8th August 2008 | Draft

Animation of Classical BaGua Arrangements

a dynamic representation of Neti Neti

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Produced coincidentally on the occasion of the opening of the Olympic Games in China in 2008. Given the 5-ringed symbol of those games, the interlocking of the 5 moving rings that are the main focus of this exploration may be considered a form of symbolic celebration of the traditions of Chinese culture.

Introduction

The representations below follow from arguments previously made with respect to the fundamental significance attached within Chinese culture to the BaGua configuration of 8 trigrams, especially given its significance for the *I Ching* -- the *Book of Changes* (*Sustainability through Magically Dancing Patterns: 8x8, 9x9, 19x19*, 2008). The implications of the dynamics of "moving symbols" were explored earlier (*Moving Symbols: radical change in religious psycho-social energy policy?* 2008). The alternation within such configurations is understood here as an indication of the challenge and potential of apophatic identity, notably in the light of the classic Sanskrit adage *Neti Neti* -- "not this, not that" (*Being What You Want: problematic kataphatic identity vs. potential of apophatic identity?* 2008).

The contemporary relevance of patterns resulting from combinations of trigrams to form the the *I Ching* hexagrams is the subject of an extensive experiment in interpretation (*Transformation Metaphors derived experimentally from the Chinese Book of Changes (I Ching) for sustainable dialogue, vision, conferencing, policy, network, community and lifestyle*, 1997). The commentary on this exercise notably explores the relevance of alternation in response to current challenges (*Policy Alternation for Development*, 1984; *Development through Alternation*, 1983, particularly its section on *Development of Comprehension and Comprehension of Development*, 1983). The exercise below is part of a general exploration into possibilities of a pattern language (*Polyhedral Pattern Language: software facilitation of emergence, representation and transformation of psycho-social organization*, 2008).

The current relevance of exploring metaphors fundamental to other cultures, and notably those of Asia, has been extensively highlighted by Susantha Goonatilake (*Toward a Global Science: mining civilizational knowledge*, 1999).

Experimental approach

As with the static configuration of *I Ching* hexagrams in the logo of this site, explained elsewhere (*Challenges to Comprehension Implied by the Logo*, 2007), **the purpose here is to explore technical possibilities of representation that may elicit new insight -- engendered by greater cognitive resonance with such representations.**

Given the extensive commentary on the two classical BaGua arrangements down the centuries, the focus here is primarily on the possibility of using web facilities to indicate how these might be represented dynamically rather than statically as is the practice.. The two classical arrangements are the "Earlier Heaven" (*Hsien Tien*) variant and the "Later Heaven" (*King Wen* or *Lo Map*) variant. Whilst these are normally represented statically, the transformations within them imply various kinds of dynamic. Only the most obvious are presented here in order to demonstrate the ease with which this can now be done with animations. These arrangements, in static form, have long

been popularly used in "BaGua mirrors" in relation to the practice of *feng shui*. There are convex and concave versions of such mirrors.

It should be noted that the rotation of the arrangements presented below does **not** correspond to traditional representations.

Earlier Heaven Arrangement (note if the SWF format animations do not display automatically, *they may do so more readily in Internet Explorer*)		
Rotating anti-clockwise	xx	Rotating clockwise

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Later Heaven Arrangement		
Rotating anti-clockwise	xx	Rotating clockwise

Given that these representations were made for the web by a non-professional, the images in the animations contain unfortunate imperfections fromn a purely technical point of view. These can be reduced and eliminated. Of particular interest is the speed of the rotation used here. Ideally, with slightly different technology, the speed could be adjusted by the viewer according to the time preferred to contemplate individual images -- in contrast with the insights that may emerge from the patterns of more rapid movement. Similarly other conventions of transformation could be selected. (Note that a more extensive range of transformations is statically represented between the 64 hexagrams in the logo of this site).

Hexagrams emerging from dynamic relationship between trigrams

The Later Heaven arrangement of trigrams is the basis for the "house organization" of the set of 64 hexagrams of the *I Ching* (see *Organization of I Ching hexagrams in terms of traditional "houses"*, 1995). In the representation below, the Later Heaven arrangement in its classical static configuration is surround by a ring of trigrams (in the same sequence) which rotates clockwise. This rotation therefore ensures that each inner trigram is brought into relationship with each rotating outer trigram so that the complete set of hexagrams for that "house" emerges during the rotation.

