



laetus in praesens

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Psychosocial Energy from Polarization Within a Cyclic Pattern of Enantiodromia

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Annex 3 of *Emergence of a Union of Imaginable Associations*

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Introduction

This is an exploration of the possibility of designing (or recognizing) new types of psychosocial energy system dependent on the skillful interweaving of "positive" and "negative" energy. This would reflect the pattern of development of energy systems exploited by the industrial revolution -- offering the possibility of "generating" psychosocial energy. The exploration is based on interrelating metaphorically the patterns associated with the [Van der Graaf generator](#), the [Möbius strip](#), the [thermodynamic work cycle](#), the process of [enantiodromia](#), and the dynamics implicit in the [BaGua](#) symbol. The design process here involves the juxtaposition or superposition of patterns variously indicated through metaphor -- thereby used as design elements to explicate the whole.

The exploration is part of a study of the distinction between the century-old Union of International Associations (UIA¹), an implicit Union of Intelligible Associations (UIA²) and an emergent Union of Imaginable Associations (UIA³) to which references are variously made..

Part A: Interrelating Metaphors -- to enable a cycle of transformation between epistemological modes

Also discussed [separately](#)

Implications of the cybernetics of cybernetics: complex adaptive systems?

The focus of UIA¹ has always been the documentation of the universe of international bodies and was so recognized by a UN ECOSOC resolution of 20 July 1950. By including the relationships between bodies and to countries, this can be understood as documenting the international system of organizations. It has been valued for this reason by scholars.

Knowledge organization is typically concerned with hierarchical relationships between entities. In the case of the entities unique to the [Encyclopedia of World Problems and Human Potential](#), and characteristic of UIA² from its inception in 1972, a major innovation was

the introduction of "functional" or systemic relationships (eg *Problem A* aggravates *Problem B*, etc). This opened the way to the analysis of "vicious" and "serendipitous" loops linking problems and/or remedial strategies in extensive networks [more].

The detailed discussion of the different cybernetics perspectives and their relevance (previously included here in earlier versions), has now been transferred into a separate document (*Consciously Self-reflexive Global Initiatives: Renaissance zones, complex adaptive systems, and third order organizations*, 2007). This considers, more generally, the different ways in which the mode or form of "description" of an organizational system is itself progressively brought into question from increasingly recursive or self-referential perspectives. The cognitive assumptions associated with the "perspective" metaphor may also be called into question with greater self-reflexivity, notably in the light of the arguments of enactivism. The implicit question throughout is how to distinguish and comprehend the forms of genuinely self-reflexive global initiatives appropriate to the challenges of the times -- and how to give organized form to such understanding.

According to Magoroh Maruyama: '...it is possible to have both positive and negative mutual causal loops counterbalancing one another in any given situation'. This understanding of the function of both positive and negative feedback loops is clearly of relevance to the hundreds of thousands of such loops documented by UIA² -- available, as hyperlinks, to exploration (and visualization) [online](#) (cf *Feedback Loop Analysis in the Encyclopedia Project*, 2000)

The very large networks of looping functional relationships documented and visualized by UIA², bring the user literally face-to-face with the cognitive limitations to significant knowledge management in relation to strategic challenges. Such representations, notably of value networks or of subtle human development concepts (and modes of awareness) from many disciplines, raise issues which highlight the relevance of second order cybernetics.

Might it be the case that all the "problems" faced by humanity are subunderstood design elements of an inherently sustainable "engine" -- whose operational integrity is of a higher degree of virtualization than currently considered credible? Being subunderstood, the design elements are mismanaged and therefore malfunction. This is notably a view highlighted by Douglas Flemons (*Completing Distinctions*, 1991)

Psychosocial energy through a metaphorical technology

A key process determining social dynamics is that associated with polarization -- especially the stereotyping of "positive" and "negative" (*Being Positive and Avoiding Negativity: Management challenge of positive vs negative*. 2005). This is despite the insights of cybernetics and arguments such as those of Maruyama (above). This process might also be seen as fundamental to social transformation -- with the old being stereotyped as "negative" and the new as "positive" in order to decouple the new from the old. Such thinking, however effective, could be considered dangerously simplistic and shortsighted -- as evidenced by the violence it engenders (cf Douglas Flemons, *Completing Distinctions*, 1991) .

Various authors refer to technology seen as metaphor (Robert Romanyshyn, *Technology as Symptom and Dream*, Routledge, 1989; David Weinberger, *Technology as Metaphor*, 2000; Jason Ohler, *Seeing Technology Through Metaphor*, 2005; Tamo Chattopadhyay, *Technology as a Metaphor: mechanics of power in the global development marketplace*, 2005; Jason Balck, at al, *The Metaphors of Emerging Technologies*, 2006). There is also a case for seeing metaphor as a form of technology (cf Digital Humanities, *Metaphor as Technology: critical thinking through understanding metaphor*). The significance of the use of metaphor in this context is well stated by Maurice Yolles (*Knowledge Cybernetics: a new metaphor for social collectives*, 2005):

Having defined the metaphorical nature of knowledge cybernetics, there is a question of whether any of the metaphorical models provided have any practical value. Whether they do depends on how one sees the nature of metaphors. They are not simple comparitors, and for Brown (2003) they provide a very important way of creating a basis for new knowledge. We do not say that the models give here are true, indeed we cannot say this because of their constructivist nature. They are simply representations that will have to be evaluated and believed if there is evidence that they are practically useful to explain and perhaps to diagnose and intervene in situations that we see.

Briefly caricatured, **the concern here is with the "metaphorical technology" of sustaining a transformative relationship by continuously converting "us and them" into "them is us" and back again.** Rather than McLuhan's "the medium is the message", here it might be argued that "the method is the message". This is seen as a key to comprehending the sustaining energy of an initiative like UIA³. Beyond the explanatory function, the question here is whether such **metaphor has an enabling function -- potentially as dramatic as the discoveries of the industrial revolution.**

The necessary concern about appropriate rigour is the subject of an excellent study by Dedre Gentner and Michael Jeziorski (*The shift from metaphor to analogy in Western science*, 1993) who use as one case study the scientist **Sadi Carnot** (1796-1832) with respect to what became known as the Carnot cycle relating heat and work. This is further explored [below](#) -- as a metaphor that is potentially as rigorous as an analogy.

Table 3 (of *Three-stage Emergence of a Union of Imaginable Associations* ***) also helps to clarify the potential role associated with each mode of understanding (as appropriately understood) of UIA¹, UIA² and UIA³ within a cyclically evolving system. Specifically this includes the recognition, from a UIA³ mindset, of the function of a UIA¹ modality and its responsibility in that respect.

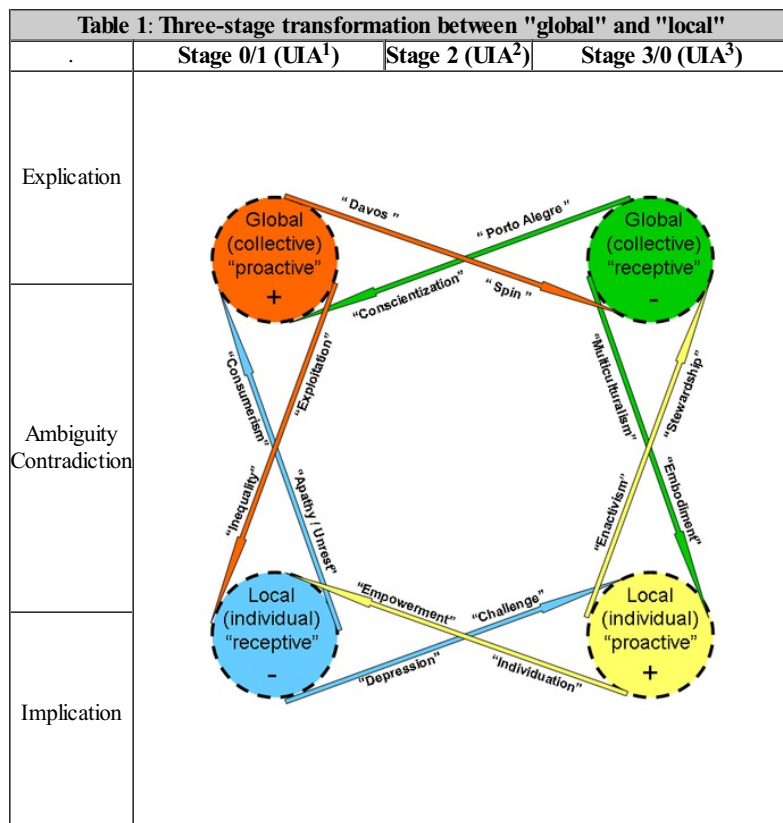
Schematic *Denkmodel*

The following model (Table 1) has a four-fold structure. This can be described as a minimal structure appropriate to the immediate purpose. "Minimal" because understanding is necessarily constrained by a cognitive need to organize in order to be able to "re-member".

It might be understood as a minimum number to discuss a system composed of two distinct "positives" ("us's") and two distinct "negatives" ("them's"). However choice of this four-fold structure should not be understood to imply that other structures of greater complexity might not be of value. These issues have been discussed elsewhere (*Representation, Comprehension and Communication of Sets: the Role of Number, International Classification*, 1978; *Distinguishing Levels of Declarations of Principles*, 1980; *Patterns of Conceptual Integration*, 1984).

To facilitate the discussion (below), necessarily in the form of linear text, the following schematic (Table 1) is used to hold some of the elements in place. It notably distinguishes and interrelates:

- the Stage 1 to Stage 3 transformation over time -- discussed in relation to UIA^1 via UIA^2 to UIA^3 (in *Three-stage Emergence of a Union of Imaginable Associations* ***)
- the global and local/individual contexts
- the positive/negative distinction
- four epistemological domains reflecting combinations of the two previous distinctions -- potentially related (with reservations) to various 4-fold systems distinguishing such modes (notably those of Ken Wilber, Magoroh Maruyama, and many mandalas)
- the cognitive patterns of the Van der Graaf generator, the Mobius strip, and the Klein bottle
- eight directional systemic relationships between the four domains
- four systemic feedback loops (or bands typical of power transmission -- Mobius twisted flat belt drives), forming the eight relationships
- movement of the belt drives understood as being clockwise around those domains (thereby charged positively) or anti-clockwise others (thereby charged "negatively")
- constitution of a thermodynamic work cycle or heat engine consequent upon such movement
- a zone of **apparent** ambiguity, discontinuity or transition, implied by the twist in each Mobius strip, understood as typical of the relation between global and individual -- an inherently confusing transformation of epistemological mode
- indicative labels (awaiting improvement) as tentatively associated with the eight directional relationships
- a process of enantiodromia, as a dynamic system, linking each of the four domains -- an "us and them" relationship to two others (one of the global/local type, one of the past/future type) which are transformed into "us is them" through the twists in the Mobius feedback loops between them
- implications for internal combustion as modelled by the combustion engine and the schematic *BaGua* symbol (of Chinese culture)



Epistemological domains

The suggestion here is that the four domains correspond to distinct modes of thought or ways of knowing. As a pattern they may be compared (as approximations) to various epistemological models (see also *Dimensions of Comprehension Diversity*, 1986; *Systems of Categories Distinguishing Cultural Biases*, 1993):

- **AQAL 4-quadrant system** (of Ken Wilber. *An Integral Theory of Consciousness*. *Journal of Consciousness Studies*, 4 (1), February 1997, pp. 71-92): The comparison with this much-cited system is however only possible by inverting the AQAL system as follows.

Table 2: Diagonally inverted representation of the AQAL system of Ken Wilber		
to demonstrate correspondence to organization of Table 1		
(which emphasizes the cultural development over time from left to right)		
	Exterior	Interior
Collective	Exterior-Collective Social ("Its") AQAL Lower-Right Quadrant (LR) e.g. Marx	Interior-Collective Cultural ("We") AQAL Lower-Left Quadrant (LL) e.g. Gadamer
Individual	Exterior-Individual Behavioral ("It") AQAL Upper-Right Quadrant (UR) e.g. Skinner	Interior-Individual Intentional ("I") AQAL Upper-Left Quadrant (UL) e.g. Freud

[AQAL](#) stands for all-quadrants, all-levels, all-intelligences, all-states, all-types:

- **Quadrants** are the dimensions of subjective, intersubjective, objective, and interobjective that emerge as a lens upon any context; every context is considered perceptible via these four dimensions.
- **Intelligences** are the capacities/potentials available to humans, including: *Logical/Mathematical, Spatial, Kinesthetic, Interpersonal, Intrapersonal, Musical, Linguistic* [\[more\]](#)
- **Levels** (or waves, or stages) refers notably to progressive steps of development in human intelligences -- the practical diagnostic scale of 'preconventional to conventional to postconventional'
- **States** are the short-term but potent conditions of the mind either natural, altered, or induced.
- **Types** refers to gender dispositions (commonly, masculine and feminine), available equally to men and women alike

Considerable research has gone into the development of this system. It is now the focus of the [Integral Institute](#) and the [Integral University](#).

Of particular interest is the claim of this system (in its more detailed form) to have comprehensively integrated all human modes of awareness. It might therefore be said that whereas [Paul Otlet's](#) ambition was to "classify the world" of phenomena through the [Universal Decimal Classification](#) (UDC) system, that of [Ken Wilber](#) (*A Theory of Everything: an integral vision for business, politics, science and spirituality*, 2000) has been to "classify the world" of awareness through the AQAL system. Both might be caricatured as "pigeon-holing systems" for "putting things in their place".

But, just as Otlet's ambitions were frustrated (as indicated by the demise of FID as promoter of UDC), the AQAL system raises the question as to its sustainability over time. Just as the UDC was effectively overtaken by the [Dewey Decimal Classification](#) system, how does AQAL respond to (and foresee) the perspectives of critics such as Stan Rowe (*Transcending this Poor Earth - à la Ken Wilber*, *Trumpeter*, 17, 1, 2001)?

Given its hierarchical nature -- promoting the progression through levels and stages of awareness -- AQAL makes no provision for the fundamental circularity associated with the humility of the biblical insight that "*The first shall be last and the last shall be first*" (*Matthew* 20:1-16) or that of T S Eliot "*Will be to arrive where we started / And know it for the first time*" (*Little Gidding*, 1942). The latter are both consonant with the serpentine [Uroboros](#) symbol favoured by Francisco Varela in his calculus for self-reference (Terry Marks-Tarlow, Robin Robertson, and Allan Combs. *Varela and the Uroboros: the psychological significance of reentry*).

