** eastern and western approaches to understanding -- perhaps best held currently by the tensions between them. It might be that it is qualities from eastern insight that are designed out of western approaches, reducing the quality of the resulting knowledge. It might be that the meaning of any form of "integration" or synthesis is elusive from a western perspective -- or from a purely eastern perspective. It might be that the purpose of the pursuit of knowledge has itself been eroded of meaning within a purely western context. As expressed by Susantha Goonatilake (1999): 'the modern agenda has run out of steam' (p.3).

Others have stressed the merits of the western approach or deplored the failure to acknowledge and integrate insights arising in the East or in indigenous cultures (Darrell A. Posey, 1999). This paper is therefore an effort to identify some reference points in terms of which future enhancement of the quality of knowing might perhaps be considered.

The fundamental assumption questioned is whether the priority for the immediate future is ever more quantities of western knowledge, or whether there is a need for the existing knowledge base to be strongly complemented by another kind of knowledge -- to ensure quality of life in sustainable global development. Or, as expressed by Goonatilake (1999): 'These quantitative changes [in growth of science] will require qualitative shifts in the nature of science.' (p.4)

A. Beyond the commodification of knowledge

There is a long tradition of treatment of knowledge as a commodity to be sought, bought and sold, and -- above all -- exclusively possessed. This is most evident in the case of military intelligence -- as currently epitomized by the *Echelon* electronic surveillance system. Increasingly it is evident in the many dimensions of intellectual property -- especially within the emergent information society. It is part of development aid negotiations for the acquisition of "know-how". It is also evident in educational processes through which knowledge is "acquired", possibly against payment of fees to educational institutions or tutors. And it is even evident in the acquisition of spiritual knowledge from people of wisdom.

There is now a strong movement to build the future global economy on knowledge and its commodification -- as exemplified by the World Bank's Global Knowledge Partnership (http://www.globalknowledge.org/) and the ASIS Strategic Alliance for a Sustainable Information Society (http://asis.jrc.es/html/fsummary.html). Such dematerialization is considered a valuable step away from the focus on material goods. Countries of the East are being encouraged to rise to the challenge of staking their place in this highly competitive knowledge economy -- and much is made of their potential in the software and data processing industries.

There are however some other kinds of challenges built into this logic. The question is whether this commodification logic is merely replicating at a new level a logic whose dysfunctionality has been challenged and demonstrated at a more material level by many authors. It is not changing the game but merely changing the terrain on which the game has been played -- notably to the disadvantage of eastern and indigenous modes of thought. This is especially evident in the prevalence of what might be called 'Project Logic', namely a focused 'efficient' mode of strategic thinking in support of economic development that is inherently economical with any wider truth (*Knowledge gardening through music: eliciting patterns of coherence for African management as an alternative to Project Logic*, 2000).

The concern here is not whether knowledge should be "free" -- as frequently argued by radical denizens of cyberspace. This perspective is merely another way of approaching the commodification of knowledge -- specifying some commodities as free of cost.

The question here is rather whether what is most valuable in knowledge can in fact be commodified. And if an attempt is made to do so, whether what is then "possessed" by the individual, or collective, "owner" is capable of retaining the qualities that renders that knowledge a significant attractor. Clearly commercially successful attempts can be made to commodify knowledge but the question is the nature of the distinction between what is possessed and the quality of knowing associated with it.

Embodiment of knowledge

In the West a stress is typically placed on possession of knowledge -- which in academic terms can be "professed" by "professors". Examinations are designed to determine whether students possess knowledge. The logic of possession is also evident in the major social focus in India, for example, on the civil service examination as developed from its colonial origins. But this logic also holds in the case of memorization of sacred texts in religious schools of different traditions.

However in the East, beyond such possession, and in many cases irrespective of it, there is much greater recognition of what might be termed embodiment of knowledge -- the "dynamics of knowing" rather than "knowledge inventory management". Through such embodiment the person, or the group, is affected by it to a degree that they are an expression of it through their behaviour. Recognition of this may be seen at one extreme in the respect for elders as embodying a lifetime of experience, or, at another extreme, for people of wisdom (gurus, etc), or for people with charisma. Some dysfunctional dimensions of this may be seen in the behaviours -- especially in relation to each other -- of those claiming to possess wisdom or spiritual authority.

In the West such embodiment is primarily carried by the terms "innate ability", "natural talent" or "experience". Hitherto this was something valued only in the apprentices to various trades. "Experience" has now become a prime quality required for the CEOs of major corporations, often irrespective of possession of knowledge or qualifications. It is interesting that whilst the process of buying knowledge (through packaged courses) is common, experience cannot be purchased -- it has to be engendered real-time. Like "maturity" it is achieved by other means.

This form of knowledge may possibly be exemplified by "tacit knowledge" -- a term that has recently been a focus of increasing attention in the West. It is most succinctly described as the kind of knowledge required to ride a bicycle -- something that does not lend itself to successful explication. It has in a very real sense to be embodied.

The embodiment of knowledge in the light of the chanted hymns of the *Rg Veda* has been explored by Antonio de Nicolas (1978), using the non-Boolean logic of quantum mechanics (Heelan, 1974). The unique feature of the approach is that it is grounded in tone and the shifting relationships between tone; it is through the pattern of musical tones that the significance of the *Rg Veda* is to be found. As de Nicolas indicates:

> 'Therefore, from a linguistic and cultural perspective, we have to be aware that we are dealing with a language where tonal and arithmetical relations establish the epistemological invariances... Language grounded in music is grounded thereby on **context dependency**; any tone can have any possible relation to other tones, and the shift from one tone to another, which alone makes melody possible, is a shift in perspective which the singer himself embodies. Any perspective (tone) must be 'sacrificed' for a new one to come into being; the song is a radical activity which requires **innovation** while maintaining **continuity**, and the 'world' is the creation of the singer, who shares its dimensions with the song.' (p. 57)

This suggested the possibility of using the musical skills of African cultures to carry, and give coherence to, new styles of policy-making as has been explored in a separate paper (Judge, 2000: https://www.laetusinpraesens.org/docs/music.php).

Knowledge in relationship

Whilst it may be acknowledged that knowledge can be embodied, the term "embodied" serves primarily to conceal the significance of such embodiment. The person may indeed be a significant attractor in a social system, but how insight is associated with this is quite unclear, notably in the case of charisma. However it is much clearer when it is recognized that such significance is recognized through relationship, namely through how in practice the person interrelates concepts, things or people, or encounters others -- notably in dialogue. This may be seen as a catalytic or ordering function. A higher form of ordering is engendered.

Both in East and West, one manifestation of this capacity is acclaimed as leadership. Much effort is made to focus on the identification

and training of leaders. Leadership training has itself become a commodity -- although little is said of how the followers of leaders trained in this way rate the knowledge embodied in their leader. It is perhaps useful to make a radical distinction between such an *ersatz* leader and a natural or charismatic leader -- as experienced in practice by the followers. But perhaps it is more appropriate to recognize the truth in the often-cited phrase that "people deserve the leaders that they get" -- with the knowledge they hold, or of which they are an expression.

In the West there is increasing value attributed to "human relations skills". A wide variety of consultants promote these skills. They may be sought -- as a commodity -- in weekend workshops. In the East they are typically exemplified by attitudes to (extended) family relationships, especially in relation to elders. In the West emphasis is placed on the skills in interpersonal relationships, notably in marketing or between sexual partners. In all these cases overt behaviour is understood to reflect a form of knowledge.

But it is especially the way in which those embodying knowledge relate to the features of their natural environment that is most striking -- whether it be (following Feyerabend, 1975) the capacity of a musician, the laboratory skills of an experimental physicist, a gardener, or a chef. But perhaps less evident and more fundamental is the way they may relate to the landscape as a whole, as in the case of many indigenous peoples for whom their knowledge is effectively embedded in their environment. This is notably the case of the Aborigines of Australia whose spatio-temporal relationship to their landscape tends to be quite beyond western comprehension and the concepts of the western legal system.

Knowledge in worldview

The case of the Aborigines draws attention to the fact that relationship knowledge may be far less instrumental and aggressive. It may be embodied in a worldview that is not necessarily expressed through any proselytizing endeavour. There may be valued forms of knowledge that are not presented as commodities, or even purveyed in any way. A person may know the way from A to B, even in knowledge space, without any need to present this knowledge to "passers by" as a commodity for sale. Whether the knowledge is offered in response to a question is another matter.

In this respect the nature of certain knowledge, and whether it lends itself to commodification, is quite intriguing. What knowledge is there in an attitude? Is a question knowledge -- or only an answer? Arguably both are forms of information, but only the second might be considered to be sufficiently organized to be termed knowledge. However the question implicit in an as yet unsolved mathematical problem would certainly be considered a form of knowledge by mathematicians.