Later Heaven Arrangement (static inner ring) with outer ring in same sequence rotated around it in a clockwise direction thereby expressing the total set of 64 hexagrams (note if the SWF format animation does not display automatically, *it may do so more readily in Internet Explorer*)

Alternative representations and readings of the trigrams

Of particular interest in considering alternative representations are the assumptions made regarding how any arrangement is to be read. Should the top of the trigram (or the hexagram) be considered to be on the outside or on the inside -- namely is the viewer understood to be within the circle or outside it.

In the case of the arrangement of the hexagrams in the logo of this page, this resulted in two alternative interpretations of that configuration (see *Alternating between Complementary Conditions -- for sustainable dialogue, vision, conference, policy, network, community and lifestyle*, 1983).

Closely associated with the interpretations of the BaGua in traditional Chinese philosophy, natural phenomena can be classified into the *Wu Xing*, or the five phases, usually translated as five elements, or more dynamically, as five movements or five steps.It will be interesting to determine the degree to which the five rings of the symbol of the Olympic Games is considered as related in some way to this framework. Strategically, such relationships are of course closely related to the classical Japanese martial arts text the *The Book of Five Rings* (*Go Rin No Sho*) by Miyamoto Musashi. This is divided into sections corresponding to those elements (*The Ground Book*, *The Water Book*, *The Fire Book*, *The Wind Book* and *The Void Book*). It continues to be highly valued in the study of strategy.

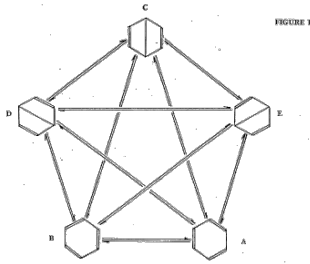## Configuration of alternatives as a resonance hybrid

In an earlier exploration of the *Comprehension of Appropriateness* (1986), one section focused on *Configuration of modes as a resonance hybrid* (later presented as *Patterns of alternation: Cycles of dissonance and resonance*). The following paragraphs are an edited version of that argument -- demonstrating its relevance to understanding the relationship between the eight different modes configured as the BaGua.

Although the perspective of David Bohm (*Wholeness and the Implicate Order*, 1980) on the nature of implicate order clarifies the challenge further, it does not say anything about the relationship between the different modes of perception and organization which can emerge, other than in the sense that they can be re-enfolded into an implicate order. Since the challenge is to deal with co-existent, and very different, frames of reference another perspective is also fruitful.

The set of alternative structures, between which alternation takes place in any learning cycle, may be more clearly understood in the light of the theory of resonance. Johan Galtung (*Methodology and Ideology*, 1977) first explored the possibility of using the organization of chemical molecules to clarify the description of social organization. He dealt with fixed structures and not with the transition between alternatives. The theory of resonance in chemistry is concerned with the representation of the actual normal state of molecules by a combination of several alternative "resonable" structures, rather than by a single valence-bond structure. The molecule is then conceived as resonating among the several valence-bond structures, or rather to have a structure that is a resonance hybrid of these structures.

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

Resonance hybrid: illustrated by the benzene molecule
(reproduced from the *Encyclopedia of World Problems and Human Potential*)

FIGURE 1

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

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

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

Implications of alternation between various conditions
(Reproduced from *Alternation between Variable Geometries: a brokership style for the United Nations as a guarantee of its requisite variety*, 1985,
which has larger versions of the images)
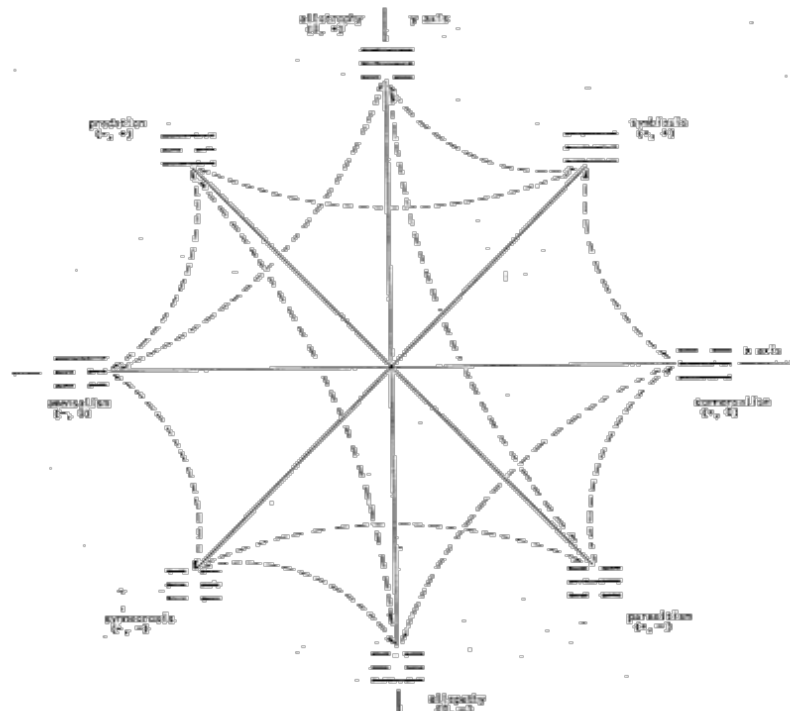
Relation between distinctions established with a Cartesian coordinate (x,y) system and a BaGua trigram system, namely between a Western linear coding system and a classical Eastern holistic system. Dashed lines in the figure indicate transformation pathways between different conditions involving minimal change (ie one trigram line only).
Convention:
(a) y = dependent variable = superior line; x = independent variable=inferior line
(b) full line = positive value; broken line = negative value
(c) when superior line and inferior line are of different value, middle line neutralizes value of the line of opposite value
(d) when superior line and inferior line are of the same value, different from middle line, the value of the middle line takes precedence over the value of the inferior line