In a number of respects both systems correspond to a hierarchical approach to knowledge -- characteristic of one of the quadrants (as stressed by Maruyama below). Such systems are essentially static, even asystemic in the sense that cybernetic systems are primarily characterized by the dynamics of the feedback loops between their parts -- as significantly highlighted in the global modelling stimulated by the [Limits to Growth](#) exercise of the Club of Rome (Donella H. Meadows, John Richardson and Gerhart Bruckmann, *Groping in the Dark: The First Decade of Global Modelling*, 1982) . No such feedback loops appear to be envisaged between the elements of the AQAL system *per se* -- between co-existing modes of awareness, as opposed to the developmental pathways beyond any given mode. Chris Soderquist (*Integral System Dynamics: a handout for integral sustainability*, 2006), in a presentation to the Integral Sustainability Workshop, notes that conventional systems dynamics is one of the more powerful tools for working on the exterior perspective and indicates possibilities of improving it to include more of the AQAL model as a first step to developing a theory of Integral System Dynamics.

- **Mandalas:** Curiously the design of circular mandalas, notably as developed by Tibetan Buddhists, suggests a powerful insight into the configuration of distinct psychosocial elements through which a more integrative (alternative) relation to "reality" is sustained. Typically their outer circumference is marked by a frieze of fiery symbols that could be interpreted as an understanding of the kind of charge otherwise associated with an electrostatic generator -- separating each such cognitive universe from other "parallel universes". Relationships between the parts of any mandala are typically indicated by aesthetic and symbolic associations. The relation of Wilber's AQAL to mandala structures is specifically acknowledged.
- **Epistemological mindscapes** of Magoroh Maruyama (*Mindscapes, social patterns and future development of scientific theory types*. *Cybernetica*, 1980, 23, 1, pp. 5-25) distinguished as:
 - **Hierarchical:** *H-mindscope* (homogenistic, hierarchical, classificational): Parts are subordinated to the whole, with subcategories neatly grouped into supercategories. The strongest, or the majority, dominate at the expense of the weak (whether values, policies, problems, priorities, etc). Logic is deductive and axiomatic demanding sequential reasoning. Cause-effect relations may be deterministic or probabilistic. (Dominant Western style, corresponding to Weberian bureaucracy) [*upper left quadrant of Table 1?*]
 - **Individualist:** *I-mindscope* (heterogenistic, individualistic, random): Only individuals are real, even when aggregated into society. Emphasis on self-sufficiency, independence and individual values. Design favours the random, the capricious and the unexpected. Scheduling and planning are to be avoided. Non-random events are improbable. Each question has its own answer; there are no universal principles. (Corresponding to Nietzschean or entrepreneurial view) [*lower left quadrant of Table 1?*]
 - **Stability:** *S-mindscope* (heterogenistic, interactive, homeostatic): Society consists of heterogeneous individuals who interact non-hierarchically to mutual advantages. Mutual dependency. Differences are desirable and contribute to the harmony of the whole. Maintenance of the natural equilibrium. Values are interrelated and cannot be rank-ordered. Avoidance of repetition. Causal loops. Categories not mutually exclusive. Objectivity is less useful than "cross-subjectivity" or multiple viewpoints. Meaning is context dependent. (Characteristic of Chinese, Hopi, and Balinese cultures; stability in social relationships, eg Confucian) [*upper right quadrant of Table 1?*]
 - **Generative:** *G-mindscope* (heterogenistic, interactive, morphogenetic): Heterogeneous individuals interact non-hierarchically for mutual benefit, generating new patterns and harmony. Nature is continually changing requiring allowance for change. Values interact to generate new values and meanings. Values of deliberate (anticipatory) incompleteness. Causal loops. Multiple evolving meanings. (Evident in some African and Asian nations; pluralist, 'generating new patterns by interaction') [*lower right quadrant of Table 1?*]

Within a particular mindscope, that which is consistent may be inconsistent across mindscapes.

A specific feature of Maruyama's culturally sensitive approach is the challenge it brings to the classificatory approach giving rise

to ordered models -- as implied by the elaboration of any hierarchical quadrant system and the sense of its adequacy to the variety of cultures and mindsets. A predilection for such ordering is understood to be a characteristic of only one of the mindscapes he identifies (the *H-mindscape*). This suggests that **the manner of ordering of each mindscape, in the light of the self-reflexivity required, invokes a Klein bottle pattern, each reframing the other in a manner consistent with third order dynamics** (see [above](#))

Although no comparison appears to have been made between the quadrant system of Wilber and that of Maruyama, it is important to stress that [Table 1](#) is not to be understood as a variant of either system. This is the reason why the circles are dotted to preclude any implication of closure, premature or otherwise. The challenge of self-reference and self-reflexivity in relation to any ordering of knowledge is that **any particular quadrant system is best understood as an approximation to a generic system** in which the concerns of higher order cybernetics are significant. It is in this sense only, as alternative approximations, that such systems are comparable. Aspects of this challenge are explored elsewhere (*Representation, Comprehension and Communication of Sets: the Role of Number, International Classification*, 1978; *Distinguishing Levels of Declarations of Principles*, 1980) and are echoed in the following approach to [visualization](#)

Global vs Local

With reference to [Table 1](#)

Of major significance to the current world situation is the polarization between an increasingly (and variously) glorified or vilified "global", and a fragmented (and variously) exploited or glorified "local" -- with which individuals are most connected. The preoccupation of UIA¹ has traditionally been with entities active in a global system -- having members from local systems excluded from the coverage of UIA¹. This focus has been privileged in the entities tracked by UIA² -- despite the inclusion of "human potential" from its inception in 1972.

The challenge of relating global and local has been explored elsewhere (*Configuring globally and contending locally; shaping the global network of local bargains by decoding and mapping Earth Summit inter-sectoral issues*, 1992) notably in the light of the spherical tensegrity structures of [R Buckminster Fuller](#) (*Synergetics: explorations in the geometry of thinking*, 1975-79, 2 vols).

Positive vs Negative

With reference to [Table 1](#)

Distinctions and difference: It could be said that the energy and motive power that drive social action and transformation are intimately related to a sense of difference. This may of course relate to the more material levels of Abraham Maslow's [hierarchy of needs](#). More generally it may be due to valuing a principle and contrasting it with situations where it is not upheld. Efforts were made through UIA² to document "constructive" and "destructive" *human values* -- relating the latter to *world problems* and the former to remedial *strategies*. Typically constructive values are labelled "positive" (or "good") whereas destructive values are labelled "negative" (or "bad"). Within UIA², clarifying this challenge was the focus of the *Human Values Project* whereby specific values were linked to specific "problems" or "strategies". Curiously the subtle (virtual) nature of values suggests the merit of treating them like the "[strange attractors](#)" of dynamical systems (*Human Values as Strange Attractors: coevolution of classes of governance principles*, 1993).

Disagreement: Considerable difficulties arise when there is disagreement over what is "constructive" ("positive") and "destructive" ("negative"). This leads to a situation in which those disagreeing with the view of "us" (necessarily "positive") must necessarily be labelled "negative" -- possibly to the point of demonisation (*Being Positive and Avoiding Negativity: Management challenge of positive vs negative*, 2005). This labelling is typically reciprocated. There is considerable energy tied up in the dynamics associated with such processes -- people may even "get a charge out of it". It is extremely evident during processes of social transformation in which innovators (labelling themselves "positive") stigmatise conservative resistance as "negative", whereas conservatives stigmatise the innovators as disruptively "negative". The perspective of second and third order cybernetics is clearly relevant.

Alternation: Such psychosocial processes are inherent in the democratic process of parties competing, using positive and negative campaign stereotypes, for the right to govern -- until the "negative" consequences of the "positive" later become apparent. As a healthy process, the possibility of such alternation may be seen as a key to development (*Policy Alternation for Development*, 1984). Alternation of the positive and negative charges in [Table 1](#) is more appropriately represented by configuring the domains in 3D as a tetrahedron. This is the fundamental system in the analysis of [R Buckminster Fuller](#) (*Synergetics: explorations in the geometry of thinking*, 1975-79, 2 vols). As noted [below](#), some tetrahedral visualizations for AQAL have been developed by Michael Ax (*Four Quadrants*). Alternation of this kind is characteristic of more stable molecular structures known in chemistry as [resonance hybrids](#).

Managing difference: Most effort at managing difference is designed to eliminate it through the achievement of consensus (being "positive") -- often by any means and at whatever cost (to those stereotyped as negative) -- whatever lipservice is paid to "consultation" (*Being Positive and Avoiding Negativity: Management challenge of positive vs negative*, 2005). Democracy, as rule by the majority, classically highlights the lack of significance attached to minority viewpoints. This approach, as noted above, contrasts completely with that associated with the multitude of technical innovations arising since the industrial revolution. These depend for the power which they generate, or for the devices driven by that power, on the appropriate management of difference. Examples include:

- electricity: distinguishing "positive" and "negative" electrical currents
- hydrodynamics: distinguishing "positive" and "negative" pressure
- thermodynamics: distinguishing "positive" and "negative" temperature (notably from combustion of organic material)
- chemistry: electropositive and electronegative ions basic to reactions

Interplay: The interplay of positive and negative can be used to hold several common experiential insights:

- positive-positive: understood as "moving" in the "same sense", as interpreted by a representative of either in the classic phrase to be "able to do business with" the other, "sharing the same values", "singing from the same hymn sheet" or being "on the same path" (of the "righthand"); represented mechanically, a belt drive transmission between them would require no twist -- they are of the "same orientation"
- negative-negative: as for positive-positive (*mutatis mutandis*); however it would be perceived by the latter in terms of phrases such as "honour among thieves", "companions of the left-hand"
- positive-negative: experienced as inherently attractive, whether as a fascination with difference and otherness or a need to condemn and exclude it from one's environment:
 - **without twist:** would be experienced as highly problematic -- the challenge of "the other" (xenophobia, etc) and of people "who do not share the same values" (as with *Men are from Mars, Women are from Venus*, 1992)
 - **with twist:** characteristic of enduring relationships (partnerships) between dissimilar people, whether of different sex, race, religion, lifestyle, belief system, etc; typically challenging for others to understand the nature of the bond (through the "twist")

The attribution of "positive" and "negative" is a matter of convention (cf Xavier Sallantin. *L'épistémologie de l'arithmétique*. Communication aux Séminaires internationaux d'épistémologie de l'Abbaye de Senanque, Sept. 1976). Typically those within each domain ("us") would perceive it as "positive" -- with other domains ("them") being perceived as "negative". A representation such as [Table 1](#) may therefore be presented in an alternative format with the signs reversed. One example is the presentation of two complementary representations of the *I Ching* (*Relationship between Hexagrams of the Chinese I Ching*, 1983). Such a more complex understanding allows for the alternation between the two perspectives. This is the case in many relationships where each party may perceive itself to be positive and the other negative, so that understanding the system requires alternating between the two conventions.

Elsewhere (*Cardioid Attractor Fundamental to Sustainability: 8 transactional games forming the heart of sustainable relationship*, 2005) the possibility of interrelating "positive" and "negative" in hybrid forms was explored in the light of the work of Edward Haskell (*Generalization of the structure of Mendeleev's periodic table*, 1972) and its development by Timothy Wilken (*The Relationship Continuum*, 2002). This was related to the Taoist perspective of the *BaGua* diagram (discussed further [below](#)).

Charge: To what extent is a "global" perspective "charged" by processes that could be modelled by devices such as the [Van der Graaf generator](#)? Certainly the spherical feature of its design is suggestive of such a pattern of understanding. What then of the implications of the more powerful developments by [Nikola Tesla](#) -- and the devices developed with his insights?

The significance of the charge associated with domains in [Table 1](#) can be understood as gaining or losing at expense of others, or perhaps to be framed as:

- negative: as receptor of negative feedback, this may be understood as ensuring a condition of homeostasis within the domain (Maruyama's "morphostasis")
- positive: as source of positive feedback, this may be understood as ensuring a deviation-amplifying condition (Maruyama's "morphogenesis")

Relationships

With reference to [Table 1](#)

[Table 1](#) offers a particular pattern characterized by four-fold and eight-fold relationships. Other patterns of course merit investigation, as noted above and elsewhere (*Representation, Comprehension and Communication of Sets: the Role of Number, International Classification*, 1978; *Distinguishing Levels of Declarations of Principles*, 1980; *Patterns of Conceptual Integration*, 1984).

The eight relationships in [Table 1](#) are here considered as four continuous feedback loops "driving" (or "driven by") the four epistemological domains. The circles could be visualized as cross-sections of cylinders over which each loop runs as a band or belt. This raises distinct issues:

- **Möbius strip:** The question is whether there are insights from technical innovation that can usefully integrate the four disparate domains in a manner of relevance to sustainability. Of particular interest in this respect is the power transmission achieved by [belt drives](#) -- specially designed belts and pulleys introduced with the industrial revolution and common to many factories. In practice flat belts over wheels were often given a half-twist before joining the ends -- thus taking the intriguing mathematical form of a [Möbius strip](#) [more]. This twist ensures that the belt has only a single side, a single boundary and of being [non-orientable](#) [more]. Clifford Pickover (*The Möbius Strip: Dr. August Möbius's marvelous band in mathematics, games, literature, art, technology, and cosmology*, 2006) describes **the Möbius strip as the ultimate metaphor for something simple, yet profound** -- a metaphor for magic and mystery, and "a perpetual icon stimulating the search for depths even in seemingly shallow waters". It exemplifies the transformation of an appearance of "us and them" into recognition of an underlying reality of "them is us".

Möbius strips have been used in "twist belt conveyors" (lasting longer because the entire surface area of the belt gets the same amount of wear), as continuous-loop recording tapes (to double the playing time), and in other manufacturing applications. Möbius-wrap coils are also common in electrical transformers. The artist [M. C. Escher](#), with his strong interest in topology, was skilled at depicting Möbius strips (cf his woodcuts *Möbius Strip I* and *Möbius Strip II*, 1963).

An experiment with any such belt (a strip of paper) further suggests that, at least with a mechanical system, the cylindrical surfaces over which it runs are best oriented so that their axes of rotation are at right angles to one another. This enhances the

difference they are called upon to carry as distinct epistemological domains.