But there is a challenge here. In an educational mode, a teacher will often choose not to deliver "knowledge" as a package to be absorbed -- or consumed as a commodity. Education may be considered more appropriate through a question. This is especially true of some spiritual teachers -- as exemplified by the use of the koan in Zen.What does this imply about the nature of knowledge that can only be elicited through reflection on a question -- or the humour of Sufi tales? Would the questions fundamental to society 500 years hence, or 500 light years distant, be valued as knowledge today?

Conversely, what can be said about the nature of the knowledge that is sought through asking a question of someone who purportedly knows? This is the dilemma of spiritual tourism through which western tourists pay to meet people of wisdom (often of the East or in indigenous cultures) and expect knowledge in response to their questions -- as part of the package for which they have paid serious money. But the knowledge may not be communicable in the language of the question. Invasive questioning behaviour may be inimical to comprehension -- and what is communicated as part of the deal may be packaged in a way that has little to do with how it is experienced as living knowledge.

This suggests several lines of exploration:

- are there forms of knowledge inherent in non-western cultures (and potentially valuable to them) that do not lend themselves to communication through western language?
- are there forms of knowledge capable of sustaining social development that are relatively incomprehensible to western-style science -- and might they have a vital, unexplored role in sustaining global development?
- are the responses to queries framed in western terms (such as to web search engines) to be considered information or knowledge, and if the former, what alternative forms of response might be envisaged of relevance to queries of another nature?
- is the question-answer polarity the only way of framing the progressive evolution of knowing, or are there other ways -- whether extant or that might be envisaged?
- is every evolution of comprehension to be described in terms of a quantitative "increase" in knowledge that is thereby "grasped" and "acquired"?

B. Social implications of knowledge organization

A number of observers have pointed to the way in which current investment in the development of cyberspace makes use of the same mindset as the development of two-dimensional physical space. Most obvious is the focus on the "information highway" and the parallels between the development of multinational telecom operations and that of the "seven sisters" of the oil industry (*From Information Highways to Songlines of the Noosphere: global configuration of hypertext pathways as a prerequisite for meaningful collective transformation*, 1996). Despite the hype, it is not clear that cyberspace is being developed or organized with any new insights. This is most obvious in the replication of real estate thinking in sale of cyberspace "locations" and "sites" -- notably based on the criteria for advertising. Information is organized through nested menus which are little different to the organization in bookshops or restaurants (from which "menu" derives). Computer hardware is promoted in the same way as automobiles, and sold by the same kind of people -- who now use a very similar patter; computer magazines are indistinguishable stylistically from automobile magazines.

On a larger scale the mentality associated with urban planning, with its emphasis on grid systems, is seen to be replicated in the design of

"geocities". It is really only in the more challenging video games that other forms of dynamic or multi-dimensional organization have started to become evident.

It could therefore be argued that global knowledge initiatives are presently designed to replicate and reinforce the very pattern of knowledge organization that proved inadequate to the challenges of enhancing development insight in the pre-cyberspace era. With increasing spatial constraints on development of the automobile, these initiatives are effectively designed to upgrade the existing pattern of dependency under a banner of "globalization". And just as the problematic consequences of the automobile era were unrecognizable at the end of the horse-drawn era, it is probable that the problematic consequences of this approach to cyberspace knowledge organization are equally elusive.

Social architecture and knowledge architecture

It is easy to argue that culture is exemplified in the design of buildings. Asia is especially rich in buildings of far greater design complexity than those typical of the West. To the extent that religious buildings (temples, cathedrals, mosques) are designed to reflect the organization of a world view as a system of knowledge, designs favoured in the West may be fruitfully compared with those of the East. The West has increasingly gone the route of functionality and relative simplicity (whatever the complexities of the electrical, air conditioning and plumbing systems). Religious buildings are increasingly difficulty to distinguish from office buildings. Knowledge organization is equally simplistic -- web menus being no more complex in structure than the directory of tenants in an office building.

It has been argued that the 'temples' of the future will be those created in cyberspace based on knowledge complexes. Society is then likely to have a period of temple construction similar to the cathedral construction of the Middle Ages. The essential feature of such structures will be they dynamics into which they entrain people, namely how they are travelled and what knowledge engagement they evoke.

Asian cultures have the advantage of a rich array of cultural symbols that are still widely used as referents. Reconciling the dynamics amongst Hindu deities, for example, calls for a mindset that is capable of working with a far greater degree of variety than is tolerable in western knowledge systems. Arguably it facilitates abilities to deal with the array of fundamental particles -- or with a rich ecosystem -- in ways that are alien to western thinking. Basically it might be argued that Asian cultures provide a richer training in variety handling -- as is the case with non-urbanized indigenous cultures. Whereas articulation and understanding of the complexity of social relationships is relatively limited in the West (and possibly in process of further dangerous oversimplification), that embodied in indigenous kinship systems, for example, is of a significantly higher order.

Whilst the consequences of this may become slowly apparent in science, they will become much more rapidly apparent in the organization of knowledge on the web. This may already be seen in the difference in complexity of websites of western religions compared to those of eastern religions. It will be intriguing to see the different emphasis in eastern search engine algorithms and the related efforts at knowledge visualization.

Knowledge organization and its social parallels

It is intriguing that the simplest agricultural metaphor is at the base of the modern approach to knowledge -- namely the "field". Knowledge workers are each assumed to work in a field -- people are asked to identity themselves by their "field". Knowledge is organized into fields. A person may work in several fields, although this may be considered somewhat suspect. The field may be considered entirely their own, in the case of a specialist on some out of the way topic. It may however be a very broad field in which whole teams of people work. Knowledge workers in a particular field may well be organized into a 'profession' (often to be declared on visa applications).

In this light the parallel between the development from subsistence level agriculture to agribusiness may be usefully explored. The question is whether there are unsuspected carry overs from working in a field, as practiced in agriculture, to that of knowledge working. Clearly there are similarities between:

- the isolated knowledge worker at the origins of a new field of science versus the farmer with his own self-sustaining plot, as compared with
- a large laboratory team of an industrial enterprise versus agribusiness exploitation of an array of fields.

The metaphor is useful because it helps clarify some of the elusive challenges of future knowledge work in the light of the more obvious challenges to farming -- especially in the contrast between East and West:

> (a) **Fragmentation**: In both farming and knowledge work, there is a major challenge of fragmentation. In the West, farms below a certain size are considered uneconomical. Intensive farming in the East is typically faced with the challenge of subdivision of plots amongst inheritors, leading again to nonviability. In both cases this may be termed unsustainability. Development of knowledge has also been characterized by rapid fragmentation of every field. Within any field there is increasing competition amongst knowledge workers, notably for recognition and funding, and there is a real question as to whether work in the increasingly smaller fields is sustainable -- in terms of relevance to any wider context. Within any field, workers quarrel over smaller and smaller territory. Disciples of aging pioneers form competing schools of thought subject to further schisms.

> (b) **Monoculture:** In both farming and knowledge work, "monoculture" is a way of ensuring sustainability according to economic criteria -- concentrating effort on "cash crops". This is however extremely problematic in both cases. The radical consequences in the case of farming are well-recognized: destruction of biodiversity, degradation of soil, dependence on

fertilizers, disassociation of the workforce from the land. The consequences in the case of knowledge work are similar but less well recognized: groupthink, infertility/uncreativity of knowledge workers, dubious science is response to sponsor constraints, dependence on stimulants, disassociation from the knowledge enterprise. These phenomena are the bane of large research institutions which are increasingly concerned with sustaining 'yield' in order to remain competitive.

(c) **Integration:** The previous phenomena pose the challenge of some form of integration. For agriculture this is expressed in terms of sustaining yield whilst mitigating against destructive effects on the ecosystem and the lifestyle of farmers. It requires a focus on an integrated distribution of specialized produce or the need for integrated farming methods (permaculture, etc). In the case of knowledge work, this is expressed in terms of the various flavours of interdisciplinarity and the challenge of integrating the perspectives of different disciplines in response to social issues. At one extreme this takes the form of "unity of science" and "Theories of Everything", or less ambitiously in 'knowledge organization', more recently defined in terms of 'knowledge management'.

The parallel between agriculture and knowledge work is valuable because it shows that the dramatic challenges of agriculture may be implicit in the challenges to the future of knowledge work. However it also points to the possibility that new insights into knowledge work, possibly deriving from the East, may suggest alternative approaches to agriculture and the development of sustainable communities.

C. Fundamental metaphors of knowledge work

The field metaphor may be explored further because of the insight it offers into prevalent understandings of the psycho-social relationship to work.

