Sustainability through Magically Dancing Patterns

8x8, 9x9, 19x19 — I Ching, Tao Te Ching / T'ai Hsiüan Ching, Wéiqí (Go)

Introduction

This exploration has been stimulated by exchanges with Ye Zude, Maurice Yolles, Chris Lucas and Peter Collins, none of whom should be held responsible for its essentially speculative nature.

Introduction

This is an exploration of the interrelationship between patterns fundamental in different ways to cultures of the East and the West. Specifically the focus is on the 8x8 pattern constituted by the 64 hexagrams of the I Ching (Yijing) and the 9x9 pattern constituted by the 81 tetragrams (or quadgrams) of the T'ai Hsüan Ching (Tai Xuan Jing). These two sets of patterns have as their root the 3x3 pattern of the BaGua and the 4x4 pattern. The 3-fold pattern is fundamental to thinking based on the enneagram. The 4-fold patterns has been extensively explored from a Western perspective by Carl Jung and thereafter in such patterns as the MBTI. The 3x4 pattern is of prime significance to thinking based on 12, notably that developed by Arthur Young on learning/action cycles.

Much attention has been given to such patterns by the mathematically inclined through the challenge of so-called "magic squares" and the interesting arrangements of numbers which emerge as significant.

Also of relevance is the manner in which such patterns have become fundamental to two distinct board games. The Eastern game of go (Wéiqí) is based on a board of 19x19. The Western game of chess is based on a board of 8x8. Such games have been the focus of a considerable amount of computer-enhanced thinking.

This exploration follows from a series of earlier papers on the I Ching and the Tao Te Ching (9-fold Higher Order Patterning of Tao Te Ching Insights: possibilities in the mathematics of magic squares, cubes and hypercubes. 2003; 9-fold Magic Square Pattern of Tao Te Ching Insights experimentally associated with the 81 insights of the T'ai Hsüan Ching, 2006). Early concern for the challenge was
Interweaving 8x8 and 9x9 within 19x19

Whilst such interweaving may have been highlighted as obvious in more specialized contexts, the possibility and significance of interrelating 8x8 and 9x9 only became apparent to this writer through consideration of the 19x19 pattern of the game of go.

The patterns may be interwoven as indicated in the following table. Essentially 4 sets of 8x8 (the game of chess) may be set into the corners of a 19x19 table -- such as to make provision for extra rows/columns permitting each 8x8 set to be bordered on the outer sides, effectively creating 4 sets of 9x9 arrays. Within the 19x19 pattern this leaves a single central column/row. Given the widespread focus on 10-based patterns, however, it is interesting that this highlighted within this framework, but only provided that the 4 sets (of 8x8 expanded to 9x9) are understood as overlapping or "sharing" the central row/column -- by which they are thereby "held together".

| Table 1: 19x9 Wéiqí (Go) board divided into quadrants of 8x8 |
|---|---|---|---|---|---|---|---|
| 58 | 38 | 61 | 19 | 41 | 60 | 54 | 10 |
| 49 | 30 | 37 | 36 | 22 | 63 | 55 | 13 |
| 28 | 50 | 57 | 46 | 18 | 48 | 32 | 44 |
| 45 | 35 | 20 | 2 | 23 | 8 | 16 | 12 |
| 31 | 56 | 53 | 15 | 52 | 39 | 62 | 33 |
| 47 | 64 | 59 | 7 | 4 | 29 | 40 | 6 |
| 17 | 21 | 42 | 24 | 27 | 3 | 51 | 25 |
| 43 | 14 | 9 | 11 | 26 | 5 | 34 | 1 |

Distinguishing the 8x8 patterns within the 19x19 pattern

There may well be many ways of considering interesting arrangements of the cells of an 8x8 pattern within the 19x19 pattern. It is however appropriate, and useful, to start with a commonly accepted pattern. That used for this exercise, as an illustration, is the one traditionally used in distributing the hexagrams of the I Ching. That is the pattern used in the lower right hand quadrant.

This pattern can then be simply transformed into the distinct patterns of the other three corners -- by a process evident by inspection of the table as a whole.

This sets aside -- or postpones -- any questions of other possible arrangements.

Consideration of any process of extension to a 9x9 "arrangement"

Various processes could be used to extend the 8x8 pattern into 9x9 -- whether starting from 8x8 or from 9x9. Any such 9x9 pattern can form one quadrant of the 19x19 arrangement above, rotating the arrangement from quadrant to quadrant as illustrated with the 8x8 arrangement.