In [Table 1](#) the twist ensures that one side of the belt is associated with a positive charge and the other with a negative charge -- each side appropriately in contact with the circular domain (as clarified below in the discussion of the Van der Graaf generator as a metaphor).

- **Wilber's "conveyor belt"**: Ironically Ken Wilber (*Integral Spirituality: a startling new role for religion in the modern and postmodern world*, Shambhala, 2006) has a widely referenced key chapter on "The Conveyor Belt". It focuses on the role of the traditional religions as a sacred "conveyor belt" to move people through all the stages of psychospiritual development -- a developmental conveyor belt. Wilber sees it as "quite possibly, the single greatest problem facing the world... fixing this problem, if there is a fix, would provide a startling new role for religion in the modern and postmodern world" (12 June 2006).

There is however no mention of the "twist" that has been so vital to industrial conveyor belts. In fact there is seemingly no recognition that a conveyor belt has to move in both directions if it is to sustain its ability to "convey" in one direction -- with the return (unconscious?) movement typically invisible from the "active" (conscious?) side. A "one-sided" developmental conveyor belt? Those on a people conveyor may well be unaware of the necessarily hidden reverse motion. Such "unconsciousness" is the subject of a study by John Ralston Saul (*The Unconscious Civilization*, 1997). This suggests that the use of the metaphor typically exemplifies such unconsciousness, as illustrated by other issues:

- in the drug trade the focus is on the problematic movement of the drugs but not on whether the demand for them is problematic (Kevin Nelson, *It's Like a Conveyor Belt*, *AlterNet*. 11 August 2003).
 - the expression "global conveyor belt" has been applied to the movement of qualified health personnel from developing countries [[more](#)].
 - the expression "conveyor belt artists" has been applied where too many graduates want to be famous artists without first learning their trade [[more](#)].
- **Cognitive "twist"**: The twist in the feedback loop between epistemological domains in [Table 1](#) highlights their fundamental distinction through an **apparent** discontinuity. The challenge of any such a twist is discussed elsewhere (*Engaging with Questions of Higher Order: cognitive vigilance required for higher degrees of twistedness*, 2004; *Twistedness in Psycho-social Systems: challenge to logic, morality, leadership and personal development*, 2004).

The operation of such a twist, and the challenge to comprehension, has been remarkably well depicted in the work of the artist [M C Escher](#), specifically with respect to the Möbius strip, but more generally as discussed below (in relation to [enantiodromia](#)).

The problem of interpretation/translation between languages is well-recognized. Curiously, it is readily assumed that such translation is not required between the conceptual "languages" that characterize different domains -- and that that challenge is insignificant to communication (rather than potentially of much greater difficulty). There is notably no recognized profession for interpretation/translation between conceptual languages. For example, the EU annually spends some €1.1 billion on translation and interpretation, namely 1 percent of the EU budget (for 3,000 staff to interpret some 11,000 meetings and to translate over 1.3 million pages of text). EU meetings are not known for their use of "facilitators".

The unaddressed challenge is evident in many efforts at interdisciplinary communication and might be considered fundamental in the case of any "clash of civilizations" (witness the minimum number of Arabic interpreters/translators in the initial period of the "war on terrorism"). In a supposedly democratic world, who interprets between the "languages" of "right" and "left", "north" and "south", "east" and "west" -- and between any "clashing civilizations"? (cf *Review of Frameworks for the Representation of Alternative Conceptual Orderings as Determined by Cultural and Linguistic Contexts*, 1986)

- **Labelling of relationships**: The "movement" of a Möbius belt "around" any pair of epistemological domains requires that one domain move in a "clockwise direction" and the other in an "anti-clockwise" direction. The former may be understood as being charged positively by this process (thereby gaining energy), whether or not it is in effect "driven" by that which is consequently charged negatively (thereby losing energy). The "charging" is discussed below with respect to the Van der Graaf generator. This process may be understood to make apparent two distinct parts of the continuous belt:
 - one moving from the domain charged positively to the domain charged negatively
 - one moving from the domain charged negatively to the domain charged positively

Two indicative labels have been **tentatively** attached to each such portion of the continuous loop:

- that close to the arrow indicative of the kind of effect it is bringing into the domain
- that distant from the arrow indicative of the understanding of the domain engendering it

It should be understood that each such label could carry other more positive or more negative connotations through alternative terms. The pattern of indicative labels, as currently in [Table 1](#), could indeed be usefully understood as poorly "tuned". The labels constitute an array that calls for "conceptual tuning" -- with all the challenges which the musical metaphor implies with regard to choice of [tuning system](#).

Eight-fold relationships: It is appropriate to note that the thousands of bidirectional systemic relationships linking entities in databases developed by [UIA²](#) for the *Encyclopedia of World Problems and Human Potential*, were only given generic names (such as *aggravates*, *aggravated by*, *alleviates*, *alleviated by*, etc). These could have been more specifically described.

- **Value memes of *Spiral Dynamics: mastering values, leadership, and change*** (by Don Beck and Christopher Cowan, 1996): This system is frequently cited as complementary to use of the AQAL quadrant system. It distinguishes a spiral sequence of eight progressively more complex (colour coded) conceptual models of the world through which humans (and cultures) adapt to handle new problems. Potentially reflecting higher order cybernetics, each new model includes and transcends all previous models understood to be organized around core values or collective intelligences (termed vMemes). These are:
 - *Beige*: Instinctual
 - *Purple*: Magical-animistic, tribal
 - *Red*: Egocentric, power, feudalistic
 - *Blue*: Mythic-membership, conformist, fundamentalist, ethnocentric, traditional
 - *Orange*: Excellence, achievement, progress, modern
 - *Green*: Postmodern, multicultural, sensitive, pluralistic
 - *Yellow*: Systemic, flexible, flowing
 - *Turquoise*: Cosmic unity, integrative, nested hierarchies of interrelationships, holism
- **BaGua and I Ching "houses"**: The traditional *I Ching* (*The Book of Changes*) offers a quite different way of encoding and portraying the eight-fold (paired) relationships of [Table 1](#). It offers the additional advantage of allowing the complexity to be scalable. The 64 hexagram-encoded conditions are traditionally clustered into 8 houses. No explicit relationship to the colour coding of spiral dynamics appears to have been made, but an interesting step in that direction is that of [Jeff Mishlove](#) (*The Rainbow YinYang*, 2006) -- a rainbow coloured representation of the Tao symbol.

Within the Chinese culture, an 8-fold pattern of relationship is a fundamental philosophical concept known as the *BaGua* (or *Pa Qua*). It is an octagonal diagram, widely reproduced as a symbol, with one trigram on each side. Its implications are associated not only with Taoist thought and the *I Ching*, but also other domains of Chinese culture (such as fengshui, martial arts, navigation, etc). Numerous images are available on the web -- oriented and coloured in a variety of ways. Of interest is the manner in which the eight conditions are generated from "positive" and "negative" -- generically understood as *yang* and *yin* respectively. Of particular interest is the fact that the dynamic relationships between the 8 conditions are typically not **explicit** in any representation. They are implicit -- although an indication of their explicit nature is offered below.

The further significance of the *Ba Gua* is discussed more extensively below in relationship to the cycle of the [combustion engine](#).

- **Transactional games**: Elsewhere (*Cardioid Attractor Fundamental to Sustainability: 8 transactional games forming the heart of sustainable relationship*, 2005) an eightfold pattern of relationships was described in terms of a generalized understanding of transactional games understood as constituting a cycle. The "relationship games", in the light of the work of Edward Haskell (*Generalization of the structure of Mendeleev's periodic table*, 1972) and its development by Timothy Wilken (*The Relationship Continuum*, 2002), are there defined in terms of a "control component" and a "work component" as follows:

Table 3: Possible 8-fold Positive-Negative Hybrid Conditions				
		X = "Work component"		
		Negative	Neutral	Positive
Y = "Control component"	Positive	<i>predation</i> (positive negativity)	<i>allotrophy</i> (positive neutrality)	<i>symbiosis</i> (positive positivity)
	Neutral	<i>amensalism</i> (neutral negativity)	O (neutral neutrality)	<i>commensalism</i> (neutral positivity)
	Negative	<i>synnecrosis</i> (negative negativity)	<i>allopthy</i> (negative neutrality)	<i>parasitism</i> (negative positivity)

Part B: Psychosocial Work Cycle: Beyond the plane of Möbius

Also discussed [separately](#)

Beyond the plane of Möbius: form and medium in terms of the calculus of indications

The following argument was developed to explore the implications of use a more complex medium than the plane surface (as with this page) as a support for insights. In contrast to the plane surface of a simple matrix (or the tabular presentation of [Table 1](#)), a torus holds an interesting position in the discussion of the relationship between form and medium as fundamental to advanced theories of communication (*Comprehension of Requisite Variety for Sustainable Psychosocial Dynamics: transforming a matrix classification onto intertwined tori*, 2006). The points made are in many respects relevant to the possibility of writing an integrative text on a continuous Möbius strip (or on a Klein bottle surface, as discussed [below](#)).

"Space" as a key to reflexivity: The torus notably featured in the work of Niklas Luhmann (*Die Gesellschaft der Gesellschaft*, 1997) and discussed by Michael Schiltz (*Form and Medium: a mathematical reconstruction, Image [&] Narrative*, 6, 2003) in relation to the calculus of indications of [George Spencer-Brown](#) (*Laws of Form*, 1969/1994). Schiltz notes that form/medium is "the image for systemic connectivity and concatenation", as described by [Humberto Maturana](#) and [Francesco Varela](#). Schiltz notes, that the notion of "space" is the key to reflexivity appropriate to any discussion of form and medium, citing Spencer-Brown as follows:

In all mathematics it becomes apparent, at some stage, that we have for some time been following a rule without being aware of it. This might be described as the use of a *covert convention*. [... Its] use can be considered as the presence of an arrangement in the absence of an agreement. For example, in the statement and theorem.... it is arranged (although not agreed) that we shall write on a plane surface. **If we write on the surface of a torus the theorem is not true** [...] The fact that men have for centuries used a plane surface for writing means that, at this point in the text, both author and reader are ready to be conned into the assumption of a plane writing surface without question. But, like any other assumption, it is not unquestionable, and the fact that we can question it here means that we can question it elsewhere.

A somewhat related point has been made by R Buckminster Fuller (*Bias on One Side of the Line* In: *Synergetics: explorations in the geometry of thinking*, 1975, #811.00). What are the implications of the added emphasis above for elaborating psychosocial development strategies?

Covert conventions: Schiltz then comments (in language that calls for a longer quotation to convey the richness of the subtle argument -- **emphasis added**) :

It was our choice to write in a plane surface that has made that distinctions indeed do cut off an inside from an outside, that 'differences do make a difference' (Gregory Bateson). Covert conventions at a level deeper than the level of form, preceding the level of form, have determined what the form would do. There lies a chance for developing a medium theory here. In this concrete case: the medium of the plane surface makes the difference. And in general: the topology of the medium makes the difference between distinctions making a difference and distinctions not making a difference. 'It is now evident that if a different surface is used, what is written on it, although identical in marking may be not identical in meaning'... Spencer-Brown has shown us that the 'medium is the message' (Marshall MacLuhan).....

Spencer-Brown's solution to the problem of many-valued functions is well-known. He constructs a tunnel 'subverting' the plane, and connects the distinguished sides. As hinted to above, the topological qualities of space are thus altered. We are now writing in a space that grants a form the possibility of access to itself, yet denies the possibility of identity with or presence to itself (Michael Schiltz and Gert Verschraegen, *Spencer-Brown, Luhmann, and Autology*. Cybernetics and Human Knowing 9, 2002, 3-4). Hence, **we are writing in a space that connects the level of first-order (operand) and second-order (operator) observations. That space is a torus. If considered operationally, distinctions written on a torus can subvert their boundaries and re-enter the space they distinguish, turning up in their own form.** The marked state cannot be clearly distinguished from the unmarked state anymore, leading to the 'indeterminacy' of the form. As the calculus explains, the state envisaged as such is a state not hitherto envisaged in the form. It is neither marked nor unmarked. It is an imaginary value, flipping between marked and unmarked, thanks to the employment of *time*. The form of the **re-entry**, as described here, has been the source of many commentaries....

Such conceptualization diverts sharply from an intuitive understanding of a medium. As seen here, a medium is far from a Euclidean container. Rather is it introverted space, it is identical to the *topology of the form*, it is the form's 'deep structure'.

There is at least the possibility that **shifting out of planar articulation of any "peace process" in the Middle East, for example, might clarify more coherent options.**

Re-entry of distinction with itself: Schiltz concludes:

If the medium of **meaning** is indeed the ultimate medium of psychic and social systems, i.e. if meaning is 'the medium of itself', then what is its 'form', the distinction through which it can be expressed? I perceive only one answer: the medium of meaning must be identical to the difference between form and medium, and the re-entry of that distinction into itself. Its consequent undecidability is the symbol of our dealing with the world. It expresses the fact that all our attempts to get a hold of the world are doomed to frustration....

Meaning as our *phenomenology* of this world can only be partial, as the difference between form/medium can only be actualized as a form. In mathematical terms: meaning is a **lambda-domain** occupied by communications that, by acting on themselves (= being a function of themselves), produce new communications in the same domain which can in turn act on themselves and further expand the domain. [cf Louis H. Kauffman, *The Mathematics of Charles Sanders Peirce, Cybernetics and Human Knowing*, 8, 1-2, 2001]

The theoretical usefulness of the distinction (and potentially its significance for sustainable development) is demonstrated by Schiltz through the exemplary medium of money.

Undermining insight using planar surfaces: The general argument raises the question of the impact of paper and flat computer screens (and "pull down" menus) in undermining any desirable emergence of non-planar surfaces for the presentation of information more capable of enabling and enhancing sustainable development. Perhaps there is a case for the "crystal balls" of the futurists of yore! The challenge is particularly evident in the articulation of any "global ethic", strategic "vision", mission statement or global plan -- like *Agenda 21* (cf *Structure of Declarations Challenging Traditional Patterns*, 1993; *Distinguishing Levels of Declarations of Principles*, 1980). What would be the consequence of endeavouring to articulate these on a torus, for example?