(a) **Property and possession:** Few would deny the degree of possessiveness associated with the fields in which people work. For a farmer, the field may be the land of his ancestors, or at least in the family for generations, or carefully worked for decades. For the specialist, this may be closely guarded territory forbidden to trespassers -- an area in which he is seeking to make a name for himself. He or she may have received the "mantle" from the previous leader in that field and consider it a right to pass it on to a person of choice. Much of the deniable history of science concerns the drama surrounding defence of such territory. In recent decades knowledge work has been increasingly protected by intellectual copyright and non-disclosure agreements. In both cases the relationship of the person to the field is a matter of identity. The person's identity may be intimately sustained by the territory in subtle ways that are currently explored in the literature on "sense of place". It is a wonder that the special relationship of indigenous peoples to their land (eg in Australia) is considered so unusual.

(b) **Dispossession and resettlement**: Little needs to be said concerning the drama of dispossession of farmers and the consequences of their resettlement on ill-chosen land. Communism may be seen as a problematic experiment in redefining the relation of the farmer to the land, shifting the focus of personal identity from the land itself to the collectivity working that land. In the case of knowledge work, analogous processes are seen in the practices to which workers are driven to ensure funding and jobs. They are called upon to switch from areas of interest to areas for which their skills are needed and for which funds are available. Their work may be "repossessed" by superiors or by the institutions for which they work. They may be required to "retrain" themselves in response to new opportunities in a turbulent job market and may be encouraged (possibly by some with hidden agendas) to believe that doing so will always be vital to their economic viability in the future. These processes are a major challenge to job satisfaction and to any sense of personal identity, self-esteem and psychological security.(c) **From field to journey**: The consequence of the previous process has been the development of a variety of forms of migratory worker. Landless agricultural workers seek work where they can find it, possibly following a regular seasonal pattern. This is increasingly seen in the case of knowledge workers. But for those still closely identified with a particular field, people not associated with that field, or with any particular field, remain a real challenge. For this reason this process is less evident in cross-disciplinary movement within the academic environment and much more evident in the dynamics associated with consultants. They feel free to move between many fields. Their skills are carried with them and no longer associated with a particular set of fields. Clearly their job satisfaction, personal identity, self-esteem and psychological security are quite differently sustained. Cultural exemplars include the western troubadour of the Middle Ages and the Japanese *ronin*.
(d) **From possession to embodiment:** Journeying with skills, identity may only be associated with possession of those skills and their transferability. In practice this is sustained by ensuring equivalence between countries of the academic or technical qualifications possessed -- although there is no corresponding equivalence between fields. Identifying with the knowledge possessed is to be contrasted with embodiment of the knowledge independent of qualifications or the fields in which it is used. This is partly recognized through the term "independent scholar" or 'jack of all trades'. Such people embody their skills in an integrative manner relatively unconstrained by their original disciplinary training or any professional association. Cultural exemplars include the Hindu *sanyasin*.

D. Sets and their comprehension

In the shift from information to knowledge the key is in the organization or ordering of the information. The emphasis in the West is placed on "lists" as most typically seen in menus on websites. These have the advantage of avoiding the challenges of introducing coherence, other than through hierarchical nesting. Much more interesting is the transition to coherent sets of elements of knowledge --

as exemplified by the periodic table of chemical elements. Here there are a variety of relationships along the various dimensions of the table -- there is a notion of complementarity. The set structure provides a scaffolding that protects elements that might otherwise be neglected or marginalized because they are little known or otherwise considered insignificant. Coherent sets might be considered as conserving conceptual diversity.

A list structure challenges through raising the question whether additional elements of knowledge should simply be added -- but there is little sense of "completeness", only of whether the list is "too long" (and therefore requires some form of nesting). The challenge of set structure emphasizes to a greater extent **where** additional items should be added within that structure -- consistent with patterns of relationship across the set. It is the reinforcement of these patterns that increases the integrative significance of the resultant knowledge complex. It is through these structures that knowledge is "packaged" and subject to "packing". This is increasingly recognized through major investments in unusual forms of information visualization (see http://www.cybergeography.org/atlas/atlas.html)

Science, western style, has tended to be less interested in the emergence of larger knowledge complexes -- other than **within specific domains**, such as chemistry (the periodic table) or fundamental physics (relationships between fundamental particles). The exception might be the pursuit of a Theory of Everything -- which however treats as derivative everything not directly related to the fundamentals of matter and energy. In particular science has been unable to provide meaningful bridges between the disciplines to ensure the emergence of any inherently interdisciplinary insight. In part this is due to the special challenges to comprehension of integrating what are effectively incommensurables. In particular western scientific methodology has provided little knowledge integration between the hard and soft sciences, or between the more objectively oriented sciences and the more subjectively oriented sciences.

The pursuit of knowledge in eastern and indigenous cultures has tended to emphasize the coherence that encompasses incommensurables **between domains** -- even if it is a challenge to comprehension and characterized by uncertainties.

Western-style science has tended to sideline the significance of its cultural heritage for the organization of knowledge. In fact western-style science might even see its emergence as a victory over inappropriate forms of coherence characteristic of the pre-scientific period -- notably in the form of Greek and Roman pantheons, or the angelic hierarchies of the monotheistic religions that succeeded them, or the 'correspondences' of the late Renaissance. The kind of "unity" that has now resulted may prove to be narrower and more simplistic than is appropriate for the future.

The issue for the future may well be how coherence is meaningfully carried in a turbulent information society in which everyone suffers from information overload -- and in which much relevant insight is underused. This is already especially problematic for young people in determining what to learn and where to find frameworks of meaning capable of sustaining individual or collective identity.

Vehicles for identity

The development of fundamental metaphors of knowledge work results in the elaboration of sets that are a challenge to comprehension. Underlying these are the following fundamentals in terms of which a locus of identity may be variously understood. 'Identity' may take a variety of forms: natural phenomena (and whether and how they are bounded in a systems or legal sense); emotions (being in love, etc); abstract concepts generated by the sciences (a plant phylum, entropy, etc); or values (peace, justice, etc) -- but especially the sense of embodied identity, or invariance, in terms of which a person experiences him- or herself. Identity is therefore closely related to the adequacy of any explanation and to how knowledge is then held.

The following approaches to identity may be considered:

> (a) **Stasis:** Whether in relation to the physical or social environment, individuals may seek explanations in terms of state or static structure -- however this is reflected in preferred conceptual frameworks, whether global ethical frameworks or theoretical structures. Preferred explanations are then articulated in terms of states and snapshots, minimizing any dynamics between states. Governance may focus on reports on the "State of the World" or the "State of the Environment".

> The case of stasis is clear and encourages simple clear-cut responses to issues of identity and boundaries. It is the classic western understanding of the separate, bounded individual relating to a community. Hence the emphasis on property and possession and a form of siege mentality that has its transcendent form in the search for Theories of Everything and ultimate absolute explanations. For the 'state', any 'citizen' is defined for administrative, legal and other purposes as a bounded, labelled entity -- which may however raise issues of false identity, multiple identities, or of non-persons without any legitimate identity.

(b) **Dynamic:** In contrast to a state focus, emphasis may be placed on change, movement and trends, whether in physical terms (travelling), social terms (career development, increasing status), cultural terms (learning), or developmental terms (individuation, spiritual quests). This may also be stressed with regard to development of knowledge (advance of science, etc). This is partly captured by the general notion of reports on "progress". The dynamic dimension is typified by work on emergent systems and chaos theory; statistically the focus is on trend analysis.

> This is best understood in terms of identity with a career -- "do not assess me for what I am but for where I am going and how I am getting there". Convicted criminals, after release, may see themselves as innocent again -- having expunged any obligation to society for past crimes. The locus is not with a particular state but the dynamic of movement between states -- boundaries are either a matter of indifference or are systematically transcended. Groups and organizations may reject any assessment of them at a particular time, arguing that they have "moved on". Conceptually there is then an identification with the learning process, with the developing history of science and with the phenomena in that process. It raises the question of what is the carrier of identity

> in process logic? Identity can then be in some way associated with a 'carrier wave' (possibly a 'standing wave') in contrast with the particular static focus.

(c) **Pattern of connectedness:** A third emphasis is on patterns of relationship, whether amongst individuals in a community or peer group, as "networking", or in patterns of trade relationships. This perception is fundamental to understanding of ecosystems. It is less well-recognized with respect to knowledge development, other than in the confused recognition of the importance of interdisciplinarity, inter-sectoral, inter-paradigmatic and inter-faith insights. But, as well stated by Gregory Bateson: "Destroying the pattern that connects detroys all quality" (**).

> This might be exemplified by the eastern understanding of the individual in community and defined by a pattern of community or kinship relationships, in contrast with the isolated bounded western individual. Conceptually the focus is on networks, exemplified by telecommunications networks. The understanding is carried confusedly by insights relating to globalization or the complexity of an ecosystem.