Of particular interest is the traditional focus on magic squares and the possibility of ensuring the emergence of interesting patterns -- aesthetically interesting to mathematicians.

The writer is not competent to explore or evaluate the many such possibilities that have been highlighted in the literature. A number of pointers are explored separately (9-fold Magic Square Pattern of Tao Te Ching Insights: experimentally associated with the 81 insights of the T'ai Hsüan Ching, 2006). One recently discovered valuable example of a 9x9 magic square, cited therein, is as follows..

| Table 2: Distribution of 81 numbers according to 9x9 pan-magic pattern (as discovered by Alan Grogono) |
|---|---|---|---|---|---|---|---|---|---|
| 36 | 51 | 30 | 65 | 80 | 59 | 10 | 25 | 4 |
| 64 | 79 | 58 | 9 | 24 | 3 | 38 | 53 | 32 |
| 23 | 1 | 17 | 49 | 28 | 43 | 75 | 54 | 69 |
| 48 | 27 | 42 | 77 | 56 | 71 | 22 | 1 | 16 |
| 76 | 55 | 70 | 21 | 0 | 15 | 50 | 29 | 44 |
| 8 | 14 | 20 | 34 | 40 | 46 | 60 | 66 | 72 |
| 33 | 39 | 45 | 62 | 68 | 74 | 7 | 13 | 19 |
| 61 | 67 | 73 | 6 | 12 | 18 | 35 | 41 | 47 |
| 11 | 26 | 5 | 37 | 52 | 31 | 63 | 78 | 57 |

The focus here is rather on the implications of the concern with whether a particular arrangement is "right", appropriate or "better" than.
Another. One problematic consequence of this is that a preferred arrangement is then promoted in terms of its particular aesthetics and degree of perfection. The arrangement is given a degree of rigidity within which certain dynamic relationships between its elements are possible. It may acquire a name and be associated with its discoverer -- even to the point of being recognized to some degree as intellectual property.

Methodologically the process may also be unsatisfactory given the range of possible arrangements of varying merit and potential significance. In terms of their wider significance, given the mathematical inclination desirable, the implication of the patterns may be obscured and subject to excessive mystification -- especially because of their challenge to comprehension when expressed numerically.

**Possibility of a dynamic pattern methodology**

The typical search for "arrangements" as with "magic squares" aims at discovery of the most integrative patterns according to various criteria. The focus is on the highest degree of order that can be embedded in the arrangement -- hence the use of "perfection" as a descriptor in the magic square literature. The challenge is that this perfection is only visible to those capable of decoding the pattern. Typically it is essentially incomprehensible to more than a few.

Another approach may however be taken by recognizing the process of pattern selection -- effectively by recognizing and integrating the pattern of consideration of (aesthetic) alternatives. This implies a shift from a single target "best" static arrangement, whatever its justification, to the alternation dynamic between several (even many) distinct possible arrangements. It is this dynamic which is characteristic of any selection process.

This dynamic is also characteristic of the interaction (or dialogue) between the variety of alternatives as they are embodied in methodologies, belief systems and institutions -- and even cultures. Hence, for example, the peculiar differences in stress variously placed on 8x8, 9x9, 10x10 and 19x19 in cultures of East and West. And, as a consequence, hence the challenge of interrelationship between those cultural frameworks -- as static rigid frameworks.

"Dancing patterns"

With such a shift to a dynamic perspective, how might the pattern of the dance be understood in the interplay between alternative possibilities?

Note that the argument here is in favour of ensuring that the pattern of the "dance" becomes apparent by other means -- rather than being remarkably obscured to most by coding the squares in the table with numbers. With the advent of widespread access to computers, the kind of pattern dance could be made readily apparent (and widely comprehensible) by using shifting patterns of colour coding -- rather than numbers. Java applets are an obvious choice -- possibly enhanced by sonification. Their use in relation to colour charts provides the simplest example.

The intuition for this exploration is the recognition that both in chess and go, those of significant expertise see the board as a whole in terms of shifting patterns of force (see Pavle Bidev. *Chess: a mathematical model of the cosmos*, 1979; Reuben Fine. *The Psychology of the Chess Player*, 1956). For those specializing in number theory, sets of numbers do indeed "dance". They have valencies that enable them to form various partnerships -- resulting in lines of relationship along columns, rows and diagonals. Few have real access to such understanding or its potential implications.