Closure as the imposition of fixity: Related questions of interest are to be found in the philosophical discussion of closure by Hilary

Lawson (*Closure: a story of everything*, 2001). He notes that "things" occur and emerge with closure:

Closure can be understood as the imposition of fixity on openness....It is the conversion of flux into identity, the conversion of possibility into the particular." Lawson uses a simple example of a piece of paper with many random dots on it. From that, we can perceive various patterns, lets say we can identify a face. That face - that 'thing' - is the result of a closure. The world of things, the world of chairs, music, quarks, algebra, society, and so on, are the results of closures. And, typically, closures are stacked upon other closures. For example, 'paper' and 'dots' are also the results of closures upon which the result of closure of 'face' rests. It is immediately clear, also, that closures incorporate a context of other closures; at the least, it is a *ceteris paribus* condition. [[more](#) | [more](#)]

In considering such closure elsewhere (*Psychology of Sustainability: embodying cyclic environmental processes*, 2002), Lawson's position was cited as follows:

Instead of seeing the world as a thing, a universe, whose truths we might uncover through for example the procedures of science, *Closure* proposes that we regard the world as open and it is we who close it through our stories. The resulting framework offers solutions to the central questions of contemporary philosophy: the character of language and meaning, of the individual and consciousness, of truth and reality. As a theory of knowledge *Closure* has dramatic consequences for our understanding of the sciences, changing what we think science is about and how it is able to do it. It also accounts for why we need and desire both art and religion. It reshapes our understanding of ourselves and the organization of society, our goals and our capacity to achieve them. But above all it makes sense of where we are and who we are.

To what extent are the various approaches to sustainable development, and the search for alternative paradigms, to be considered as efforts to achieve new -- and more encompassing -- forms of closure?

Visualization: quadrant systems / Möbius strips / Klein bottles

Quadrant systems: Given the importance of 4-quadrant systems for the organization of thought, it is not surprising that mathematical and visualization techniques have been developed, notably by Michael Ax (*Four Quadrants*), to show how they model linearity and non-linearity to serve as a bridge for the modern mind looking to understand, integrate and use various insights through a concise model. There are of course numerous 4-fold images, including the four-leaved clover.

Möbius strips: Numerous images are available illustrating the Möbius strip. That on the WolframMathWorld site enables interaction with it [[more](#)]. Anu Garg has an interactive *VRML Mobius Strip*. The University of Michigan Virtual Reality Laboratory offers several [interactive animations](#). As noted, the artist [M. C. Escher](#) was skilled at depicting Möbius strips of which one (*Möbius Strip II: Red Ants*, 1963) is on the aforementioned virtual reality site. A [flash movie](#) and VRML presentation have been produced by Drastic-Creations.

Klein bottles: A true Klein bottle in four dimensions does not intersect itself where it crosses the side. It is a closed but borderless surface with no inside or outside, which can be embedded only in a four-dimensional space. Again numerous images are available illustrating the Klein bottle. That on the WolframMathWorld site enables interaction with it [[more](#)].

The most interesting, with greatest supplementary information, is that of Konrad Polthier (*Imaging maths: inside the Klein bottle*, 2003). This enables access to various animations, including one showing how it is formed from two Möbius strips. A second shows how a cylinder (otherwise bent round to form a torus) can be used to make a Klein bottle: instead of adding a twist (as with the making a Möbius band from a strip of paper), one end of the cylinder is looped back through the cylinder and glued to the other end, with the two boundary circles given opposite orientations. Polthier also offers an animation of a figure-8 Klein bottle and a Lawson-Klein bottle (a Klein bottle in the 3-sphere S^3 , among a family of helicoidal - staircase-like - surfaces) as projected into 3-dimensional Euclidean space. Of particular relevance to the following argument is the animation illustrating the 3D analogue to a Möbius belt drive.

"Sphering the Circle" (from 2D to 3D): a Klein-bottle relationship "belt drive"?

The 2D representation of epistemological domains as circles in [Table 1](#) is of course only indicative of an abstraction with experiential significance. A more powerfully significant representation is in 3D form with spheres rather than circles. The wrap-around experience of a sphere as a closed domain then more accurately suggests the self-sufficient nature of experience within such a cognitive "world". The other domains are then well-sensed as "other worlds" whatever the relationship to them -- and however distant they appear (*Towards an Astrophysics of the Knowledge Universe: from astronautics to noonautics?* 2006)

However, with respect to relationships between domains, the extension into 3D does raise the issue of how they are to be understood as feedback "loops" -- given that a loop is normally characterized by 2D thinking reflected in systems diagrams. Such a loop is only an abstraction which bears little experiential resemblance to how feedback is actually experienced. How is a "loop" to be (better?) understood in 3D, and specifically one like the Möbius strip? The matter is complicated by the fact that a Möbius strip is a two-dimensional strip that acquires a degree of three-dimensionality through being twisted through the third dimension.

Klein bottle: The 3D analogue to the Möbius strip, to which reference is often made, is the [Klein bottle](#). Even more than in the case of the Möbius strip, this poses a challenge to comprehension, especially given the constraints on its visualization as an "impossible" structure (through being twisted through the fourth dimension). Aside from visualization, as an external object, the question here is how it may be considered indicative of cognitive interaction between a "positive" ("us") and a "negative" ("them"). More specifically, how does one

identify, through the pattern it offers, with the process of encountering a "them" who may be understandable as "us" -- an "outsider" who may well, appropriately understood, be an "insider"? Comprehension of this possibility is assisted by Polthier's [animation](#).

As discussed elsewhere (*Symbolic relationship between positive and negative*, 2005; *Snoring of The Other: a politically relevant psycho-spiritual metaphor?* 2006), the classic depiction of opposite yin-yang complementarities in the Tao symbol can be understood as a two-dimensional projection of the topology of a [Klein bottle](#) (as suggested to the author by Nadia McLaren). Melanie Purcell (*Imperatives for unbiased holistic education: the Klein bottle, a universal structure: an archetypal image*, 1999; *What are The Relationships Between Infinity and Zero?: the diagonally woven single joined thread Klein bottle, and the implications of a cyclic universe*, 1998; *Looking at the Universe through the belly of a Klein bottle*, 1999) has explored this as follows:

Truth is relative to the perspective of the observer, and the nature of the perception of reality will determine the nature of the truth expressed. In this presentation I want to explore the relationships between opposed world views and how these oppositional perspectives will determine the nature of truths held. Most models used to describe relationships create an exclusive domain that exteriorises that which is outside or marginalised by the structure.

The Klein bottle is one structure that creates no exclusive domain as it is a modality that, through a structural twist, unifies the inside and outside surfaces into a continuous surface. Through the use of such a structure, seemingly opposed perspectives can be illustrated as aspects of the whole where seemingly paradoxical environments necessitate a decisive shift from an 'either / or' critique to a pluralistic 'and / both' scenario. This structure allows for the relativity of truths to be realised as expressions that are inextricably linked to relative world views, and therefore creates a focus for a holistic approach to information generation.

Whereas Purcell has focused on understanding topological manipulation of the lines used to represent yin and yang, and the associated classic symbolism (notably of a [pelican pecking at its breast](#), discussed [below](#)), the symbol of the Tao can itself be understood as a two-dimensional representation of a Klein bottle (and as a stylized approximation to that of the pelican). The symbol then constitutes a 2D schematic of the comprehension challenge of the Klein bottle. The symbol of the Tao might then be usefully understood as a Klein bottle as represented by Picasso!

Briefly, the light and dark parts hold polarities such as "positive" and "negative". But each of these (in more complex variants of the symbol) has a small "eye" of the opposite colour. These may each be considered as an opening into the larger part of the same colour -- a window (or a tunnel in 3D) from one part to the other.

Summarizing:

- the small black circle (within the white zone) is to be understood as reduced to a "cognitive singularity" through which the black surface is to be seen and by which access to it is obtained
- the small white circle (within the black zone) is to be understood as reduced to a "cognitive singularity" through which the white surface is to be seen and by which access to it is obtained
- effectively these two circles are the **same** singularity seen from the different surfaces, one "inside" and one "outside" the higher dimension Klein bottle
- the white and black surfaces are then continuous through the "cognitive singularity", such that there are not two surfaces (distinctly coloured) but a single surface that is readily seen as of two kinds (white and black), depending on from which side of the singularity the surfaces are viewed.

Möbius and Klein representations: Purcell herself clarifies the relationship of the Klein bottle to the more readily understood [Möbius strip](#). A Klein bottle can be produced by gluing two Möbius strips together along their edges (as [illustrated](#) by Polthier); this cannot be done in ordinary three-dimensional Euclidean space without creating self-intersections (thus distinct from Varela's understanding of "re-entry").

Like the Möbius strip, the Tao symbol/Klein bottle then offers a continuous single surface -- without a distinct "inside" or "outside". In the case of the Tao, emphasis (by Taoists) is typically placed on the illusory nature of the distinction -- as being one of limited awareness.

This illusion may be clarified in the easier case of the Möbius strip where observation of it from any particular point does indeed create the illusion of two sides. It might be decided to colour white the proximate side (directly visible from that perspective) and to colour black the part that is perceived as distant (and crossed by the white portion) -- with the implication that this may also be the colour of a significant part of what is hidden. Such contrasting colouring is typical of representations of the Möbius strip. This distinctive colouring is of course seen to be mistaken when the Möbius is manipulated and viewed from another perspective. The white/black discontinuity is recognized to be erroneous and inappropriate. But, even when theoretically aware of the structure of an uncoloured Möbius strip, comprehending this continuity is a challenge to grasp -- as it is with the continuities between any polarities (cf Douglas Flemons, *Completing Distinctions*, 1991). Clearly the case of the Klein bottle is even more challenging -- especially given the implied "cognitive twist" in 3D.

The "dynamics" potentially associated with the Klein bottle, as presented by Konrad Polthier (*Imaging maths: inside the Klein bottle*, 2003), probably offers one of the most powerful illustrations of the environmental challenge of recycling. This is especially because of the manner in which it effectively incorporates the necessary cognitive twist. Here the twist is associated with the challenge of rendering (re)consumable what one excretes -- no mean feat for the squeamish!.

Cognitive twist as a dynamic in 3D: It is therefore interesting to explore some suggestive examples of the challenge -- each contributing to comprehension of the generic case of the relation between "positive" ("us") and "negative" ("them") in which the "twist"

functions as some kind of "transformative insulating device". The examples below, generalizing from a Möbius belt "around" an epistemological domain, are based on the intuition that in the 3D situation "around" is associated with some kind of dynamic "encompassing" process -- probably fundamental to many dynamic relationships. The ability of topology to describe a Klein bottle rigorously completely obscures the possibility that it may be associated with a challenging cognitive dynamic (as partially [illustrated](#) by Polthier). This issue has been explored in relation to a torus, where interrelated tori may be significant to comprehension of the twist (*Comprehension of Requisite Variety for Sustainable Psychosocial Dynamics: Transforming a matrix classification onto intertwined tori*, 2006)

Table 4: Indication of nature of "encompassing" cognitive processes, resulting in "inversion"			
	Stage 1	Stage 2: "cognitive twist"	Stage 3
Virtual	implication	holomovement	explication
	information	learning	decision/choice
	insight	reflection	invention
Bodily functions	ingestion	digestion	defecation
	inspiration	gas exchange	expiration
	intercourse	conception/gestation	birth
Behavioural	acquisition	incorporation	production
	enfolding	?	exposing?
	encompassing	?	excluding?

Many of these expressions are used metaphorically as indicators of experiential significance.

In the Möbius case, the mechanical movement of a (conveyor) belt is suggestive of how a feedback loop "works". But in each row in Table 4 (above), in the 3D case, this process is more closely represented by the operation of annular muscles -- as with the rhythmic contraction of smooth muscles ([peristalsis](#)) to propel food contents through the digestive tract. The experiential feel for the process, and the twist, is illustrated by phrases such as "I could eat you up" (whether amorously or in a business situation); "swallowing" or "being swallowed" (by a business competitor). The dynamic may be better described and understood in terms of cognitive catastrophes (*Cognitive Feel for Cognitive Catastrophes: Question Conformality*, 2006). Most curiously, in the light of any Klein bottle modelling of "engulfing", the term is frequently used as a descriptor by mystics of the experiential relation to "god" (cf Alec Irwin, *Devoured by God: cannibalism, mysticism, and ethics in Simone Weil, Cross Currents*, 2001).

Transcending distinctions: A very well-documented study by [Douglas Flemons](#) (*Completing Distinctions*, 1991) endeavours to interweave the ideas of Gregory Bateson and Taoism in a unique approach to therapy. He starts from the position that:

Any act of knowing, any knowing act, begins with the drawing of a distinction, with the noting of a difference. A boundary is created when a whole is distinguished from a part...Knowing is composed of boundaries imposed.

This clearly relates to any distinction between "positive" ("us") and "negative" ("them"). With respect to the Tao, where such distinctions are neatly indicated by yang and yin, he continues:

Where is the Tao in all of this? Abductively extrapolating from the pattern we will be poised to look for it in the reciprocal relationship between the connection and separation of yin and yang, in the circuitous way their twoness is one and their oneness is two.

That phrase could be a description of a Möbius strip. But he continues:

Front can follow back only if they are cyclically connected, and indeed Lao Tzu does make reference to the Tao in terms of circular motion: Returning: Tao's moving". Tao is not a thing, or a conglomerate of parts, but a process of recursive relationship, emergent from the connected separation of yin and yang.

As emphasized earlier, the attribution of a "positive" coding or a "negative coding may be a matter of convention, choice or perspective so that an alternative interpretation is also significant -- typically highlighted in discussion about the nature of what kind of "power" is relevant in any analysis of the interplay between man and woman. In this sense it may be appropriate to alternate between:

reifying (the other)	"twist"	identifying (with the other)
identifying (the other)	"twist"	reifying (the other)

Where the polarization is between past and future, through the present, of relevance is:

- the seed of the future in the past
- the trace (or memetic heritage) of the past in the future

Both are psychological drivers, often of overriding importance, to reproduction, dynasty building and ensuring a legacy -- whether in the case of ordinary families or leaders of groups and nations.

Symbolic clues: The pelican symbolism is common to Christianity [[more](#)] and to [18th Degree of Freemasonry](#) (Knight of the Rose Croix, also known as the [Knight of the Pelican](#)). The pelican is an alchemical symbol for the stage known as *mortificatio* or *nigredo*, the

breaking open of the outer shell to reveal the inner person (cf *Enlightening Endarkenment: selected web resources on the challenge to comprehension*, 2005). As the mother pelican was believed to feed her young from blood pecked from her own breast, she is also sometimes used as a general symbol of self-sacrifice. From a depth psychology perspective into alchemical symbolism, Craig Chalquist (*Cooking For The Collective Unconscious: An Alchemically Enlivened Recipe*) points out:

... the whole secret is in knowing the vessel. It must be thick so its boiling contents won't get away (projection, symptoms, psychosis). It must focus its heat on its center, aided by reflux condensers and the retort called the *pelican*, in which the distillate runs back into the belly. Put psychologically: in the sturdy vessel of an ego purged of personal issues, the contained nonego self can undergo transformation.