This 3-fold division cannot presume to be the only such division. a variety of other approaches are reviewed elsewhere (*Systems of Categories Distinguishing Cultural Biases*, 1993), notably that of Magoroh Maruyama. As noted earlier, the possibility of using music as a vehicle for identity in African cultures has also been explored (*Knowledge Gardening through Music: patterns of coherence for future African management as an alternative to Project Logic*, 2000)

F. Metaphors as conceptual scaffolding

The question is what metaphors inherent in eastern cultures will provide scaffolding for what forms of science that may be surprising, unrecognizable, or even incomprehensible in the West?

For example, in the sections above, two sets were presented:

- **3-fold**: stasis; dynamic; and pattern of connectedness
- **4-fold**: property and possession; dispossession and resettlement; from field to journey; from possession to embodiment

Does the pattern of relationship between the trinity of gods of Hindu culture, for example, provide more clues to ways of understanding the relationships between stasis, dynamism and connectedness? Or if not, is this pattern understood differently in ways that give greater weight and credibility to such relationships than emerge from equivalent cultural archetypes in western cultures? For science, is the way in which threeness is typically understood in the West (see the triadic paradigm of Paris Arnopoulos, 1993) constraining the development of insight into the structure of the atom (electron, proton, neutron), for example? Are there other qualities to threeness that are better understood and more credible to eastern cultures? The same question may be asked of sets with larger numbers of elements (see *Patterns of Conceptual Integration*, 1984).

The question for science grounded in eastern cultures is in what way their pantheons, or pluralistic frameworks for complex dynamics, will enable the emergence of patterns of insight in which diversity is held more appropriately than within frameworks in which western style unity is emphasized.

Irrespective of the degree of credence attached to pantheons, or to other "non-scientific" patterns of organizing understanding, it is useful to recognize that as metaphors they provide a form of scaffolding (or matrix) for the organization of insight. In so doing, they may enable the emergence of "scientific" understanding. They have been widely recognized as vital to scientific creativity. The comprehensible is used to provide scaffolding for the incomprehensible or the not-yet-known.

Especially intriguing is that by shifting the focus of insight from individual set members to the set as a whole, the issue of whether identity is carried by a static, a dynamic, or a relationship of connectedness (using that example) may now be addressed in terms of all three together. Namely, when is any particular perception appropriate and how are the transformations between one perception and another achieved within a coherent framework? The focus is now on the **complementarity** between the explanatory emphasis associated with each member of the set.

In this light the adaptation by the developer of the Bell helicopter, Arthur Young (*Geometry of Meaning*, 1978) of the 12 measure formulae of physics into a 3x4-fold set -- that he also matched with the traditional zodiacal signs common to East and West -- is an example of the manipulation of sets in ways that merit further exploration (see adaptation of these results to sustainable strategies and dialogue *Characteristics of phases in 12-phase learning-action cycle*, 1998).

	Property Possession	Dispossession Resettlement	Movement between fields	Embodiment
Stasis				
Dynamic				
Connectedness				

"Global" as an example of a cognitive challenge

Western-style sciences have been relatively limited in their ability to deal with any challenges of integration between incommensurables. Ironically this becomes most obvious in the current enthusiasm for things 'global' and the process of 'globalization' -- especially in terms of its dramatic implications for the livelihoods of those in developing countries. As many have remarked, 'global' becomes a disguise for

homogeneity, notably as built into 'systems'..

The fashionable use of "global" focuses simplistically on the geographical dimension: the planet as a whole. This emphasis is the culmination of a century of successful effort towards international understanding -- of "thinking globally and acting locally", of "global villages", of "global action plans", of "global ethics", of "global consciousness" and of "globalization".

What has been largely lost in this process is the other sense of global, namely some kind of comprehensible, integrative whole -- of which a geographically bounded planet is but one particular instance. "Global" is too readily taken to mean planet-wide and no more -- a recognition by certain regions that there are others on the planet. "Interdisciplinarity", "transdisciplinarity" and "integrative" have themselves evolved into holistic buzz words because of the essential failure of the initiatives they represented in responding to the fragmentation of knowledge. "Holistic" could even be considered as content-free -- providing the cozy, existentially unchallenging, explanations typical of New Age books. "Global understanding" in this integrative sense has become almost a myth in pursuit of which some heroes occasionally continue to quest (cf. 'unity of science', etc). Science western-style ignores how higher orders of unity are to be comprehended.

Perhaps it is only in mathematics that the clearest, and most general, distinction is maintained between "global" and "local". Unfortunately that discipline is incapable of taking into account the essential psychological distinction between the two that is associated with broader (rather than narrower) processes of comprehension, communication and learning. It is possibly only in Q-analysis that powerful clarification is given to the relationship between degrees of comprehension (Ron Atkin, 1977, 1981: see review).

For those of psychoanalytical orientation, there is also the suspicion that the current fascination with "global" competitiveness could usefully be seen as a projection onto a world scale of the competition of the tiny sperm of the male to reach the much larger female egg to ensure reproduction. The struggle for "globalization" may thus be partially driven by the oldest of instincts. From this perspective what awareness do those competing to imprint their particular vision on the world have of their global goal? This perspective would completely undermine democratic processes in relation to global governance. It would be reassuring to discover that sperm "cooperate" like migrating geese or like teams of racing cyclists. It is ironic that the preoccupation with globalization should occur in a period of falling male fertility and concern at the "feminization of nature" (through widespread pollution by oestrogen substitutes).

In terms of the concerns of this paper, eastern insights may offer a more fruitful understanding of "global" as a potentially accessible cognitive whole rather than as an essentially inaccessible geographical one (although the latter may serve as a metaphor for the former). Just as one can travel around the globe without being able to see it as a whole from any one perspective, so one may perhaps be able to "circumnavigate" a cognitive whole without being able to "grasp" it. It is even possible that the understanding which tends to "grasp" cannot be fruitfully termed "global" -- or that what can be so grasped is not fruitfully understood as a whole of larger significance, or of requisite variety (cf. Ashby's Law).

In terms of the challenges of global governance, the ability of a particular discipline to grasp the challenges of society cannot in this sense be understood as "global". It is necessarily sub-global, namely local in some way which honours the particular, "local" insights of that discipline. A single finger cannot pick up and hold a large ball, just as the ball cannot be completely viewed from a single perspective. In this metaphor, there is also a distinction between "clutching" and the many skills required to play with the ball through a variety of grips and actions. What does this then imply for global 'development' or "dialogue"?

Neal Stephenson (1999) has provided an intriguing review of the contrast between the Windows and Linux platforms in terms of the empowerment of their respective users. He describes this contrast metaphorically in terms of H G Wells' classic distinction between the beautiful Eloi and the ugly, techy Molochs (*The Time Traveller*, 1898) . In effect the Microsoft strategy creates (for today's Eloi) a form of conceptual cocoon of 'global' information facilities whose limitations and failures are only reluctantly acknowledged to the persistent (the Molochs) who have to maintain such systems -- a pattern similar to the glossy conceptual backing for 'globalization' that obscures the cruder realities it engenders for many. Those developing countries opting for use of Linux are avoiding entrapment and disempowerment by such conceptual hype.

This distinction challenges the interpretation to be given to 'global' in the World Bank's Global Knowledge Partnership, in Peter Russell's *Global Brain* (1983), or even in Susantha Goonatilake's *Toward a Global Science* (1999) -- that inspired this paper. However, in expressing concern about one hegemonic interpretation of 'global' science as 'totalizing', Goonatilake (1999, p. 8), seeks to reframe it: 'science as a totalizing project is totalizing only to the extent that it is an organized skeptical attempt to gather valid knowledge.' Missing however are richer insights into how the body of human knowledge can be articulated and comprehended as an integrated whole -- perhaps inspired by mathematics and the contributions of non-western science.

Crop-rotation as a metaphor of more fruitful relationships between set elements

The tendency to focus on single explanations or vehicles of identity may be explored in terms of its policy implications. Linear thinking encourages adoption of policies without thought to the nature of the policies which will have to follow them to remedy the havoc they cause, however incidentally. Given the many feedback cycles essential to the coherence of the natural environment, a non-linear approach would suggest the exploration of "policy cycles" -- within which any "linear" policies are perceived as phases.

In searching for appropriate metaphors to illustrate the need for cycles of policies (or conceptual approaches) there is a certain appropriateness to using a process which has traditionally been considered basic to sustaining the productivity of the land, namely crop rotation. The rotation of agricultural crops planted in fields is an interesting "earthy" practice to explore in the light of the mind-set which it has required of farmers for several thousand years. It is especially interesting given the central role of the 'field' metaphor in knowledge work and the challenge of sustainability of yield.

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 period, 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 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 -- or how many distinct perspectives are required to sustain an understanding of a complex whole. 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.

Are there integrative insights that require more than two contrasting perspectives to encompass their higher degree of ordering? Might there be a third or fourth complement to the 'wave' and 'particle' insights into light?