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

Resonance hybrids could well provide a key to the conception, design and operation of coalitions of people or groups using forms of

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

Simplistic 4-phase model of counter-flowing policy cycles
(Adaptation from *Alternation for Development*, 1982)

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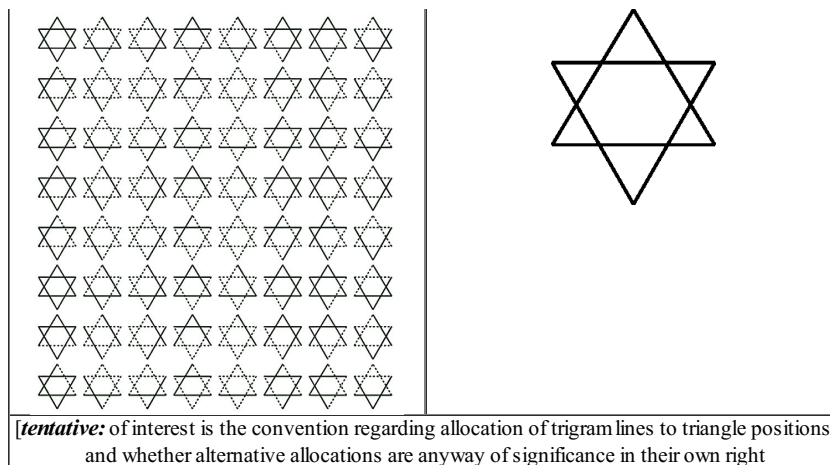
Mapping of I Ching hexagram coding onto Star of David

Six lines are configured in a number of cultures to form a double triangular "hexagram". This is most commonly associated in the West with the Hebrew Star of David symbol. It is however also used by Christians (notably the Mormons) and in Islam. Six pointed stars are also to be found in the cosmological diagrams of Hinduism, Buddhism, and Jainism. The non-Jewish Kabbalah (also called Christian or Hermetic Kabbalah) interprets the hexagram to mean the divine union of male and female energy. In traditional alchemy, the two triangles represent the reconciliation of the opposites of fire and water.

In the earlier exploration noted above (*Sustainability through Magically Dancing Patterns 8x8, 9x9, 19x19 -- I Ching, Tao Te Ching / T'ai Hsüan Ching, Wéiqí*, 2008), using one particular triangular design convention, it is therefore also of interest to explore the configuration of the 6 lines of the *I Ching* hexagram into a double triangle consistent with such traditional symbolic use. The following table was presented in that document (as Table 6: Double triangular representation of hexagrams: Star of David)

The above set can now be presented as a dynamic pattern (as had been suggested in that earlier exercise) in what follows.

Table 6: Representation of *I Ching* hexagram codes mapped onto the Star of David	
64 *I Ching* hexagrams configured as double triangles (as in animation on the right)	Animation of 64 hexagrams suggestive of the dynamics of triadic bonding

[**tentative:** of interest is the convention regarding allocation of trigram lines to triangle positions and whether alternative allocations are anyway of significance in their own right

Misleading representation of fundamental symbols in two dimensions?