For further comments see Remo F. Roth (*The Seal of Solomon and the Pelican of Alchemy*, 2003) in the light of his study of *The Wheel Image of Nicholas von Flue*

Comprehending the set of epistemological domains: Applying these considerations to the relationship between any pair of epistemological domains, it can be understood that any one domain will engage in a complex process of seeking to encompass and engulf another -- or to be encompassed and engulfed by another. The cognitive relationship between the four domains of [Table 1](#) therefore benefits from being understood in terms of the higher dimensionality implied by the Klein bottle. There is continuity -- but through a complex "twist". The situation is clearly much more complex because of the number of domains distinguished. When the feedback "loop" relationships is represented by mechanical belts, [Table 1](#) is a comprehensible mechanical system -- potentially typical of a factory in the early phases of the industrial revolution. The 3D case is however a challenge for the psychosocial revolution of the 21st century.

The four epistemological domains of [Table 1](#) can also be fruitfully considered in terms of the insightful descriptions of *Flatland* (1884), *Sphereland* (1965) or *Flatterland* (2001), regarding the experience in 3D of four fingers of a 4-dimensional hand. There is then no comprehension of their mysterious interconnections or of how they function together. AQAL points towards such comprehension by using concentric circles centred on the intersection of the four quadrants.

Is there a case for recognizing conventional understanding of organization to be as cross-sections through a Klein bottle? Does this suggest possibilities for reframing exploration of unexplored pathways in the Middle East situation?

Enantiodromia: cycling through the "cognitive twist"

Of Greek origin, the term "enantiomer" (also "enantiomorph", particularly in terms of structure) refers to a mirror image or an opposite reflection. It is used in a number of contexts, including architecture, molecular physics, political theory, and computer system design. C G Jung introduced the related term "enantiodromia" into philosophy as the dialectical movement in which a force, in its fullest development, turns into its opposite:

This remarkable psychic change is one that usually occurs after the midpoint of life has been crossed, and it might be described as a reversal of psychic current. Only rarely does this subtle change of direction appear clearly on the surface; in most people it takes place, like all important things in life, beneath the threshold of consciousness. (*Collected Works*, Bollinger Series Vol. 15, para. 8).

In the context of Jung's focus on consciousness, it is the process by which one mindset becomes its opposite, and the subsequent interaction of the two as when an individual or a group comes to adopt a set of beliefs opposite to those held at an earlier stage. Enantiodromia, possibly in contrast to enantiomer, then represents the process whereby the excessive emphasis of one force inevitably produces its contrary. Typically it may be associated with the emergence of unconscious understandings contrary to those previously held consciously (see also John Fudjack, *The Structure of Consciousness: liminocentricity, enantiodromia, and personality*, 1999). Eventual recognition of the "underside" of Wilber's conveyor belt could be understood in these terms.

With respect to the relation between any two epistemological domains in [Table 1](#), enantiodromia is then indicative of the process of inversion in cycling "through" the cognitive twist. The nature of the cognitive inversion associated with the "twist" is well-encoded in the complementary pairs of trigrams making up the *BaGua* -- which thus portrays a cyclic pattern of [enantiodromia](#) (further discussed below).

Understanding opposites: As discussed elsewhere (*Toward an Enantiomorphic Policy*), the cultural historian [William Irwin Thompson](#) (*From Nation to Emanation: planetary culture and world governance*, 1982) has sharpened considerably the ecology-sensitive intuition concerning the psycho-social lessons to be learned from cooperation between co-evolving systems. He stresses the importance of an appropriate understanding of the interaction between opposites by citing E F Schumacher (*A Guide for the Perplexed*, 1978):

The pairs of opposites, of which freedom and order and growth and decay are the most basic, put tension into the world, a tension that sharpens man's sensitivity and increases his self-awareness. No real understanding is possible without awareness of these pairs of opposites which permeate everything man does ... Justice is a denial of mercy, and mercy is a denial of justice. Only a higher force can reconcile these opposites: wisdom. The problem cannot be solved but wisdom can transcend it. Similarly, societies need stability and change, tradition and innovation, public interest and private interest, planning and laissez-faire, order and freedom, growth and decay. Everywhere society's health depends on the simultaneous pursuit of mutually opposed activities or aims. The adoption of a final solution means a kind of death sentence for man's humanity and spells either cruelty or dissolution, generally both. (1978, p. 127)

Field of interacting opposites: Of interest in relation to consideration of the four epistemological domains of [Table 1](#) above, Thompson develops his argument by exploring in some detail "one model for a field of interacting opposites". He uses the traditional psycho-cultural image of the quaternary, a geometrical version of [William Blake's *Fourfold Vision*](#) (cf Marcel O'Gorman, [The Fourfold Visions of William Blake and Martin Heidegger](#)). This permits an enantiomorphic juxtaposition of the four basic political orientations that Thompson distinguishes: conservative, liberal, radical, reactionary.

These four political parties "attempt to play out certain values in time...". He suggests that the structure can also be used to interrelate the four basic political and economic worlds he distinguishes: the capitalistic first world, the communist second world, the resource rich third world, and the fourth world of least developed countries:

In the present transitional world-system, the interactions of the Four Worlds are unconscious, full of projections, and laden with conflict and of structural violence...The purpose of invoking the archaic Quaternary in a modern context of international relations is to make the unconscious conscious...The Quaternary enables us to see and model relationships of a more complex, polycentric variety. (p. 50)

Incorporation of contradiction: Others, such as Sohail Inayatullah ([The Futures of Cultures: present images, past visions, and future hopes](#), 1988), have used these insights to make a powerful point (of cautionary value to Wilber's "one-sided" use of the "conveyor belt"):

New visions of the future must empower without power becoming oppressive. And finally new visions must articulate their own dark side, must construct polities that incorporate their own contradictions, that is, they must develop structures to counter what cultural historian William Irwin Thompson calls enantiodromia, the tendency for institutions and structures to become their opposite, to become what they are fighting against. To do this, these movements need to be aware that oppression exists in every age, and that while intellectual knowledge expands in every generation, wisdom often does not and each generation must learn the painful experiences of previous generations. This is the idea that revolutionary and reform movements have emerged before with mixed results and at times they have become the new oppressors.

Thompson's conclusion: "good" conscious intentions are no longer adequate motivational bases to guide revolutionary movements or political programs. If we are to reduce the relentless frequency and powerful aftermaths of these enantiodromias in the future, then we must be able to discern and integrate what is underneath conscious motivation and that is the full spectrum of unconscious motivations.

These arguments are consistent with those of Donald Michael ([On the requirement for embracing error](#). In: [On Learning to Plan and Planning to Learn](#), 1973) and John O'Brien ([Embracing Ignorance, Error, and Fallibility: competencies for leadership of effective services](#), 1987).

Cycle of learning: Yolles ([Knowledge Cybernetics: a new metaphor for social collectives](#), 2005) has insightfully interrelated a number of these threads:

In this paper we explain how this metamodel can be established as a social geometry, the epistemological content of which entertains knowledge cybernetics, the structures and processes associated with knowledge that enable identity, degree of autonomy and coherence to be explored.... The form of the metamodel is defined by its ontology, while its content is epistemological. This content derives from a variety of works that include contributions from Beer's cybernetic approach, Habermas's (1979) Knowledge Constitutive Interests, Marshall's (1975) knowledge schema that links with the ideas on generic forms of knowledge by Schutz and Luckmann (1974). The general model is referred to as Social Viable Systems (SVS), and its epistemological nature as knowledge cybernetics.

He concludes:

In particular we have shown that, redefined within a learning context, there is a close connection between Jung's ideas on personality style (and Myers-Briggs development of this), Kolb's notions of learning style (and Honey and Momford's development of this) and our knowledge profiling extended to include extroversion and introversion.

Of particular interest is his adaptation of the cycle of learning styles of [David Kolb](#) ([Experiential Learning: experience as the source of learning and development](#), 1984). [[more](#)]. Elsewhere, Maurice Yolles and R Frieden ([A Metahistorical Information Theory of Social Change, Organisational Transformation and Social Change](#), 2, 3, 2005) have explored the ideas of change in the large scale cultures of [Pitirim Sorokin](#) ([Social and Cultural Dynamics](#), 1937-1942), and formulated an enantiomer theory of cultural change. Frieden's new rational constructivist information theory, which derives from [Fisher Information](#), provided a useful means by which epistemological considerations can be conditioned according to rigorous rules embedded in its mathematics and the social geography of a Social Viable System (SVS).

Again, with respect to the relation between the four epistemological domains in [Table 1](#), to what extent should they be understood as a form of learning cycle through a succession of cognitive twists? This relates to the preoccupation of Arthur Young ([The Geometry of Meaning](#), 1978) with the learning-action cycle and his "Rosetta Stone of meaning"

Given the interest of [M C Escher](#) in depicting the Möbius strip, and his interest in topology, some of his other striking works also justify describing him as the artist most skilled at depicting the process of enantiodromia, as noted by John Fudjack and Pat Dinkelaker ([Escher's](#)

Psychosocial work cycle / heat engine

A **heat engine** is a physical or theoretical device that converts thermal energy to mechanical output. A **Carnot heat engine** is a hypothetical engine (a thermodynamic cycle) that operates on the reversible **Carnot cycle**. **Sadi Carnot** used water as an analogy for the processes associated with heat in the **heat engine**. The suggestion to be explored here is that there is therefore a case for examining the extent to which the thermodynamics derived from its study may be used to explore the relationship between "heat" and "work" in the learning cycle relating the epistemological domains discussed above. Specifically, **are there relationships to be understood between any "heat" of psychosocial interaction with the associated "energy" generated or the "work" done?**

As noted earlier, the necessary rigour with which Carnot explored the analogy between water and heat is discussed by Dedre Gentner and Michael Jeziorski (*The shift from metaphor to analogy in Western science*, 1993). It is claimed that perhaps the most important contribution Carnot made to thermodynamics was the process of abstraction of the essential features of the steam engine, as it was known in his day, into a more general, idealized heat engine. This only began to have a real impact when modernised by **Émile Clapeyron**, in 1834 and then further elaborated upon by **Clausius** and **Kelvin**, who together derived from it the notion of entropy and the second law of thermodynamics.

Transformations over time: As explored elsewhere (*Composing and Engendering the Future: presenting the future*, 2001), the notion of a work cycle is introduced here because it is relatively clear that a living system cannot exist in a state of stasis on interfaces between past, present and future. Living is synonymous with one or more active work cycles through which energy is moved through feedback loops to ensure integrity in the moment. The most obvious in mammals may be the respiratory cycle (and others implied by Table 3).

This energy may take the form of attention -- even vigilance, as typically recognized in certain forms of meditation. Those drawn to the enneagram are particularly attentive to the cyclic structure of work as mapped by that diagram (see Anthony Blake, *The Intelligent Enneagram*, 1996). The structure might be usefully considered to map six intermediary positions necessary to hold a relationship between past, present and future -- whether as interfaces or different ways of understanding time.

The concept of a work cycle is basic to thermodynamics -- as exemplified by the Carnot cycle. The question here is whether this provides insights into a necessary dynamic relationship between past, present and future in terms of the nature and focus of attention or the transformation of collective bodies. Is there a sense in which living embodies some such cycle -- of which the heat engine is merely a limited material analogue? The heat engine cycle does indeed have to relate past, present and future in order to sustain its activity.

Psychosocial "work cycles": Curiously it is Gregory Bateson in a section on *Form, Substance and Difference* of his book *Steps to an Ecology of Mind* (1972) that relates the depth psychology work of Carl Jung to the thermodynamics of Sadi Carnot. But it is in another book, translated by Jung's colleague Richard Wilhelm (1929), that Jung comments on a fundamental cycle identified in a Chinese text *T'ai I Chin Hua Tsung Chih* (*The Secret of the Golden Flower*) -- more recently translated by Thomas Cleary (1991) [Note also an [online variant](#) translated by Walter Picca in 1964].

This focus has also been compared to the *Nestorian Gospel of St Thomas* -- although within the Christian tradition careful attention has indeed been paid to the significance of a "rota" as a cycle of duty, of which there may be musical variants. The much-cited Chinese work discusses the "circulation of the light" of awareness through various conditions during meditation reminiscent (if only in the metaphors used to describe them) of stages of the Carnot heat cycle.

The insights of such circulation may also be evident in the psycho-social attraction of certain pattern dances -- presumably providing some kind of time-binding resonance transcending past, present and future for participants.

Engendering flow: The interesting contrast between the electromechanical (or organic combustion) case and the psychosocial case is that, in the second typically little attention is paid to how "work" is derived from an appropriately designed encounter between "positive" and "negative". Rather the focus is typically on the elimination of the "negative" as rapidly as possible -- even avoiding exposure to it, as in the legend regarding the problem-free childhood of the Buddha. In a society increasingly conscious of the need to recycle to conserve energy resources, the equivalent process is probably limited to "recovery" programmes (for criminals, substance abusers, etc), although many labelled "negative" are also labelled "losers" and "basket cases" -- and beyond recovery. Pressure to "eliminate" those stereotyped as "negative" may facilitate their death -- as in argument supportive of systemic neglect and genocide (*Spontaneous Initiation of Armageddon a heartfelt response to systemic negligence*, 2004).

In a social transformation process, however, the art is readily assumed to be that of framing and charging the new as "positive" and the current (or older) situation as "negative" (*Being Positive and Avoiding Negativity: Management challenge of positive vs negative*, 2005). People may be "psyched up" through empowerment techniques -- or future prospects may be "talked up" by appropriate selective information management (as in the financial markets). Highly problematic use may be made of some form of negative stereotyping (or even demonisation) to achieve this end -- as is typical of racial stereotyping leading to genocide.

The "positive" then becomes an attractor towards which movement takes place (away from the "negative") -- as in the case between high pressure and low pressure weather systems. The implication of the latter metaphor is that the movement relieves the stress of the higher pressure condition. The challenge is however to recognize the return part of the cycle -- from negative to positive (as in Wilber's conveyor belt).