Re-reading as a method

The radical suggestion is that all conceptual patterns, from any discipline, can be profitably "re-read" as metaphors -- through which insights can be gained of relevance to other domains of knowledge. The body of knowledge, generated by the disciplines over the years, may therefore be systematically (re-)explored as a resource for implicit insights. In a sense the geological layers of knowledge laid down over the centuries, including "fossilized knowledge", may be mined. Much will be irrelevant, but there are seams of insight of great value. The challenge is to separate the two.

In many disciplines, work undertaken decades (or even years) in the past is no longer of any interest. This implies that work done today is in most cases a fairly rapidly wasting asset for society as a whole -- other than for historical purposes. The difficulty with this perspective is that it neglects the challenge of educating each generation anew, and the problem of cultures and sectors of society without the resources to deliver the latest insights in a form in which they can be absorbed. As with many technologies, obsolete presentations continue to be used and to have their place. This can be seen in the distribution of out-dated textbooks in developing countries and in their use of "out-dated" traditional technologies. Some impoverished countries are obliged to operate on a basis of continuing repair of equipment, rather than its progressive replacement.

The reality of society is that different generations of information and technology coexist, often quite fruitfully. Old technologies may be rediscovered as more appropriate than the new. Portions of new technologies may be recycled in strangely innovative ways -- as may be seen in the use of old automobile tires in certain cultures. There is therefore merit in considering conceptual patterns from the past as a non-wasting asset that may prove more appropriate under certain circumstances than the most recent. Whilst more sophisticated, the latter may be both less accessible and less robust in practice. (This argument is developed in *Paradigm shifting through transposition of key: a metaphoric illustration of unexplored possibilities for the future*, 1999)

H. Polarities, territoriality and globality: insights from the I Ching

Western-style sciences have significantly failed to provide coherent cognitive support in response to the dramatic crises of 'global' society. Despite the World Bank's Global Knowledge Partnership (http://www.globalknowledge.org/), the nature and quality of the knowledge proposed is not commensurate with the challenges (see *Coherent Policy-making Beyond the Information Barrier*, 1999). Available responses to these emerging crises are handicapped by what could be usefully understood as cognitive issues associated in various ways with: polarization, patterns of incommensurables, uncertainty, comprehensiveness (coherence or integration), dynamism (vs statics), decision-making, transformation (or development), and comprehension (and the learning process).

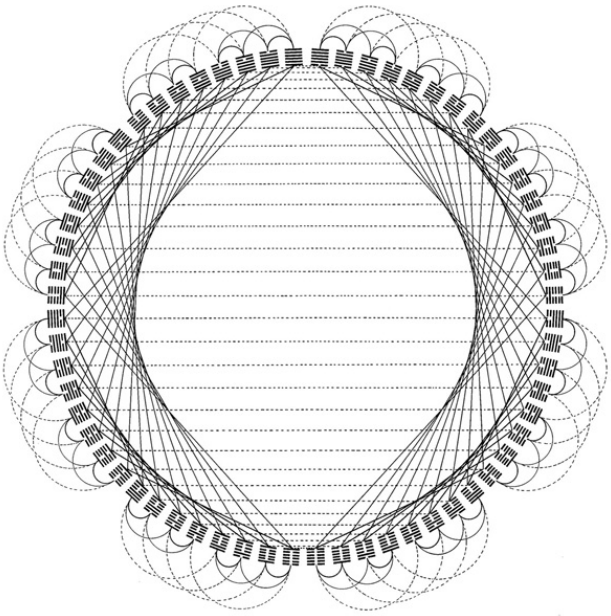
These issues tend, in whole or in part, to be designed out of any western efforts at 'global' modelling that are therefore only applicable under certain conditions. Curiously, however, they are designed into the structure of the Chinese traditional *I Ching*, or *Book of Changes* which purports to take account of the specificity of all conditions -- but at a price.

In the case of polarization, the challenges are only too evident in the simplistic approaches to the following 'gaps': North-South, East-West, Wealth-Poverty, Informed-Ignorant, Youth-Age, etc. How such differences become significant -- leading to schismatic speciation of schools of thought -- is not considered. But the real challenges to future knowledge, is how such differences are to be managed.

Perhaps the most fundamental insight of commentaries on the 64-phase *I Ching* pattern is that conditions change. As the *Book of Changes*, it is the relationship between the conditions which is as important as the conditions themselves. It is in this sense that the

approach of Myers-Briggs, for example, is characteristic of a static rather than a dynamic perspective. It is indeed the case that people can be trapped in a particular condition. It is however vital to recognize how they can transform from one condition to another.

The binary line coding of the *I Ching*, encoding polarization, is used to represent the possibility of change. Thus an unbroken line can change into a broken line, and a broken line can change into an unbroken line. In doing so the line-structure is transformed to represent one of the other conditions in the pattern as a whole:



All the line-structures in any of the specific patterns are connected by transformational pathways in this way -- to form a truly global pattern. All the lines in a line-structure do not necessarily change at the same time. Traditionally the tendency of any one of them to change is indicative of a qualifying condition that lends itself to a particular interpretation. Examples of such qualification can be seen from an *I Ching* experiment (*Transformation Metaphors derived experimentally from the Chinese Book of Changes (I Ching) for sustainable dialogue, vision, conferencing, policy, network, community and lifestyle*, 1997). See discussion of implications (*Recommendations for Change and Intervention in the World System*, 1971).

The challenge is to explore (and comprehend) both the static conditions and their tendency to transform into other conditions in a given pattern. Clearly a condition may be static over an extended period -- constituting either a valuable stable platform (a "type"), or a trap. Transformations between conditions may take place very rapidly. Traditionally, for example, a breathing cycle can be understood as passing through a series of conditions. Practitioners of a breathing discipline may understand this in terms of a 2-phase pattern (inspiration / expiration) or more complex patterns reminiscent of crop rotation. The same could be said of combustion engine or similar cycles. The dynamic pattern of conditions is then clearly vital to a larger process than is obvious from the perspective of any single condition. In this sense there may be personality "types" that are characterized more by a dynamic pattern of transformation between a number of conditions than by any single condition. Psychotherapists, for example, are concerned with pathological cycles of behaviour.

A key concern is how to design a viable transformation pattern or cycle. What conditions should form part of the pattern? How many of them are required for the cycle to be sustainable? Such challenges could be seen in terms of designing a dance -- how many steps are required? Or in composing a piece of music -- how many chords are needed to make an attractive melody? In each case an acceptable sequence needs to be determined, plus a sense of a viable whole. The pattern of transformations could be seen as a form of 'resonance hybrid' that sustains a structure that is necessarily unstable in any of its particular manifestations. It is interesting to reflect on the subtler orderings of knowledge that could only be sustained by transformations between more limited insights -- as illustrated by the wave vs particle theory (and recent interest in their 'entanglement'). Although in the case of the *I Ching* it is a 64-phase structure rather than a 2-phase structure that is sustaining the higher ordering.

In changing from one condition to another, the possibilities are to impose constraint on a free condition (eg broken to unbroken line) or to free up a constrained condition (eg unbroken to broken line). But the framework is less obvious than this implies. The constraint on a condition may be due to the context of a line (unbroken lines above and below a broken line). The constraint may be due to vacillation or subservience (broken line) in relation to commitment and direction (unbroken line).

In the light of Leibniz's early interest in the *I Ching* and binary coding (resulting in the computer), it is interesting to reflect on the possibility that the structure of the *I Ching* might be used as the basis for the design of a new kind of computer. Clearly there are intriguing possibilities for a transformation of existing binary computer logic into *I Ching* logic -- some have been explored by Katya McCall Walter in 1995 (http://www.arkspark.org/3books/3toc/3toclec.html) There have been interesting studies of the maths implied by this logic, notably by Tony Smith (http://www.innerx.net/personal/tsmith/ichgene6.html).

The question is what such a hypothetical computer might compute and to what end? In contrast with western-style 'excluded middle' logic, it might for example be used to encompass the four-valued logic that Kinhide Mushakoji (1988) considers basic to interparadigmatic dialogue, or the Jain seven-valued logic as described by Susantha Goonatilake (1998) in speculating on the possibility of the transformation of Boolean algebra (basic to computers) into others based on 4- or 7-fold logics:

> Aristoletian logic is two-fold. X is either A or not A. In contrast, Jains developed a seven-valued logic called the *Sapta-bhangi*: a

> thing may be (*Syat asti*); a thing may not be (*Syat nasti*); a thing may or may not be (*Syat asti nasti*); a thing may be inexpressible or indescribable (*Syat avaktavyah*); maybe it is and is inexpressible (*Syat nasti ca avaktavyah*); maybe it is, is not, and is inexpressible (*Syat asti ca nasti ca avaktavyah*). (p. 224 and 225)

For example, a method for generating tenacious tests by using a timed seven-valued calculus with consideration of delay of each gate in a circuit under test was presented in the Proceedings of the Fourth Asian Test Symposium (ATS '95) (*Generation of Tenacious Tests for Small Gate Delay Faults in Combinational Circuits* by Hiroshi Takahashi, Takashi Watanabe, and Yuzo Takamatsu).