The concern here with articulating particular patterns is therefore set in the context of understanding how any dance between them might be presented and comprehended. Some accessible metaphors may be variously helpful:

- **Tartan kilt patterns**: The set of many tartans highlights the way in which particular patterns emerge through being variously coloured. Each is however a particular pattern very much frozen in time. The concern here is with a visualization that would allow the particular arrangement of colours in a given tartan to emerge as part of a morphing process between all such tartan patterns -- rows moving backwards and forwards and changing colour and width, as with columns. But rather than a random process, what is the morphing sequence that could be understood as a higher order pattern in its own right?
- **Sword dance**: In some cultures, and notably in the Scottish tradition, two swords are laid out to create quadrants -- as in the table above. The dancer shifts between the quadrants in a complex sequence of movements, emphasizing one or more quadrants over the other.
- **Crystal structures**: Crystals may be distinguished as body-centered or face-centered. In this sense, represented in two-dimensions, the "weight" of the table rows and columns may give weight to the outer rows and columns (emptying the centre to a degree) -- or alternatively may fill the centre, thereby lightening the outer rows and columns
- **Chladni patterns**: These patterns result from the oscillation of a plate metallic sheet covered with a suitable fine powder. The patterns, of significance to violin and guitar design, are determined by the frequency of oscillation and the shape of the plate and the manner of its support. Chladni patterns are of interest because they indicate ways in which a zone can be broken down "naturally" into sub-zones under different conditions (*Chladni patterns: examples of integrated, multi-set concept schemes*, 1984)
- **Quadrille and square dancing**: The quadrille is a historic dance performed by four couples in a square formation. It is a precursor to traditional square dancing. In both situations a range of arrangements between the participants is variously explored. But the significance lies at a level of the dynamic between those positions.
- **Game of life**: As an early computer simulation, the well-known Game of Life was devised as a cellular automaton John Horton Conway in 1970. It continues to stimulate imagination in terms of how possibilities get engendered and destroyed.

Such examples point to the possibility of using understanding of various possible arrangements of numbers within the table to drive colour coding of such numbers -- whether at the level of the cell, the row or column, or the diagonals -- such that transformations between the arrangements can be visually tracked as a morphing process. The question is what renders the dynamic aesthetically
Formation dancing: a "body-centered" alternative?

On the assumption that the singular 8x8 arrangement of the 6-fold hexagrams might be position centrally within the 19x19 array, this might be done as follows. Successive concentric outer rings might then be represented by 5-fold, 4-fold, 3-fold, 2-fold and 1-fold indicators. Note that the 1-fold might take the form of either a complete or broken line (yang and yin signs) that could then alternate in the positions of the outermost ring. Similarly the 4 forms of the 2-fold might then alternate in the next inner ring -- with a similar process for the 3 3-fold, the 16 4-fold and the 32 5-fold.

<table>
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<th>Table 3: 19x19 board with indication of central set of 64 hexagrams</th>
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Of interest in this case is the sense in which such a diagram resembles a geomantic compass (lo-p‘an in Chinese) central to feng shui. This suggests possibilities for the generation of the patterns of such a compass. The diagram is also indicative of the appeal of particular formal arrangements of gardens.

Cross, swastika variants and lauburu

The 19x19 pattern becomes a viable framework for 8x8 and 9x9 quadrants by identifying a central unoccupied "cross" as is evident in the above presentations.

However when only the 8x8 quadrants are considered, there is an outer unoccupied ring of cells in the 19x19 table. These, with the cross formation, lend themselves representation of the two variants of the swastika as traditionally identified in the Hindu tradition -- for which the right-facing version represents the evolution of the universe (Pravritti), facing left it represents the involution of the universe (Nivritti). In Buddhist imagery represents dharma, universal harmony, and the balance of opposites. In Japanese variants the left-facing version represents love and mercy, whereas the right-facing variant represents strength and intelligence. Both are often found at the beginning and end of Buddhist scriptures (outside India).

A form of the swastika had also been known from ancient Greece as the gammadion or tetra-gammadion -- composed of four gamma signs.

Given the focus here on linear and square-based patterns, the possible relationship to patterns involving curvature are well-illustrated by the four-armed lauburu of Basque tradition -- it being possible to outline each arm with three sweeps of a compass as discussed elsewhere (In Quest of "Meta-Union"? Interplay of generic dimensions of any "union of international associations" 2007). This suggests an interesting relationship, within each quadrant, to the golden spiral curve associated with the Fibonacci sequence.