Reversible processes and enantiodromia: The **Carnot cycle**, when acting as a **heat engine**, is composed of four distinct reversible processes -- four successive and contrasting operations:

- **expansion of a gas at a constant "hot" temperature:** the gas causes the piston to do work on the surroundings, driven by

absorption of heat from the high temperature source

- **expansion without change in amount of heat:** as a result of adequate insulation, the gas continues to expand, doing work on its surroundings, but associated with a cooling of the gas to the "cold" temperature
- **compression at a constant "cold" temperature:** with the environment doing work on the gas, causing heat to be removed from the gas into the low temperature source
- **compression without change in amount of heat:** as a result of adequate insulation, the environment works on the gas to compress it and causing the temperature to rise to the "hot" temperature..

The suggestion here is that from a [general systems](#) perspective this may be generalized to apply to other forms of difference and other forms of work -- making it potentially relevant to new insights into socio-economic cycles necessary for sustainability (notably in the light of theory regarding the maximum efficiency of a Carnot cycle engine). The perceived difference between "positive" and "negative" may also drive such a cycle, possibly at an axiological level.

The feedback loops of [Table 1](#) can be usefully reframed and explored as such reversible processes.

As discussed elsewhere with respect to [psycho-social heat cycles](#), a variety of heat engines have been constructed. The question to be asked is whether an analogous variety of "heat engines" could be usefully recognized in psycho-social systems. For example, might the variety of such cycles correspond to the variety of metaphorical uses of "heat" currently recognized:

- political heat ("diplomatic heat")
- heated market ("heated competition", "heated rivalry")
- dialogue heat ("heated dialogue", "heated debate", "heated argument", "heated communication")
- psychological heat (whether "internal" to an individual or to a community)
- theological or religious heat (of particular debates)
- spiritual heat
- intellectual heat
- emotional heat

The thermodynamic parallel has notably been explored in relation to economics:

- Juergen Mimkes: *A Thermodynamic Formulation of Economics*
- Steve Berman: *The Carnot Cycle of Intellectual Capital and Perpetual Discovery: Innovation* (Collaboration and Transformation, Global Digital Technology and Media Conference) [[more](#)]
- C Bianciardi, A Donati and S Ulgiati: *On the relationship between the economic process, the Carnot cycle and the entropy law* *Ecological Economics*, 8, 1993, 1, pp. 7-10
- Stefan Baumgärtne: *Entropy* *Internet Encyclopaedia of Ecological Economics*, International Society for Ecological Economics February 2003
- A. Khrennikov: *Financial Heat Machine. Physica A: Statistical Mechanics and its Applications*, 350, 2003, 2-4, pp. 487-490

Of relevance to such explorations would be Marshall McLuhan (*Understanding Media*, 1964), given the distinction he explored between "hot" and "cool" media (cf Gordon Gow. *Thawing out Media: Hot and Cool*, 1995; G E Stearn, *McLuhan: Hot and Cool*, 1967). A hot medium is one that extends one single sense in high definition. Hot media are, therefore, low in participation, and cool media are high in participation -- requiring completion by the audience. Also of relevance is the work of Orrin Klapp (*Opening and closing: Strategies of information adaptation in society*, 1978). Potentially of greater interest is the exploration of psychosocial driving forces such as "hope" and "depression", "optimism" and "pessimism" in terms of the Carnot cycle -- notably in relation to "heated" or "inflated" argument. To what extent are some phases ("upbeat" or "downbeat") to be understood as "cognitive catastrophes"? (cf *Cognitive Feel for Cognitive Catastrophes: Question Conformality*, 2006).

The manner in which the Carnot cycle might be related to Haskell's coaction cardioid is explored elsewhere (*Sustainability: interrelating the Carnot cycle with the Cardioid "cycle"*, 2005). The role of the cardioid in the *Mandelbrot set* is explored separately (*Sustainability through the Dynamics of Strategic Dilemmas: in the light of the coherence and visual form of the Mandelbrot set*, 2005). The relation of the Haskell coaction cardioid with that of the Mandelbrot set is being explored by [Kent Palmer](#).

The processes of the Carnot cycle can usefully be understood in terms of enantiodromia -- as a process about reversal. As argued by H Sabelli (*Entropy as symmetry: theory and empirical support*, 1994), process theory provides a framework unifying thermodynamics and evolution, as well as a methodology to study entropy and dimensionality in complex processes. He argues:

- Every process and every structure includes two opposite components (enantiodromia): attraction and repulsion, union and separation, asymmetry and symmetry, left and right, positive and negative. For instance, every physical force of attraction has a range at which it repels.
- In the process formulation, the maximization of entropy (involution) and the production of information (evolution) are two opposite and inseparable aspects of the same process (enantiodromia)
- Process theory thus redefines the second law as a maximization of symmetry resulting from the generation of opposite processes. Evolution and involution coexist (enantiodromia, the union of opposite processes).

The study by Douglas Flemons (*Completing Distinctions*, 1991), in the light of Gregory Bateson (*Mind and Nature: a necessary unity*, 1978) and Taoism, distinguishes a number of processes relating to difference that could be understood in terms of a cycle:

- completion / connection / separation
- contraction / separation / connection

These may be usefully related to the four-fold model of *nowness* of Francisco Varela (*The Specious Present: a neurophenomenology of*

time consciousness, 1997). This four-fold model of nowness is based on flows and dynamical trends, as discussed elsewhere (*Present Moment Research: exploration of nowness*, 2001). These may be very helpful to understanding the cognitive twist in the reversible process of enantiodromia -- especially since it could be related to the topological structure of the [Borromean knot](#) as used by psychoanalyst [Jacques Lacan](#) to define the relationship of the symbolic, the real, and the imaginary (and helpfully discussed in an anonymous blog of [20 January 2007](#) and [21 January 2007](#)) [[more](#)].

Varela analyzes this relationship in a later paper (*The Gesture of Awareness*, 1999) [see also Claus Otto Scharmer. *Three Gestures of Becoming Aware: Conversation with Francisco Varela January 12, 2000*]. Curiously, in the light of the work cycle argument (*Composing and Engendering the Future*, 2001) and Flemons terminology, he proposes a 3-fold cycle at the core of the act of becoming aware in the moment: "an initial phase of *suspension* of habitual thought and judgement, followed by a phase of *conversion* of attention from 'the exterior' to 'the interior', ending with a phase of *letting-go* or of receptivity towards the experience." Varela sees the phenomenological *epoché* as "the ensemble of these three organically linked phases", for the simple reason that the second and third are always reactivated by, and reactivate, the first. He provides a valuable discussion of the three interlinked cycles and the obstacles traditionally recognized to some of their processes.

Psychosocial power and its generation

Power: The importance of "power" is significant to both technical innovation and social contexts. Value is attached to acquiring power. It may be taken or attributed. Recent decades have seen value attached to social processes of "empowerment".

Lack of "power" is resented and a source of frustration -- whether the power derives from fuel to drive some device or in a social situations typified by popular unrest. Ironically major concerns are currently expressed both about the constraint on non-renewable energy resources (oil, etc) as well as about the disempowerment experienced by the average citizen (and especially the underprivileged). The latter may be expressed in terms of increasing inequality -- namely difference -- between the "powerful" and the "powerless". As with electromechanical devices, differences in psychosocial systems (including those under transformation) are typically sustained by appropriate "insulating" barriers -- "energy containers".

Power generation: Within this context it is worth reflecting on the technology of empowerment in the light of the devices for electromechanical power generation. An instructive example is the case of electrostatic power generation such as with the [Wimshurst machine](#), the [Tesla coil](#), or the [Van der Graaf generator](#) -- typically a feature of demonstrations in school physics laboratories. The latter is an electrostatic machine which uses a moving belt to accumulate very high voltages (up to 5 megavolts) on a hollow metal globe [[more](#)].

Can such devices be meaningfully used to model generation of power in psychosocial systems? Do they model forms of movement through which a "positive" charge is built up in relation to "negativity"?:

- **in social movements**, through movement of people in relation to a leadership ("paying tribute", *puja*) that thereby becomes empowered? This is exemplified in the design of "throne rooms" for the reception of supplicants as with the design of many religious edifices for the ritual reception of worshippers
- **in a movement of opinion**, through which supportive "facts" are progressively selectively distilled and configured to highlight a perspective?
- **in personal reflection** (and meditation) through which confirmatory insights are gathered in support of a "positive" attitude? Nicola Tesla further developed the Van der Graaf generator technology (cf Nikola Tesla, *Possibilities of Electrostatic Generators*, *Scientific American*, March, 1934). Tesla was renowned for his capacity to simulate equipment operation (such as the Tesla coil) in his mind for testing purposes. It is appropriate to ask to what extent such capacity benefits from understanding of system isomorphism through metaphor

A static mandala is used as a systems diagram to focus meditation. In the light of the insights of general systems theory, for a person (or a group) is it indeed possible to model psychosocial "power generation" by a form of identification with the systemic design and processes of such devices -- possibly as a "motor" or a "dynamo" (terms both widely used with respect to psychosocial systems)? Some sense of what is involved is offered by understandings in design, especially in static terms, of "goodness of fit" (Christopher Alexander, *Notes on the Synthesis of Form*, 1964. This understanding may also be expressed dynamically in the sense of a design that "works", notably in the case of clothing with reference to an "ensemble that works".

What role might "alternation" and "wiring" play in such processes? *****

Engines and gearing: The past century has provided widespread familiarity with engines, notably combustion engines in motorbikes and other vehicles. The operation of the piston cycle has entered collective consciousness in many ways -- as well as the distinction between 2-stroke engines and those with multiple cylinders. This suggests a line of inquiry as to whether thinking itself can be understood as operating in cycles that might be usefully modelled by such engines for many people.

In this sense a basic cycle would alternate between the extremes of any form of polarized thinking -- with each extreme providing a turning point. One might be associated with the charge that drives the cycle. Clearly this might be understood as a cruder pattern than that associated with multiple cylinders -- if their operation could be integrated to reinforce a common rotation. Of special interest in this respect are rotary engines (cf the [Wankel rotary engine](#)).

It could be argued, for example, that common **combustion engines are a particular materialization of a much more generic cycle of relationships through which power (generally understood) is engendered**.

Following from the earlier discussion of an 8-fold pattern of relationships (according to Chinese culture) in relation to [Table 1](#), this pattern could be understood as offering a schematic of how any generic (psychosocial) engine might work. As noted, the typical

schematic, widely disseminated as the *BaGua* symbol, leaves the dynamics implicit and to be precisely inferred from the standard line-coding by which each is represented. The dynamic is recognized in the shift around the *BaGua* when an unbroken line transforms into a broken line, or vice versa. Such movement has been explored elsewhere (*Navigating Alternative Conceptual Realities clues to the dynamics of enacting new paradigms through movement*, 2002)

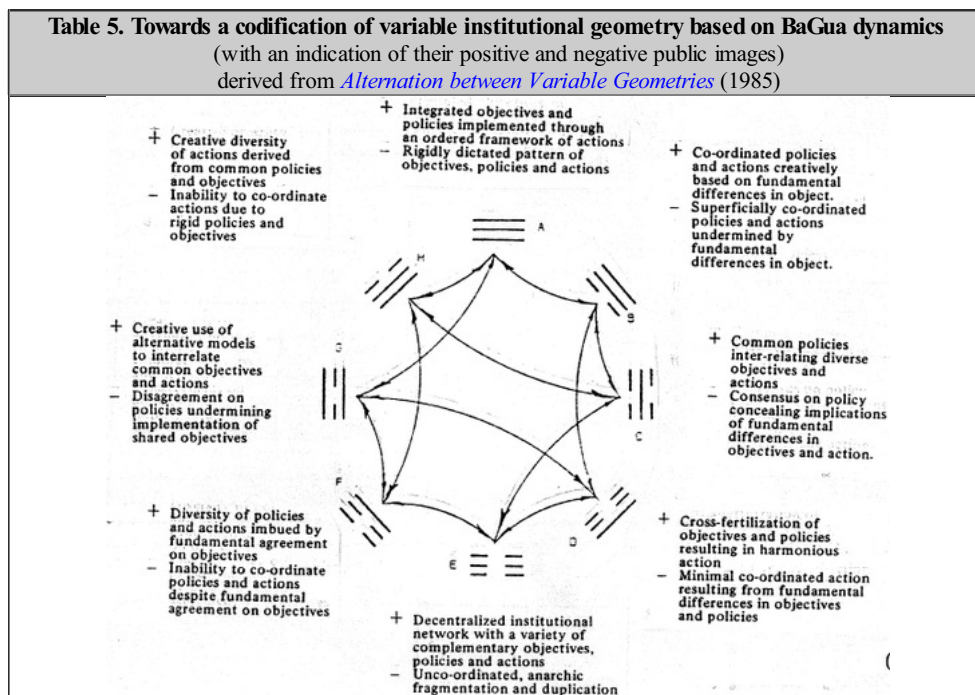
Particularly suggestive is the degree to which the conditions encoded by combinations of two lines represent the qualitative extremes of the four epistemological domains in Table 1 -- including their "positive" or "negative" charge, again as generically understood. The 8 conditions encoded by 3 lines then represent the relationships between them. Note however the inherent fluidity associated with determining (in the moment) how such lines are to be understood to represent either "conditions" or "relationships" between them.

BaGua dynamics: Within this context there is a remarkable potential correspondence between the operational requirements of a standard "combustion engine" and the **dynamics** of the *BaGua*. Such a correspondence is recognized in Taoism in the case of the "internal combustion" engine -- where "internal combustion" corresponds to insights of Taoist alchemy associated with the dynamics of meditation. The human body is indeed an internal combustion engine (of a chemical nature). Fully understood, this is indeed the *Secret of the Golden Flower*. But it is perhaps more meaningful to more people to map the well-known dynamics of the (automobile) combustion engine into the dynamics of the *BaGua* and vice versa:

- **combustion engine:** Following from the earlier discussion of the Carnot cycle and herat engine, well-illustrated and documented by the *Wikipedia* entry, the [internal combustion engine](#) is one in which the burning of a fuel occurs in a confined space called a combustion chamber. This exothermic reaction of a fuel with an oxidizer creates gases of high temperature and pressure, which are permitted to expand. The defining feature of an internal combustion engine is that useful work is performed by the expanding hot gases acting directly to cause movement, for example by acting on pistons, rotors, or even by pressing on and moving the entire engine itself. These elements might be summarized in terms inflammable gas (= "air"), exhaust/cooling (= "water"), spark (= "fire"), and cylindrical container (= "earth"). But the "secret" of course lies in the spatial and temporal configuration of the dynamics between them -- as with the discover of the **V-8 automobile engine**?
- **BaGua and ki (qi or ch'i):** Fundamental to the *BaGua* are of course the archetypal insights of fire, air, water and earth (R. G. H. Siu. *Ch'i: a Neo-Taoist approach to life*. MIT Press, 1976). The dynamics between these are associated with the energy of *qi*. The cautionary comments of Andrzej Kalisz (*Qi: Magic Power?*) are of relevance.