The use of *I Ching* logic in encoding the genetic code and the vitamins basic to human life has been the subject of several commentaries (Martin Schonberger, 1992). However following the potential relationship to the Jain scheme, there is also the more complex pattern of the Buddhist text *Brahmajala Sutta* ('The Discourse on the All-Embracing Net of Views'; translated in 1978 by Bhikku Bodhi in *The All-Embracing Net of Views*) [see discussion and the resultant table of 62 possible viewpoints in *Patterning: Interrelating incompatible viewpoints*].

There is certainly a fundamental need for an ordering device for the variety of perspectives that can emerge in relation to any challenge or opportunity. Might such a device be used for predicting knowledge speciation in any domain? Goonatilake refers to Jain efforts 'to calculate the permutations and combinations of all possible explanations -- epistemology on a grand scale' and continues: 'In artifical intelligence, a similar all-encompassing exercise is the attempt to generate solutions by evolutionary means' (1999, p. 227)

The *I Ching* has been adapted to encode the complexities of dialogue, vision, conferencing, policy, network, community and lifestyle in parallel experiments (*Transformation Metaphors derived experimentally from the Chinese Book of Changes (I Ching) for sustainable dialogue, vision, conferencing, policy, network, community and lifestyle*, 1997). It has also been used to explore ways of reframing polarization and complexifying the knowledge space within which territorial issues (Jerusalem, indigenous lands, etc) are discussed elsewhere (*And When the Bombing Stops? Territorial conflict as a challenge to mathematicians*, 2000).

I. Subjectivity vs Objectivity

Western-style science has developed through an emphasis on objectivity. The limitations of this assumption for science have been widely reported in the case of the role of the observer in fundamental physics. But these exceptions to objectivity have essentially been marginalized to ensure that the role of the observer is minimized wherever possible. An interesting discussion of the relationship is provided by Max Deutscher (*Subjecting and Objecting*, 1983)

It is possible that eastern-style science may offer subtler ways of handling this relationship; 'science' may be reframed more inclusively as 'psience' to encompass challenges of differential comprehension and cultural variation. Ironically they have the same pronunciation. Hermann Hesse's Nobel Prize winning *Glass Bead Game* usefully contrasts, as a complementarity of playing styles, what are effectively the western and eastern approaches to the game of globalizing knowledge:

> 'In the formal Game the player sought to compose out of the objective content of every game, out of the mathematical, linguistic, musical, and other elements, as dense, coherent, and formally perfect a unity and harmony as possible. In the psychological Game, on the other hand, the object was to create unity and harmony, cosmic roundedness and perfection, not so much in the choice, arrangement, interweaving, association, and contrast of the content as in the meditation which followed every stage of the Game....The Game encompasses the player after the completion of meditation as the surface of a sphere encompasses its center, and leaves him with the feeling that he has extracted from the universe of accident and confusion a totally symmetric and harmonious cosmos, and absorbed it into himself.' (p. 197, 1943, 1969) [NB: there are numerous web-based initiatives, of highly variable quality, to emulate the Game]

The received wisdom amongst western researchers is that reasoning operates according to rational, logical, formal rules. However Philip Johnson-Laird (1998) has demonstrated that although people can reason in this way, they do not usually do so. Instead they take various short cuts in the light of mental models that they have constructed and that make people vulnerable to falsity or counterfactual alternatives -- that people generate with great regularity, according to his collaborator Ruth Byrne. Although these alternatives may be at the root of creativity, she argues that what we seem to find more difficult is creating counterfactual alternatives that are unlike the ones that everyone else creates.

The *I Ching* (like the *Kama Sutra*) provides an interesting coding system to structure inquiry into the range of possible relationships between knower and known, between the worker and the field. Its 64 hexagrams may in fact be used to represent 64 possible variants of the subjectivity/objectivity relationship -- from extremes of objectivity (*yang*) to extremes of subjectivity (*yin*) -- and the nature of the transformations between them.

Such an inquiry could be extremely valuable to reframe the extremes of polarization associated with attitudes to property and especially territory, whether in physical or knowledge space. This would be highly relevant to recognition of the attitude of indigenous peoples to their land and to the embedding of their cultural knowledge in the environment -- and relating the variants of this understanding to the objective extremes of western-style property rights. An attempt at such an exploration has been made elsewhere (see *Discovering Richer Patterns of Comprehension to Reframe Polarization*, 1998). It is somewhat ironic that it is precisely such cognitive reframing that may be vital to more fruitful approaches to the vexatious issues of intellectual copyright -- currently constrained by the simplest of polarizations, based on excluded-middle logic, and embodied in law.

Integration of subjective dimensions may help to reframe many 'external' social issues in terms of their psychological roots -- consistent with the emphases of many eastern and indigenous belief systems. Understanding of seemingly external collective issues, such as

disease, unemployment, insecurity, malnutrition and injustice, may be explored in the light of individual psychological *coherence, boredom, vulnerability, malnourishment and prejudice* respectively (see discussion) and of Buddhist notions of dependent co-arising (see). This may be especially fruitful in identifying alternatives for remedial action -- if the focus is on personal moment-by-moment significance, rather than safely projected onto western-style psychological studies without any temporal focus or personal self-reference. A major initiative in this respect is the work of R G H Siu on *Panetics* (1994), following his taoistic investigation of science (1974). There is also the intriguing possibility that the associated patterns of 'values' and 'virtues' (so extensively articulated in eastern belief systems) may in fact encode attitudinal control 'mechanisms' (and traps) for the effective navigation of knowledge spaces (*Techniques of navigation: virtues and vices*, 1998)

There is a relationship between comprehensive integrative insight and 'global' (as discussed above), much explored within eastern cultures, that might be contrasted with western-style scientific exploration. It might be summarized by Maria M. Colavito (The New Theogony, 1992) in her discussion of two models of creation in culture as the Models of the One and of the Zero. The One functions by division, the Zero by addition:

> "The model of creation by the One is the aural model. This model produces mythology, geometry, alchemy, polytheism, music, mysticism and enlightenment through revelation. The model of creation by Zero is the literary model, It is responsible for theology, algebra, biology, monotheism, visual art, asceticism and knowledge through the appropriation of data. Humanity needs both models. Our modern culture has focused on the skills necessary to produce only the latter model. A simple journey through history reveals that this struggle between these two world views is not new." (p. 19)

Commenting on this, Antonio de Nicolas (1989), sees this as the problem: the One does not know by its own skills. It is only in the model of the Zero that knowledge comes forth with its language of substances. Now the question arises what is the function of the One? Creation, of course. And how does this take place? From the *Rg Veda*, through the *Gita,* the "skills" of the One as model are the skills to open the heart and consequently the frontal lobes, to be able to make decisions for oneself and the culture in every situation. On the other hand, the skills of the Zero model, develop the neocortex only and close the entrance to the frontal lobes: wise decisions are difficult and the best solution is the "monoculture" or as it is called the uniform global culture.

The contrast might be caricatured by that between the knowledge associated with a coherent 'sense of place' and that associated with the need to travel the globe in order to be a global traveller -- adding zeros to frequent flyer mileage! It is the former insight which offers the collective self-discipline for the containment of overpopulation; it is the latter which guarantees further population explosion and unsustainable growth. In the former case the search for identity is always elsewhere, requiring progress in terms of the arrow metaphor. In the latter case identity is defined by interlocking (great) cycles defining asphere -- whose circumferences may each be composed of a sequence of many individual arrows. This raises the question of the relevance of eastern insights into 'non-action' with respect to challenges to modern society (see discussion). How is the coherence of a sense of place to be understood?

There is the intriguing possibility that the complexity and subtlety of explanation of objective phenomena may be severely constrained by the capacity of human cognitive capacity. The development of science may, to a significant degree, be about the development of that capacity through use of externalities as challenges that require better explanations. But as artefacts of the human mind this tool kit of meaningful patterns is necessarily limited and every effort is made to use one of these tools on new phenomena before making any effort to develop new ones. To some degree, therefore, understanding of cosmology or fundamental physics may be as much about what forms human knowledge can credibly take -- hence the value of metaphor and 're-reading'. The satisfactory quality of any explanation may be due to some kind of 'fit' with human cognitive organization. In an important sense the properties attributed to astrophysical or nuclear phenomena may derive their structure from innate cognitive abilities concerning acceptable patterns through which things can be meaningfully organized. Science in this sense is as much about eliciting a subjective sense of organization as discovering organization of objective phenomena. The intimacy of these relationships may prove more amenable to eastern-style science.