Whilst the 8 basic trigrams constitute a coherent system, major challenges to comprehension emerge when the insights are extended through use of a second such set. This may either take the form of a parallel set -- a second circular configuration -- or placing one trigram upon another to constitute a hexagram. This challenge is reflected in the case of the two triangles constituting the Star of David.

Common conventions are used in the orientations of the BaGua or the Star of David. As with other symbols, "upwards" is considered as the direction of the transcendent integrity of "heaven", and "down" as associated with mundanities and even "hell". Such uses of "up" and "down" metaphors have been well explored by George Lakoff and Mark Johnson (*Metaphors We Live By*, 1980).

Some of the challenges to advanced theories of communication focus on the relationship between form and medium, as 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. Schiltz argues with respect to conventional indication in writing, for example:

> 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'.

These arguments were considered with respect to the conceptual constraints associated with articulation of concepts in tables -- the standard two-dimensional matrix used by many "conceptual models" (including explanations of the Earlier and Later Heaven BaGua arrangements in *Wikipedia*). The possibility explored, notably in the light of Schiltz's insight, was the greater appropriateness of representation on a torus -- in fact on two intertwined tori (*Comprehension of Requisite Variety for Sustainable Psychosocial Dynamics: transforming a matrix classification onto intertwined tori*, 2006).

Mathematically, and especially geometrically, it is appropriate to investigate more complex representations that can be "reduced" to the classic elegant simplicity of the trigram/hexagram mapping in two dimensions. An illustrative metaphor of the possible advantages and disadvantages is the distinction between black/white TV and colour TV. The former may indeed be more appropriate in that colour is implied and must be imagined -- eliciting a degree of active engagement absent in the case of experience of the latter.
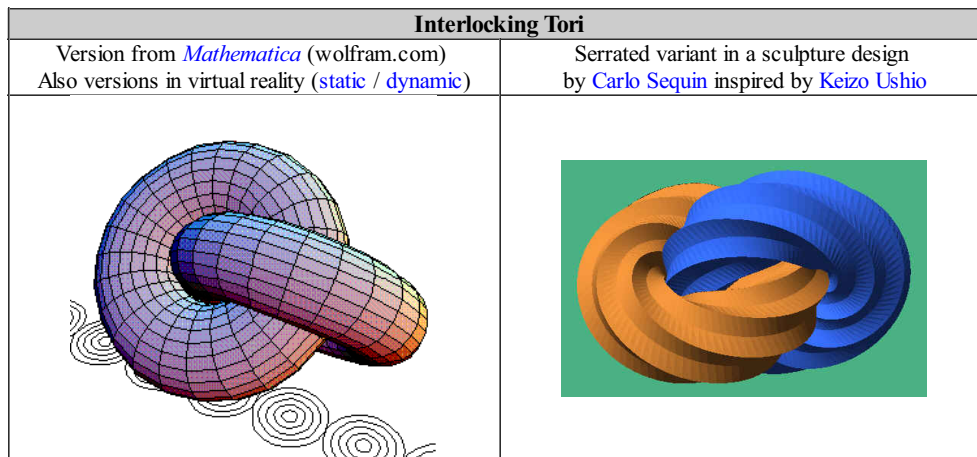
The relevance to the above use of two configurations of 8 trigrams is that in three dimensions these two sets may be related in other ways. Such possiblities may then hold mnemonically more complex insights -- more appropriate to the degree of complexity of the challenges they endeavour to encompass and indicate. The representation in two dimensions is not thereby challenged, rather it is seen as a projection of a three-dimensional representation into a two-dimesional symbolic form.

The possibility to be considered is then:

- **BaGua**: rather than two separate 8-fold BaGua circles (as in the Fu Hsi system, prior to invention of the *I Ching*) or one set superimposed on the other (as in the 64 hexagrams), the second is understood as rotated out of the two-dimensional plane until it is at right angles to the first, and then understood as passing through the centre of the first -- as a tube rather than a flat circular band. Each BaGua circular band passes through the centre of the other -- to form interlocking circular tubes (whose surfaces might be marked by the broken and unbroken lines of the BaGua).
- **Star of David**: in this case one triangle, rotated out of the two-dimensional plane, passes through the centre of the other. Again, each triangle passes through the centre of the other -- to form interlocking triangles (of which there are many suggestive images on the web). Although the Star of David is also represented as triangles interlocking, curiously this is done in such a way that the triangles cannot be moved out of two dimensions, in fact the simplest accessible image of two such triangles in three dimensions

is a toy for infants.