Should the BaGua be understood as the operational schematic -- the minimum instruction set -- for a standard V-8 combustion engine?

The sort of schematic that extraterrestrials might endeavour to communicate to catalyze psychosocial development on a planet?



The operation of the combustion engine, in the light of Maruyama's argument, could be thought of as a subunderstood variant of the "operating principles" of the *BaGua*. The irony of course is that it will be primarily within the Chinese culture that this relationship would be understood to the degree of being able to make any psychosocial interaction "work" as an "engine". This use of traditional metaphor has been well-argued and foreseen by Susantha Goonatilleke (*Toward a Global Science: mining civilizational knowledge*, 1999) as discussed elsewhere (*Enhancing the Quality of Knowing through Integration of East-West metaphors*, 2000).

Engines of greater power: Potentially of even greater interest are more sophisticated "psychosocial engines" involving more complex feedback loops and cycles -- for communities and nations. Again it is intriguing the extent to which, by adding more lines to the schematic (from 3 to 4, to 5, to 6, to 7, to 8), more powerful (more generic) "engines" may be identified. It is in this sense that the 64-conditions resulting from 6-line encoding could be understood -- with all the challenges to self-reflexive comprehension embodied in the commentaries on the set of 64 dynamically interrelated *I Ching* hexagrams (*Relationship between Hexagrams of the Chinese I Ching*, 1983). The same could be said of the 81-conditions resulting from 8-line encoding embodied in the *Tao te Ching* or the *T'ai Hsüan Ching*

(see studies in *Documents relating to Patterns of I Ching / Tao te Ching*). Should both of these be considered as schematics of possible "psychosocial engines" -- or of the same one at different degrees of virtualization?

This indicates potentials beyond the basic "2-stroke" engine characteristic of contemporary preferences for distinguishing "positive" and "negative" (without consideration of "grey areas") -- and endeavouring to construct a sustainable cycle from them. It also points to the implications of deliberately, or inadvertently, avoiding the possibility of more complex cycles. It is worth considering the extent to which this "2-stroke" approach is significantly incapacitated by "backfiring" -- to the point of inoperability.

Related to such understanding of an engine is that of gearing whereby overly rapid rotation is translated into slower and more powerful rotation that can perform certain kinds of work (*Hyperaction through Hypercomprehension and Hyperdrive: necessary complement to proliferation of hypermedia in hypersociety*, 2006). Many forms of thinking might be associated with rapid cycles. These need to be geared down to speeds that can mesh with operations in the material world (see *Conceptual Birdcages and Functional Basket-weaving*, 1980). This challenge might be seen in relation to that of gearing down principle to practice.

It would be instructive to engender a dialogue between Eastern and Western experts on combustion engines -- with some sensitivity to the dynamics of their own "internal combustion" as meditators.

Cognitive "gateways": Elsewhere (*Navigating Alternative Conceptual Realities: clues to the dynamics of enacting new paradigms through movement*, 2002) the question was raised of how to configure, juxtapose and superpose sets of categories (3, 4, 5, etc) to create a "door frame" governing integrative cognition -- to frame any response to the riddle of life in the present. This challenge can now be presented dynamically as a learning cycle of phases, or a sequence of such cycles. This is most easily described in terms of a particular kind of fair ground challenge involving a tunnel through which one must walk -- in which the frame of the tunnel rotates. To make life difficult, the tunnel frame is made up of successive segments with a triangular, square, pentagonal, hexagonal, or other cross-section, each rotating independently.

In the cognitive analogue however the challenge in the present moment is to position relevant conceptual sets of 3, 4, 5, etc aspects (thus essentially incommensurable) in relation to a common centre in order to move/navigate through them -- even if they rotate at different rates in relation to one another around such a common axis. As in the segments of the fairground tunnel, each "side" is effectively a trap to which it is a mistake to cling more than temporarily -- but such features frame the cognitive doorway. This challenge may also be described metaphorically by the geometry of magnetic bottles used to contain plasma to ensure nuclear fusion, where containment can only be successful if the plasma is effectively prevented from touching (and being "quenched") by any such contact.

The conceptual implications of this challenge have been most clearly articulated by Ron Atkin (1981) in describing the navigation of different degrees of complexity in a multidimensional space. He illustrates the challenge by use of a simple triangle [more].

These considerations raise the question of how fundamental sets of principles are to govern behaviour, especially in the moment. Whether it be the basic "Liberty / Equality / Fraternity" that originated with the French Revolution, or variants of the *Universal Declaration of Human Rights* with its 30 principles, it is how these governing principles relate to each other dynamically, rather than statically (as with conceptual laundry list), that is a vital key to viable navigation. 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 in the moment [more] ***

It is within this framework that the function of "vicious" problem loops -- as with "cycles of violence" in the Middle East -- and the corresponding "serendipitous" problem loops becomes evident. Of course the same thinking could be applied to "vicious" strategic cycles and to corresponding "serendipitous" strategic cycles (*Transformative Approaches to International Organization*, 1994; *Configuring Relationships between World Problems and Cognitive Resources*, 1995).

Subunderstanding: autism, ADHD and schizophrenia

The phenomenon of subunderstanding has been noted above as framed by Magoroh Maruyama. If there is a "psychosocial engine", at some degree of virtualization, whose essential cycle is to be more fully comprehended, it is appropriate to note other ways of framing the challenge of doing so.

One approach, cited in an earlier study (*Societal Learning and the Erosion of Collective Memory: a critique of the Club of Rome Report: No Limits to Learning*, 1980), is Doris Lessing's fictional description of the poignant encounter of a "development specialist" from an advanced galactic culture with a leading representative of a "developing" planet:

To say that he understood what went on was true. To say that he did not understand -- was true. I would sit and explain, over and over again. He listened, his eyes fixed on my face, his lips moving as he repeated to himself what I was saying. He would nod: yes, he had grasped it. But a few minutes later, when I might be saying something of the same kind, he was uncomfortable, threatened. Why was I saying that? and that? his troubled eyes asked of my face: What did I mean? His questions at such moments were as if I had never taught him anything at all.

He was like one drugged or in shock. Yet it seemed that he did absorb information for sometimes he would talk as if from a basis of shared knowledge: it was as if a part of him knew and remembered all I told him, but other parts had not heard a word. I have never before or since had so strongly that experience of being with a person and knowing that all the time there was certainly a part of that person in contact with you, something real and alive and listening -- and yet most of the time what one said did not reach that silent and invisible being, and what he said was not often said by the real part of him. It was as if someone stood there bound and gagged while an inferior impersonator spoke for him. (Doris Lessing, *Re: Colonised Planet 5 - Shikasta*, 1979, pp. 56-57).

The same study also provided a [citation](#) from R.D. Laing (*The Divided Self; a study of sanity and madness*, 1960) to highlight the degree to which world society might in effect be suffering from a form of chronic schizophrenia (see also *From Apartheid to Schizophrenia: ecological ignorance and the logic of depersonalized "separate development"*, 1971).

A potentially more fruitful approach is that indicated by current research into mirror neurons (Vilayanur S. Ramachandran and Lindsay M. Oberman, *Broken Mirrors: A Theory of Autism*, *Scientific American*, November 2006; Giacomo Rizzolatti, Leonardo Fogassi and Vittorio Gallese, *Mirrors in the Mind*, *Scientific American*, November 2006). As a newly discovered class of nerve cells, these appear to be fundamental to social interaction because of their role in empathy, the perception of another's intentions and as a patterned reflection of the outside world. This may possibly also imply an inhibited capacity to anticipate later phases in any cycle of phenomena. Research indicates that dysfunctions of this neural system could explain some of the primary systems of autism, including social isolation and absence of empathy -- specifically the capacity to relate the actions of others to one's own. Many suffering from autism have difficulty in understanding metaphors, sometimes interpreting them literally. Comprehension of metaphor requires the ability to extract a common denominator from seemingly dissimilar entities.

To what extent might humanity as a whole be considered to be suffering from what could be metaphorical understood as dysfunctionality of the mirror neuron system -- whether in its existing communications systems or in the emergent "global brain" (*Simulating a Global Brain: using networks of international organizations, world problems, strategies, and values*, 2001)?

Is the process of "civilization" closely associated with the development of such a mirror neuron system? Is the collapse of a culture, as documented by Jared Diamond (*Collapse: how societies choose to fail or succeed*, 2005) in any way a consequence of pathology of that system? Might some form of collective autism explain the unbalanced degree of intellectual focus on certain functions -- with the exceptional development of scientific specialization to be compared to the talents of [autistic savants](#), suffering from Savant Syndrome?

The challenge of recognizing a "psychosocial engine" might also be framed in terms of other forms of dysfunctionality of collective memory as explored elsewhere (*Societal Learning and the Erosion of Collective Memory: a critique of the Club of Rome Report: No Limits to Learning*, 1980).

Perhaps most intriguing, given recent widespread publicity, is the phenomenon of [attention deficiency hyperactivity disorder](#) (ADHD). Many commentators have acknowledged the problems associated with the increasing pace of life, short-term "business" and policy-making, and the inability to recognize or relate to longer term cycles (*Engaging Macrohistory through the Present Moment*, 2004). This is notably a focus of the [Long Now Foundation](#).

The attenuation of such capacities is well-modelled for all by the experience of progressive loss of memory with advancing age and the progress towards senility and dementia. Whether singly or in combination, any of the above phenomena, as characteristics of contemporary cultures (or some of them), could severely inhibit recognition of a "psychosocial engine". Alternatively failure to do so could make individuals or groups the unknowing "victims" of such dynamics (cf John Ralston Saul, *The Unconscious Civilization*, 1997). This may be the case with the all too evident vicious "cycles of violence".

Is humanity on the threshold of a major breakthrough to a new kind of psychosocial technology for handling "positive" and "negative" charges?

Have many electromechanical innovations anticipated the patterns of insight required to design and operate such processes? Does "technogeny" in some way anticipate or replicate "psychogeny"? This may be an implication of the proposal of the term by Edward Haskell (*Full Circle: The Moral Force of Unified Science*, 1972), where *technogeny* is coined to mean forms of control (such as manufacture, transport, agriculture, communication, simulation, etc), the capacity to do which is transmitted, not mentally, but genetically.

Jacques Attali (*Noise: the political economy of music*, 1985) makes a case for innovations in the organization of music anticipating innovations in social structure. The discredited [recapitulation theory](#) in biology that [ontogeny](#) recapitulates [phylogeny](#) is now reframed to suggest that if a structure pre-dates another structure in evolutionary terms, then it also appears earlier than the other in the embryo. Elsewhere it was suggested that a form of psychogeny (the genesis of mind) may replicate ontogeny [[more](#)]. Psychogeny is a neglected phenomenon of possible relevance to the near future (Wayne Viney, William Douglas Woody, *Psychogeny: a Neglected Dimension in Teaching the Mind-Brain Problem*, *Teaching of Psychology*, 22, 1995; Y Lebrun, *From Psychogeny to Organicity: Is the Brain Going to Outgrow the Psyche in the Third Millennium?* *Brain and Language*, 71, 1, 2000). Ken Wilber has hypothesized that psychogeny equals sociogeny, namely that the development of individuals is reflected in the development of society and vice-versa (cf D. Matzke, *Subjective "I" requires extension of information paradigm*, *Quantum Theory*, 04.03, Abstract No: 905). *** Technogeny (coined term) Forms of control (q.v.) such as manufacture, transport, agriculture, communication, simulation, etc. the capacity to do which is transmitted, not mentally, but genetically. E.g. nest construction by termites. [[more](#)]

Conclusion: implication for sustainable development and governance

This argument has pointed to the possibility of designing (or recognizing) new types of psychosocial energy system dependent on the skillful interweaving of "positive" and "negative" energy. It would reflect the pattern of development of energy systems exploited by the industrial revolution -- offering the possibility of "generating" psychosocial energy.

Aspects of such "technology" are already to be recognized as "successfully", if dubiously, exploited in:

- processes to deliberately scapegoat and demonise individuals or peoples, whether by religious communities (eg accusations of

- witchcraft) or by nations (leading to genocide)
- stigmatizing products and practices through advertising and propaganda in order to justify new behaviour -- as challenged by Edward de Bono (*I Am Right -- You Are Wrong: from Rock Logic to Water Logic*, 1990)
- the dynamics of the relationship between opposing political parties and movements of opinion -- as challenged by Ray Harris (*Left, Right or just plain wrong? Politics in the integral movement - A consciously provocative polemic*, *Integral World Newsletter*, February 2003)
- some techniques of magical practices, whether contemporary, traditional or in indigenous communities -- or as the "magic" of charismatic leaders and facilitators

The question raised by the argument above is whether these techniques reflect a relatively crude insight into such possibilities -- possibly to be compared with the earliest inventions of the industrial revolution. Are they to be understood as a form of "one-shot" exercise, as with the static electricity sparks resulting from charging a Van der Graaf generator -- to be contrasted with any form of continuous electricity supply (whether? Is the current psychosocial "technology" in parliamentary assemblies and "save-the-world" gatherings to be compared to that of a two-stroke combustion engine -- of very low efficiency and prone to "backfiring"?)

Rather than functioning in a two-stroke, spastic mode, is it possible that the relationships of [Table 1](#) are the basis for a form of multi-stroke, psychosocial engine -- a "difference engine", perhaps to be called an "enantiodromor"? Or, given the problematic waste products, are there also possibilities of deriving energy from "fusion" rather than "combustion" (*Enactivating a Cognitive Fusion Reactor: Imaginal Transformation of Energy Resourcing (ITER-8)*, 2006)?