J. Relationship and Community

The 20th century has in many ways been characterized by an explosion in the nature and variety of relationships, whether through knowledge organization, systems and their analysis, communications networks, distribution networks, ecological food webs, or networking of every shade. 'Relationships' have become a prime preoccupation of interpersonal and community dynamics. This explosion has been the focus of a number of western-style sciences which have offered insights into aspects of the phenomenon. Unfortunately relationship failure has also been a prime characteristic of the past century and science has proved relatively ill-equipped to suggest alternatives to many of the challenges that have emerged. These may be associated with:

- inadequacy of models of possible integration, whether denoted by 'unity', 'global', 'transdisciplinary'
- inadequacy of models of relationships between faiths, aspiring to some form of unity through inter-faith dialogue (and bedevilled by some 40 simulateanous religious conflicts around the world at the end of the 20th century)
- inadequacy of models of relationship between minorities and majorities, and the territories on which they have conflicting claims
- inadequacy of models of the variety of interpersonal relationships (marked by family crises, divorce and other breakdowns)
- inadequacy of models of sustainable (alternative) communities

There is an intriguing relationship between the scientific enterprise as the pursuit of knowledge, and the masculine approach to sexual relationships. As noted by Goonatilake (1999, p. 20), feminist research has indicated, that much of western-style science and images of knowledge are heavily influenced by thinking supported by male sexual metaphors (Eveyln Keller, 1985). This concern suggests the value of speculating on the degree to which science may be considered a form of 'sexual harassment of reality' (see *Beyond Harassment of Reality and Grasping Future Possibilities learnings from sexual harassment as a metaphor*, 1996). It would then not be surprising that

such integrative models fail to emerge from science, if the research emphasis is effectively on a pattern of promiscuity reminiscent of one-night-stands -- the publish or perish syndrome that dominates science..

From this perspective, is reality a kind of "other" through which a scientist can, at least potentially, "reproduce" himself by some subtle form of cognitive intercourse? In which case are there also distorted understandings and approaches to such intercourse? Macho efforts are made to "grasp" reality and the future (Linda Alcoff et al, 1993). This is considered an important goal of education. Individuals, groups and society, "grope" their way into the future. Is there anything to be learnt by wondering how reality may feel about such grasping and groping? What kind of future emerges from processes of grasping and groping? Many engage in "stripping" reality of its various disguises in order to uncover what lies beneath -- this is the essence of scientific 'discovery'. As the key objective of the scientific method -- truth is thus reality laid bare -- through aggressive operations of the mind.

This mindset aims at acquisition and possession of knowledge -- reminiscent of Christian biblical references to a man "having knowledge of" woman. In poetic and vulgar jargon, there are references to such intercourse as 'plowing a field' -- again recalling the 'field' metaphor governing knowledge work. Many scientists would undoubtedly rate any creative discovery as 'better than sex'. It is not therefore strange to witness the subsequent concern with the 'dissemination' of results -- for which there are many zoological parallels.

Is it possible that the dysfunctionality of western-style science, in the face of the challenges to society, derives in part from the ways in which it parallels the dysfunctionality of male-female relations that have been a worldwide focus in recent decades? If this is the case, then the subtler male-female relationships articulated within the dynamics of various eastern pantheons may suggest other ways of 'knowing' reality -- less invasive and more harmonious. The erotic architecture of Hindu temple design exemplifies the variety of ways of knowing that are designed out of western equivalents. Is it possible that the positions of the *Kama Sutra of Vatsyayana* ("Kama Sutra" is Sanskrit for "Aphorisms of Love"), and the associated trantric disciplines, are vehicles to encode the full set of possible cognitive relationships between knower and known? The philosopher Paul Feyerabend (1975) would certainly subscribe, with humour, to the recognition of 'sex workers' as a category of 'knowledge workers'!

The science of the future may necessitate a subtler courtship of reality -- of Gaia -- than the increasingly functional approaches characteristic of western-style science with its mechanistic emphasis reminiscent of sexual plumbing arrangements. Reality may not react favourably to rape or to the more abusive mindsets governing male-female relationships in West and East. The present may be seen as an era of development in which it was natural to be 'economical with the truth', whereas the challenges of relationships in the future may require an emphasis on being 'ecological with the truth' -- as implied by the increasing use of the term 'ecology of knowledge'.

It is in this sense that it is important to recognize the questionable attitude underlying any project to 'mine' civilizational knowledge, as proposed in the project to 're-read' the cognitive products of civilizations (*Metaphors as Transdisciplinary Vehicles of the Future*, 1991) and embodied in the title of Susantha's Goonatilake's excellent work on *Toward a Global Science: mining civilizational knowledge* (1999). It is especially questionable when the attitude echoes that of the rape of the natural environment, notably through 'strip mining', for which this era will be severely condemned by the future.

The missing emphasis may prove vital to developing understanding of new relationship possibilities and enhancing ability to engage in them fruitfully -- whether interpersonally, in community, or amongst disciplines or belief systems. In a society in which many have to encounter a variety of 'aliens' (whether due to generational, cultural, or other gaps), the nature of communication with any future genuinely extraterrestrial aliens by 'scientists' might usefully be structured in other than in the purely western style -- as presented so often in fictional scenarios (see *Communicating with Aliens: the Psychological Dimension of Dialogue*, 2000).

Diana James, an anthropologist with the Australian Aborigines comments (in a private communication) that the virtual worlds that might be designed by eastern or indigenous knowledge workers could explore the 'alien within' rather than the 'alien without'. Maybe the aliens many seek to communicate with inhabit inner space worlds of alternative cognitive metaphors. What 'spaces' are we seeking, and will we simply colonize what we discover or will we see the spaces between as more important than the known recognised cognitive objects or 'facts' ? Will the spaces redefine the picture? Perhaps even more intriguing is the possibility, that through certain kinds of knowledge, some have long been able to shift into an inner form of orbit -- inhabiting such inner space -- and avoiding the conventional path to mortality. The 'Immortels' of the Académie Française may reflect aspects of this belief -- as do the hopes of many knowledge workers for 'immortality'. Maybe whole civilizations can migrate in this way to preserve their culture -- surviving 'hidden' into the future (perhaps like the ancestors of the Australian aboriginal Dreamtime) as do 'ancient' portions of the DNA carried by recently emergent species. Perhaps we then become their vehicles, permitting them to continue to navigate the world through our eyes?

K. Archetypal knowledge objects basic to computers of the future

The major software breakthrough in recent years has been the object-oriented programming method in which the contents and processes of all software applications are defined as logical 'objects'. There is now an intimate relationship between what can be represented as such objects and what amounts to an emerging understanding of what constitutes knowledge.

A very significant application of the object-oriented method is in the newer videogames that are the focus of so much attention and investment. As has been truly said there is now a strong drift from conventional methods of education to what amounts to 'edutainment'. Whilst many aspects of this process may be regretted from a purist perspective on the forms of knowledge that are the purview of scholars, the question is to what extent knowledge of the future will be effectively carried by new vehicles of this kind. There is a curious irony in the recent emergence of the concern with object-orieted programming and with metaphor. For software developers 'metaphor' provides a key to reframing application development -- significant new applications tend to be explicitly based on new metaphors. But, as indicated in the discussion of 're-reading', metaphor is effectively about using objects to hold knowledge.

In classical times, it may be assumed that knowledge was deliberately embedded in archetypal tales and legends (such as the set of *Jataka* tales) -- especially in oral cultures or where writing / reading skills were rare. In this way pantheons and their internal dynamics

carried knowledge. Increasingly major sections of the population have their psychic space at least partially ordered in terms of the archetypal figures of soap operas or videogames. They are effectively choosing to have knowledge and coherence of significance to them carried by such figures. As in the case of the Japanese *Manga*, these may have semi-godlike attributes and behaviours -- beyond the bounds of physics.

The origins of the Finnish success in information technology can be found, according to *Newsweek* (May 1999), in the *Kalevala*, the national epic of Finland. The article focused on Sampo, a virtual machine accumulating wisdom and wealth hundreds of years before Bill Gates. In Jyrki Pöysä's study *Virtual Kalevala - global or national?*, the *Kalevala*, is seen in the context of globalizing information technology. Reinforcing this perception, the Finnish Presidency of the European Commission, was introduced by a speech on the New Dimensions of Learning in the Information Society (July 1999) -- referring first to the influential role of the *Kalevala*. In a similar vein, *Wired* (September 1999) comments on the exceptional anti-authoritarian sentiment that is the core of Nokia's success as deriving from Antti Rokka, the hero of Väinö Linna's *The Unknown Soldier*. The hero of the Finnish information society is a person with a marked aversion towards all hierarchies. Asian cultures might do well to explore the significance of their own epics, such as the *Mahabarata*, for knowledge management.