The 19x19 framework suggests how by reducing it to a 17x17 framework or less, the arms of the swastika can become proportionately thicker -- namely by excluding the 9x9 possibilities in each quadrant. It is also noteworthy that, formed in this way, the sequence of cells forming the distal portion of the branches of the swastika introduce a 10-fold ordering by using the central cross otherwise unused with either the 8x8 or 9x9 quadrants.

<table>
<thead>
<tr>
<th>Table 4: Two variants of the swastika within 19x19 frameworks (thickening of branches with lighter colour illustrates limitation of each quadrant to the 8x8 pattern)</th>
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<tbody>
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<td><img src="image" alt="Diagram" /></td>
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</table>
Of interest with respect to the case made above for a dynamic, "dancing" relationship, clearly a focus either on the right-facing or on the left-facing variant implies a form of unhealthy rigidity. In this respect it is notable how some environmentally oriented progressive groups, presumably to be associated with strategies that are the antithesis of those favouring the deprecated Nazi variant of the swastika, may nevertheless be labelled "fascist". The latter perception is then understandably associated with rigidity rather than with one or other of the variants.

Some dynamic pattern questions

Questions of interest include:

- How is the expansion of the 8x8 to 9x9 to be represented? As an external border or as an internal border?
- Does the shared "10th" column/row move from its central position? Does it engage momentarily with one or other set of quadrants preferentially?
- How does the emergence and dissolution of patterns emulate the holomovement hypothesized by David Bohm -- whereby those that have "disappeared" are actually present in potentia?
- What forms of "mirroring" occur between quadrants -- as is so evident in any dance?
- Between how many symmetrical arrangements can the system oscillate (or cycle) to bring out how many comprehensible (recognizable) patterns?
- What is to be understood by subtler patterns -- associated with more complex magic square arrangements?
- How are observers of the shifting patterns engaged by it -- as are listeners to patterns in music? Are there cultural differences in this respect?
- For a given observer, at what point does coherent subtlety degrade into incomprehension?
- How imbalanced is it meaningful the parts to become -- before the tension of the disorder pulls the dance back to higher degrees of order? And conversely, how ordered can the dance become before it has to breakout into a degree of imbalance to engage with the potential of variety?
- How do the smaller, generative patterns, such as 3x3 and 4x4, operate within the larger framework -- as partially explored in the Game of Life?
- Given the 8-fold nature of the BaGua, and its two traditional arrangements, is there significance to the convex and concave mirrors traditionally associated with them -- as distinct forms of aesthetic focus -- "eyes" and "holes"?
- Does the dance between arrangements open up "pathways" across the framework as in the diagonals of the more highly ordered magic squares? What of subtler pathways as are significant in crystallography?

Triangular representation of 64 I Ching hexagrams

The following representation constitutes an alternative to the columnar representations of hexagrams in an effort to explore other mnemonic possibilities. The order follows that used in the lower right hand corner of the first table (namely that in the Richard Wilhelm translation of the I Ching. Although this order is used in the Wikipedia entry on the I Ching, it is not the order of the classical King Wen sequence. The lower, internal triangle, corresponds here to the lower trigram (in which the horizontal line corresponds to the lowest in the columnar hexagram representation). The upper lines correspond to the upper trigram (in which the central vertical line is the uppermost in the columnar hexagram representation). The convention of complete and broken line is maintained.

Table 5: Triangular representation of 64 hexagrams
It is interesting that Barbara G Walker, in a discussion of the earlier Fu Hsi (Earlier Heaven) arrangement of the hexagrams in what is described as the only feminist interpretation of the I Ching (I Ching of the Goddess, 2002), explains a still earlier representation based on two interlinked triangles: one pointing down and the other up pointing.

**Double triangular representation of hexagrams: 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.

Following the above exercise, 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.

### Table 6: 64 I Ching hexagrams configured as double triangles

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<th>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</th>
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<tr>
<td>This array has been presented in an experimental animation in a separate paper Mapping of I Ching hexagram coding onto Star of David (2008)</td>
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Such possibilities might be further explored in the light of treatment of the Star of David as framing a strange attractor in which the aesthetics of poiesis required for its comprehension is seen as a necessary precursor of the autopoiesis to which it points (El-Attractor -- Timeless Complex Dynamic Health, Wealth, Stealth / Youth, Couth, Truth, 2007).