The fundamental distinction from conventional "linear" thinking is exemplified by the contrast between the "Gulf Stream" (readily described and understood as a two-dimensional "one-way" process) and the complex three-dimensional [thermohaline circulation](#) (otherwise described in terms of the [great ocean conveyor belt](#), the global conveyor belt, or, most commonly, the meridional overturning circulation) -- complete with complex three-dimensional "twists". This is to be contrasted with the dangerous "linearity" of Ken Wilber's presentation of a "one-way" spiritual "conveyor belt" (*Integral Spirituality: a startling new role for religion in the modern and postmodern world*, 2006). This argument is developed in greater detail elsewhere (*Potential Misuse of the Conveyor Metaphor: Recognition of the circular dynamic essential to its operation*, 2007).

The global oceanic conveyor belt in fact offers a remarkable model (and a symbol of requisite complexity) of the cyclic nature of what Wilber's spiritual conveyor ought to be -- a collective global analogue to the cycle of the *Secret of the Golden Flower* (mentioned above). Chogyam Trungpa (*Cutting Through Spiritual Materialism*, 1973) might then be understood as a Buddhist challenge to any spirituality treated as on the same surface of any "conveyor belt", rather than calling for a different quality of insight that interrelates the illusory distinction between materialism and such spirituality -- as in the cyclic dynamic through the twists of the Möbius belt:

Walking the spiritual path properly is a very subtle process; it is not something to jump into naively. there are numerous sidetracks which lead to a distorted, ego-centered version of spirituality; we can deceive ourselves into thinking we are developing spiritually when instead we are strengthening our egocentricity through spiritual techniques. This fundamental distortion may be referred to as spiritual materialism.

With the Möbius strip as a model, the Buddhist emphasis on "not-grasping" and "letting-go" might then be understood as one of avoiding attachment to a particular perspective on any apparent distinctions between two sides. As illusions, the "two sides" are "not as they seem, nor are they otherwise." (*Mahayana Lankavatara Sutra*). As the Möbius topology makes clear, the "enlightened" view, whether with respect to spirituality or the ocean conveyor, simply calls for recognizing the apparent distinction in the moment without projecting all the cognitive overlay of self and other, beginning and end, subject and object and all the deep seated emotional attachment that gives rise to and follows from such categories. Such distinctions obscure recognition of the cycle through which such understandings are linked. The cycle is as significant in the case of the ocean conveyor, the spiritual conveyor, or that of the *Golden Flower*. Curiously, the apparent termination of the Gulf Stream can be understood in the light of any Klein bottle modelling of "engulfing" (as discussed in [Table 4](#) with respect to the mystical relation to God).

Ironically, whilst Wilber stresses the vital significance of enabling the spiritual conveyor, considerable concern is expressed in parallel at the possibility of an abrupt stopping of the Atlantic Meridional Overturning Circulation as a consequence of climate change. As cycles both are however a challenge to comprehension. Especially intriguing as a complex model (like [Table 1](#)), the ocean conveyor belt reconciles several transformations between different forms of "positive" and "negative" (temperature, density, salinity). It is therefore not inappropriate to associate the foreseen sudden disruption to that global conveyor to intuitions of a spiritual Armageddon (*Spontaneous Initiation of Armageddon a heartfelt response to systemic negligence*, 2004).

With respect to socio-economic implications, the "cognitive twists" in [Table 1](#) would seem to be closely associated with the "reversibility" of the processes indicated there in terms of enantiodromia. It is indeed remarkable that [Ivan Illich](#) (*Tools for Conviviality*, 1973), in an analysis highlighting the challenges of polarization, makes reference to the necessity for distinct forms of "inversion" that would appear to be closely related to the socio-political analogue of this "twist" process:

- The price for a convivial society will be paid only as the result of a political process which reflects and promotes the society-wide **inversion** of present industrial consciousness.
- The major institutions now optimize the output of large tools for lifeless people. Their **inversion** implies institutions that would foster the use of individually accessible tools to support the meaningful and responsible deeds of fully awake people. Turning basic institutions upside down and inside out is what the adoption of a convivial mode of production would require. Such an inversion of society is beyond the managers of present institutions
- Economics useful for the **inversion** of our present institutional structure starts out from politically defined limiting criteria. It is on

these negative design criteria for technological devices that I want to focus attention.... Nor can economists foresee institutional **inversion** when for them all institutions must be evaluated according to the increase in their planned output and their ability to externalize internal dis-economics in an unobtrusive way.

- This means that politics in a postindustrial society must be mainly concerned with the development of design criteria for tools rather than as now with the choice of production goals. These politics would mean a structural **inversion** of the institutions now providing and defining new manmade essentials.
- To **invert** politics, it will not be enough to show that a convivial life style is possible, or even to demonstrate that it is more attractive than life in a society ruled by industrial productivity. We cannot rest with the claim that this **inversion** would bring society closer to meeting the goals now stated as those of our major institutions.... We need a way to recognize that the **inversion** of present political purpose is necessary for the survival of all people.
- The radical functional **inversion** of our major institutions constitutes a revolution much more profound than the shifts in ownership or power usually proposed.
- Such an **inversion** of the current world view requires intellectual courage for it exposes us to the unenlightened yet painful criticism of being not only antipeople and against economic progress, but equally against liberal education and scientific and technological advance.
- But equally, the psychological **inversion** that will accompany a limitation of tools is a premise for the convivial psychological pressure necessary for effective contraception.

Might it be the case that all the "problems" faced by humanity are subunderstood design elements of an inherently sustainable "engine" -- whose operational integrity is of a higher degree of virtualization than currently considered credible?
Being subunderstood, the design elements are mismanaged and therefore malfunction.

Would such an "engine" embody more integratively the dynamics of the relationship between global and local as explored elsewhere (*Configuring Globally and Contending Locally: shaping the global network of local bargains by decoding and mapping Earth Summit inter-sectoral issues*, 1992; *Using Disagreements for Superordinate Frame Configuration*, 1992):

- Local integration at the expense of global fragmentation?
- Global integration at the expense of local fragmentation?

This dynamic framing raises the possibility that problematic situations, such as those of the Middle East, might be better explored through development of their **cyclic dynamics** rather than through efforts to resolve them in **static territorial terms**. How can static territorial preoccupations be understood in dynamic terms? (cf *And When the Bombing Stops? Territorial conflict as a challenge to mathematicians*, 2000).

Given the self-reflexive approach of this argument, is such a possibility a challenge to a paper of this kind -- as a highly charged assembly of arguments that potentially disempowers the reader in a manner somewhat analogous to the operation of a Van der Graaf generator? By contrast is this the subtle merit of traditional cognitive devices like the *I Ching* which encourage a different quality of encounter with the insights to which they point?

References

- Jorge Avelaira. Consciousness and Reality: a stable-dynamic model based on Jungian psychology. *Metareligion*, 2001 [[text](#)]
- Stafford Beer:
- Cybernetics and Management. English University Press, 1959
 - The Heart of Enterprise. Wiley, 1979
 - Diagnosing the System. Wiley, 1985
 - Beyond Dispute: the invention of team synteegrity. Wiley, 1994
- T. L. Brown. Making Truth: Metaphor in Science. University of Illinois Press, 2003
- Karin Knorr Cetina. Complex Global Microstructures: the new terrorist societies, *Theory, Culture and Society*, 22, 2005, 5, pp. 213-234 [[text](#)]
- J Cohen and I Stewart. The Collapse of Chaos: discovering simplicity in a complex world. Viking, 1994
- Max Deutscher. Subjecting and Objecting. St Lucia, University of Queensland Press, 1983
- Douglas Flemons. Completing Distinctions: interweaving the ideas of Gregory Bateson and Taoism into a unique approach to therapy. Shambhala, 1991
- D Gentner and M Jeziorski. The Shift from Metaphor to Analogy in Western Science . In A . Ortony (Ed .), Metaphor and Thought. Cambridge University Press, 1993, (2nd ed) (pp . 447-480) [[text](#)]
- Susantha Goonatilake. Toward a Global Science: mining civilizational knowledge. Indiana University Press, 1999
- Ivan Illich. Institutional Inversion. Cuernavaca, CIDOC Cuaderno, 1972 (#1017)
- Anthony Judge:
- Documents relating to Polarization, Dilemmas and Duality [[text](#)]
 - Documents relating to Configurations and Patterns [[text](#)]

- Enactivating a Cognitive Fusion Reactor: Imaginal Transformation of Energy Resourcing (ITER-8), 2006 [text]
- Reframing Sustainable Sources of Energy for the Future: the vital role of psychosocial variants, 2006 [text]
- Polarities as Pluckable Tensed Strings: hypercomprehension through harmonics of value-based choice-making, 2006 [text]
- From Statics to Dynamics in Sustainable Community: navigating through chaos by playing on polarities as attitude correctors, 1998 [text]
- Energy Patterns in Conferences: weaving patterns of information as a context for higher levels of integration, 1988 [text]
- Development of Comprehension and Comprehension of Development (Part 8 of *Development through Alternation*), 1983 [text]

Sara B. Jutoran. From Observed Systems to Observing Systems, 1985/2005 [text]

Vincent Kenny and Philip Boxer. The Economy of Discourses: a third order cybernetics? *Human Systems Management*, 9, 1990, 4, pp. 205-224 [text]

Hilary Lawson:

- Reflexivity: the post-modern predicament. Hutchinson, 1985
- Closure: a story of everything. Routledge, 2001 [review].

Guoying Li and Jian Zhang. Sphering and its Properties. *Sankhya: the Indian Journal of Statistics*, 1998, 60, Series A, Pt. 1, pp. 119-133 [text]

C. J. Lofting. The Book of Structures: the Unchanging in the *Book of Changes*,. 2005 [text]

Peter D. Loly. A Logical Way of Ordering the Hexagrams of the Yijing and the Trigrams of the *Bagua*. *The Oracle - The Journal of Yijing Studies*, 2, 12, January 2002, p.2-13 [text]

S. P. Marshall. Schemes in Problem Solving. Cambridge University Press, 1995

Terry Marks-Tarlow, Robin Robertson, and Allan Combs. Varela and the Uroboros: the psychological significance of reentry. [text]

Magoroh Maruyama:

- Peripheral Vision Polyocular Vision or Subunderstanding? *Organization Studies*, 25, 3, pp.: 467-480 [text]
- Mindscapes in Management: use of individual differences in multicultural management. Dartmouth, Aldershot, 1994
- Dysfunctional, misfunctional, and toxifunctional aspects of cultures, organizations, and individuals. *Technological Forecasting and Social Change*, 1992, 42, pp. 301-307
- Metaorganization of Information: information in Classificational Universe, Relational Universe and Relevational Universe. *Cybernetica*, 8, 1965, pp. 224-236
- The Second Cybernetics: Deviation-Amplifying Mutual Causal Process. *American Scientist*, 51, June 1963, pp. 164-179, pp. 250-256 [text]

Humberto Maturana and Francisco Varela:

- Autopoiesis and Cognition: the realization of the living. Reidel, 1979
- The Tree of Knowledge. Shambhala, 1987

Donald N. Michael. On the requirement for embracing error. In: *On Learning to Plan and Planning to Learn*, 1973

John O'Brien. Embracing Ignorance, Error, and Fallibility: competencies for leadership of effective services, 1987 [text]

John D Perron. Composition with a Cognitive Twist. (Paper presented at the 15th Annual Conference on English Education, Knoxville, Tennessee, March 1977) (ERIC ED140320) [text]

Clifford A. Pickover. The Mobius Strip: Dr. August Möbius's marvelous band in mathematics, games, literature, art, technology, and cosmology. Thunder's Mouth Press, 2006 [contents]

R Poli. The Basic Problem of the Theory of Levels of Reality, *Axiomathes*, 2001, 12,3-4, pp. 261-283

H. Sabelli. Entropy as Symmetry: theory and empirical support. New Systems Thinking and Action for a New Century: *Proc. International Systems Society 38th Annual Mtg.*, B. Brady and L. Peeno (Eds.), Pacific Grove, 1994,. pp. 1483-1496 [text]

Michael Schiltz:

- Form and Medium: a mathematical reconstruction. *Image [&] Narrative*, 6, 2003 [text]
- Space is the Place: The Laws of Form and Social Systems. *Thesis Eleven*, 88, 2007, 1, pp. 8-30 [text]

A. Schutz and Thomas Luckmann. The Structures of the Lifeworld. Heinemann, 1974

E Schwarz. Towards a Holistic Cybernetics: From Science through Epistemology to Being. *Cybernetics and Human Knowing*, Vol. 4, 1997, No. 1, pp. 17-50

M. Schwaninger. Intelligent Organisations: An Integrative Framework. *System Research and Behavior Science*. 18, 2001, pp.137-158

R. G. H. Siu. Ch'i: A Neo-Taoist Approach to Life. MIT Press, 1976

Tony Smith. I Ching (Ho Tu and Lo Shu), Genetic Code, Tai Hsuan Ching, and the D4-D5-E6-E7-E8 VoDou Physics Model [text]

William Irwin Thompson:

- Catastrophist Governance and the Need for a Tricameral Legislature. 2007 [[text](#)]
- From Nation to Emanation: planetary culture and world governance. Findhorn, Findhorn Foundation, 1982

Francisco Varela:

- A Calculus for Self-reference, *International Journal of General Systems*, 2, 1975, pp. 5-24
- The Embodied Mind. MIT Press, 1991 (with E Thompson and E. Rosch)

Heinz von Foerster:

- Ethics and Second-order Cybernetics. *Stanford Humanities Review*, volume 4, 1995, issue 2 (theme: *Constructions of the Mind: Artificial Intelligence and the Humanities*) [[text](#)]
- Cybernetics of Cybernetics. Urbana, Biological Computer Laboratory, University of Illinois, 1974. (Sponsored by a grant from the Point Foundation)

Ernst von Glasersfeld. The Construction of Knowledge: contributions to conceptual semantics. Seaside, California: Intersystems Publications, 1987.

Ken Wilber. Integral Spirituality: a startling new role for religion in the modern and postmodern world. Shambhala, 2006

Maurice Yolles:

- The Political Cybernetics of Organisations. *Kybernetes*, 23(9/10), 2003, pp. 1253-1282
- Revisiting the Political Cybernetics of Organisations. *Kybernetes*, 34(5/6), 2005
- Knowledge Cybernetics: a new metaphor for social collectives (Paper to 11th ANZSYS Conference / Managing the Complex, 2005) [[text](#)]

Maurice Yolles and Kaijun Guo. Paradigmatic Metamorphosis and Organisational Development. *System Research and Behavior Science*, 20, 2003, 177-199. [[text](#)]



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