These developments may be anathema to conventional science, but it is proving to be a civilizational choice that is partly a rejection of the ways in which knowledge is communicated by western-style science. But the key issue is whether this new approach to the representation of what people find meaningful can be used as a vehicle for new kinds of knowledge -- perhaps better adapted to the opportunities and stresses of a complex society. If such videogames are chosen for recreational purposes -- to relieve stress -- perhaps they could be used to carry insights that prevent it and empower exploration of alternatives.

It is in this respect that there is a case for considering how software of the future might be developed to carry knowledge which would currently appear unusual to western-style science. It is interesting that videogame software is already being adapted to portray archetypal figures and their relationships -- notably in role-playing variants where 'avatars' accumulate attributes that govern the dynamics of these relationships (Bruce Damer, 1998: http://www.digitalspace.com/avatars). The avatars may be designed or chosen by the user from extensive compilations of legendary figures. Other such games, such as the *Mario* series, have 'hard-wired' entities -- that the past would perceive like geniis in a bottle.

It is not therefore farfetched to envisage new forms of software in which knowledge-complexes ('objects') effectively 'takeover' or condition the operation of the interaction rather than simply being portrayed. The thousands of virtual worlds currently under development in cyberspace (see *Active Worlds*) may well become arenas in which alternative forms of knowledge operate in a more meaningful manner than in the virtual world effectively provided by western-style science. As 'worlds', populated by avatars in dynamic interaction, they may become preferred cognitive habitats to what is otherwise on offer -- prefiguring the orbital colonies of which space enthusiasts dream. The challenge of classical western-style science may be to find ways of navigating to such worlds -- and trading knowledge with their denizens. The opportunity for eastern-style science is to design virtual worlds in which alternative cognitive metaphors prevail -- with new geometries opening up new spaces for new fields and new ways of knowing. These are, as Goonatilake puts it: 'higher-order models of our world than science usually indulges in through mathematics' (1999, p. 218)

The explosion of virtual reality possibilities, combined with richer insights into identity, polarization, territoriality and possession, and subject-object relationships, may lead to breakthroughs in the management of territorial claims whether around the globe or in knowledge space, as explored elsewhere (*Discovering Richer Patterns of Comprehension to Reframe Polarization*, 1998). In discussing the cognitive significance of virtual realties, Goonatilake (1999, p. 216-219) also refers to the variety of schools of thought and their apprehension of reality (p. 207, et seq) -- but without however suggesting that their relationship and speciation processes might well be given coherence through such virtual spaces.

As a thought experiment it is therefore interesting to consider what a computer would be like if its operations were governed, for example, by principles of the Japanese art of *ikebana* -- itself a vehicle for knowledge of a certain kind. How could it be designed to exemplify that knowledge and what new kinds of knowledge and coherence might such a system then offer? Software cultivating 'artifical life' (http://alife.santafe.edu/) already indicates feasibility -- but missing is its use as a cognitive vehicle. The same question might be asked of other art forms through which complex patterns of insight are developed, held and communicated.

In contrast to the algebraic logic of western style science, Goonatilake points to Ter Ellington-Wough's (1974) review of Indian and Tibetan traditions using a geometrical logical system:

> 'The Western algebraic system uses sequential techniques of quantification and negation; on the other hand, the Indo-Tibetan geometric system 'demonstrates configurational relationships of similarity (symmetry) and congruence' (1974; p. 26). Both systems use equivalence, but in the algebraic it is quantitative, while in the geometric it is qualitative. While contemporary Western logic uses constructs of algebraic symbols in algebraic equations, the Indo-Tibetan system presents formulations in mandalas, pictorial symbols within geometric constructs.
>
> The geometric logic of the mandala is mathemtical and symbolic, its symbols pictorial. The mandala is also multivalued, not single-valued. More than one set of symbolic equivalences can be shown in a diagram and, later, can be interpreted as needed at different levels. Abstract simplicity is abandoned; symbols (plants or animals, human figures, and cultural objects) are chosen because of their 'richness and complexity'. Combining them creates symbolic composites. If worked out, a grammar of mandalas, Ellington-Wough notes, would give linguistic meanings to the geometric conversions used in drawing a manadala, including 'similarity, conguruence, concentricity, bisection, quartering, subdivision, inclusion, radiation or projection, tragency, parallelism and perpendicularity '(1974; p. 39). A new vocabulary of logic would then emerge.' (1999, p. 227)

Steps towards use of geometric logic in computer applications have been made notably by Steven Vickers (1994) and Jeremy

Gunawardena (1991). The application of cybernetic thinking to team geometry has been explored by Stafford Beer (1994) using principles of tensegrity (Judge, 1978).

It may prove to have been a mistake to reject archetypal figures as out-dated mystification -- if they can serve as vehicles to carry insights and patterns of coherence in areas where western-style science is failing the needs of society. The issue is how such figures, as knowledge objects, can be designed to carry knowledge of a higher order -- especially to sectors of society that are inherently at a disadvantage when knowledge is primarily carried by text, as at present.

One possibility is to 'massage' visualized information complexes onto memorable archetypal figures using morphing techniqes (ensuring that specific symbolic details provide hot links to other information or images). Steps towards this have been taken in the online databases (on world problems, strategies, international organizations, etc) of the Union of International Associations (gallery). These include a very extensive range of insights into human development as derived from eastern cultures (see Human Development Project), on the assumption that these may offer ways of reframing understanding of issues and initiatives.

L. Succinctness, grokability and overload

Perhaps the most severe condemnation of modern knowledge production is the degree to which the proliferation of its products parallels that of the population explosion and the challenges to which that gives rise -- including the denial that there is any problem. The phenomena of information overload and information underuse are widely recognized.

Despite the quest for a Theory of Everything, it is increasingly clear that the higher orderings of significance cannot be effectively rendered compact enough to ensure comprehension in a manner that can be related to the challenges of society or to more meaningful knowledge production. Just as developing countries are accused of uncontrolled population explosion, the prolixity of western science may prove to be its own downfall. Or again, as expressed by Goonatilake (1999): 'These quantitative changes [in growth of science] will require qualitative shifts in the nature of science.' (p.4)

It is curious that whilst the latin alphabet facilitates current computer operations, it inhibits access to knowledge by cultures using other scripts -- and especially ideograms, as in Chinese. And yet the compactness of ideograms allows much more information to be succinctly conveyed -- as is seen in their extensive use on mobile phones and pagers in China and Japan. With the challenges of interpretation/translation costs, it may be that there will be a rapid shift to ideogrammatic presentation of knowledge.

It is to this challenge to which eastern-style science may respond because of the greater accessibility of complex integrative symbols that are widely used as referents. Again it is the possibility of articulating their dynamics in new information tools and computers that is a fascinating prospect.

M. Containers for comprehensible meaning in the future

If religion, and now science, are societal undertakings located on some long-term knowledge development pathway, what kind of knowing will emerge in the future on that pathway, and to what will it be applied? Despite temporary aberrations, it might be argued that this pathway is characterized by progressive articulation of greater coherence and integration -- in which it is the nature of such 'integration' that is itself progressively reframed. The reframing must itself now integrate the recognition of loss of certainty, resulting from the work of Kurt Gödel on the possibilities of completeness in mathematics -- namely that for numerous reasons each perspective advanced fails to satisfy those holding other perspectives.

Implicit throughout the discussion above is the nature of future containers for higher orders of meaning that pose a challenge to comprehension. Religion has explicitly used metaphor to offer access to such levels of meaning -- and typically Asian, and notably Persian, cultures have freely used sexual metaphors to this end. It is clear that knowledge complexes like the *I Ching* are designed to serve as containers of this kind. The generative emergence of overtones (http://www.overtonechanting.com/overtone.htm) through the techniques of Tibetan 'one voice chord' or Tantric overtone chanting (provide a metaphor of how improbable insights can emerge from a pattern of lower frequency intonation that thus serves as a container -- reminiscent of the role of resonance hybrids in chemistry (see). But it is equally true that technologies like crop rotation, or the challenges of plasma containment in a magnetic bottle, offer powerful metaphors for exploration of the design challenges of such containers. Eastern-style sciences, as well as indigenous cultures, may have much to offer in this process.

Following the example of the Right Livelihood Award -- as the alternative Nobel Prize -- perhaps there is a case for the eastern world to establish an annual equivalent to the Nobel Prize to celebrate achievement in eastern-style science and alternative knowledge management. This could be extended to include indigenous cultures. Care would need to be taken to avoid simplistic romanticization of the other -- so often a characteristic of early sensitivity to the merits of the opposite pole of any polarity. East and West can only offer complementary styles of knowing that together hold a higher quality of knowing.

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