In both examples, the separate symbols (interlocked in this way) can then be understood as moving in relation to one another. In the case of the BagGua, in three dimensions each flat circular configuration becomes a tube -- with the two tubes intertwined as shown below. Their movement with respect to one another is then best shown in virtual reality.

Interlocking Tori	
Version from *Mathematica* (wolfram.com) Also versions in virtual reality (static / dynamic)	Serrated variant in a sculpture design by Carlo Sequin inspired by Keizo Ushio

A curious feature of allowing such fundamental symbols to be represented in three dimensions, rather than two, is that it echoes other symbolic representations such as people linking arms or the Mobius strip (as echoed in 2 dimensions by the infinity symbol and the number 8). Interlocking triangles are, for example, of significance both to Celtic symbolism, to Renaissance art and to family therapy.
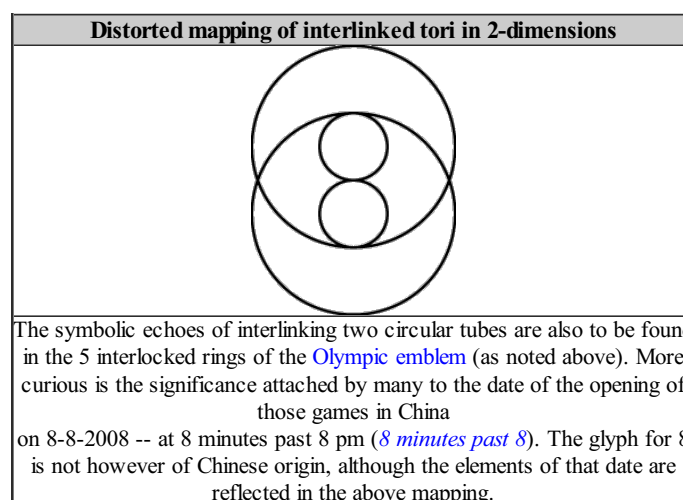
Further implications of moving out of planar representation of fundamental symbols are explored in *Psychosocial Work Cycle Beyond the plane of Möbius* (2007) within the dynamics of polarization and enantiodromia (*Psychosocial Energy from Polarization within a Cyclic Pattern of Enantiodromia* (2007).

As a mnemonic indicator the rotation into the third dimension suggests a dissociation of the reality associated with the lower trigram from the framework associated with the upper trigram. It implies a different orientation or a different modality. The interlocking through their respective centres implies, however, a degree of intimate association that is a more explicit challenge to the comprehension than when the trigrams are positioned one above the other in a hexagram. In the latter case the necessary creative "magical twist" in understanding is implicit rather than explicit. At the same time, the intertwining is indicative of the fundamental challenge of "transmission" between the two domains -- bridging polarizing implications such as up-down,

The traditional symbolic associations of the two triangles of the Star of David -- as male and female -- are more evident in the interlaced twin tori, especially in their movement with respect to each other, effectively entraining each other. The dynamic representation suggests the processes of consumption and birthing and, in a further indication of the "transmission" challenge, offers pointers to the nature of cognitive embodiment (as argued by George Lakoff and Mark Johnson, *Philosophy In The Flesh: the embodied mind and its challenge to western thought*, 1999; Francisco Varela, et al., *The Embodied Mind*, 1991). The relevance of the latter focus is discussed elsewhere (*Psychology of Sustainability: embodying cyclic environmental processes*, 2002).

Also relevant is the manner in which clockwise and anti-clockwise movements are necessary to this entrainment. Also discussed in the earlier paper (*Comprehension of Requisite Variety for Sustainable Psychosocial Dynamics: transforming a matrix classification onto intertwined tori*, 2006) is the complex nature of the common centre, bounded by the tubular forms of the two tori -- in movement -- reminiscent of the symbol of the Tao characteristically positioned at the centre of the BaGua mirror.

There is a certain charm to the fact that the original BaGua arrangement is held to have been revealed to Fu Hsi by the "supernatural" -- with the irony that the structure of the benzene model as a resonance hybrid is famously held to have come to Kekule in a day-dream of a snake seizing its own tail (a common symbol in many ancient cultures known as the Ouroboros).

Distorted mapping of interlinked tori in 2-dimensions
The symbolic echoes of interlinking two circular tubes are also to be found in the 5 interlocked rings of the Olympic emblem (as noted above). More curious is the significance attached by many to the date of the opening of those games in China on 8-8-2008 -- at 8 minutes past 8 pm (*8 minutes past 8*). The glyph for 8 is not however of Chinese origin, although the elements of that date are reflected in the above mapping.

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