Patterns of possible interactions between linear and triangular configurations

To the extent that the double triangle (Star of David) configuration of lines offers a major design contrast to the column of lines typical of the I Ching hexagram, it is also of interest to explore how these two extremes might be considered as "parental" generators of a set of intermediate designs. These intermediates might be understood as reflecting one or other "parent" to a greater or lesser degree -- if only from a design or patterning perspective.

The "parents" may of course be used to represent the set of 64 I Ching conditions, either as the standard column of lines or their configuration into 64 variants of the Star of David (as illustrated above) -- by using the classical convention of either broken or unbroken lines. In the same way, each of the "children" generated by the two "parents" (in the table below) may also be used to represent the 64 conditions -- again by making appropriate use of either broken or unbroken lines.

<table>
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<tr>
<th>I Ching hexagram</th>
<th>&quot;Star of David&quot;</th>
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The arguments for exploring such a symbolic marriage have been presented elsewhere (Enhancing the Quality of Knowing through Integration of East-West metaphors. 2000). Of special interest is the manner and extent to which the engendered patterns, like the "parents", are themselves valuable representations of distinct form of mirroring between "inner" and "outer" -- and other fundamental polarities of psychological significance -- as extensively discussed in the traditions focused on either "parent" individually. As configurations, rather than the more abstract line structures, the question is whether these are mnemonically helpful in understanding the distinctions which they may be used to symbolize.

Dynamics, resonance hybrids and Pascal lines

The above pattern representation appears to highlight static patterns. However it should not be forgotten that the translated title of the I Ching is the Book of Changes. The hexagrams offer codes for conditions between which change takes place -- with the focus on the implicit tendency to such transformation and its relation to decision-making. In suggesting a "marriage" with the Star of David, the latter is more typically understood as a static representation -- as represented, the "marriage" might be understood as between the dynamic and the static. However the Star of David may also be fruitfully understood as a standing wave pattern -- especially in its relation to the patterns and dynamics of the Tree of Life through the Kabbalah, and to the geometry of the Flower of Life pattern, notably as discussed and extensively illustrated by Andrew Monkman (Sacred Geometry: Flower of Life).

In this context it is therefore also of interest to explore the relation of both the representation of the I Ching and the Star of David to representations of understandings of the dynamic structure of the hexagonal benzene molecule that is so fundamental to the molecules.
constitutive of any organic life. In chemistry the structure, known as a resonance hybrid, derives its stability or coherence from the pattern of resonance between a set of partial or individually unstable extremes. It is a fundamentally dynamic entity. Relationships between the benzene molecule and the Star of David are noted in the literature. As a pattern, the one may be readily transformed into the other -- through operations that relate both to the Tree of Life representation.

In this sense the above table might be fruitfully extended to include mappings of I Ching hexagrams onto a hexagon. Furthermore, given the symbolic recognition of setting any such representation within a circle, of related interest is the significance of mapping the hexagram lines onto a hexagon inscribed within a circle -- introducing the closed curvature that is so intimately related to intuitive understandings of completeness, wholeness, coherence and integrity.

A hexagon so inscribed gave rise to a mathematical proof by Blaise Pascal -- considered to be of considerable significance. Pascal's theorem states: The three intersections of the pairs of opposite sides of a hexagon inscribed in a conic are collinear, namely they lie on a straight line, since named of the line of Pascal. Because of the value of this proof in resolving many other problems, it has given rise to the term Mystic Hexagram or Hexagramnum Mysticum (cf Alexander Bogomolny, Pascal Lines: Steiner and Kirkman Theorems II; Do You Speak Mathematics? 2002).

There are 60 such lines (at which three pairs of opposite sides meet) which together form an interesting, but complex, pattern at various scales as described and illustrated in the extensive MathWorld commentary on Pascal lines -- which notes that they are best visualized in the mathematically "degenerate" case of a (not necessarily regular) hexagon. That commentary presents the array of such paThese lines intersect, three at a time, in 20 Steiner points, and also in 60 Kirkman points. Each Steiner point lines together with three Kirkman points on 20 Cayley lines. Alexander Bogomolny provides an applet to illustrate these properties. 60 is the number of Hamilton cycles on a complete graph K6 with 6 vertices (where two paths, represented by the same loop but traversed in different directions, are considered identical. 60 = (6-1)!/2). The array of these 60 figures (suggestive of those above) is presented in the MathWorld commentary.

Another applet, less ambitious but clearer, has been provided by Joseph L. Pe (Pascal's Mystic Hexagram Theorem, 1998). The most comprehensive representation is provided by Chris Fisher and Norma Fuller (The Complete Pascal Figure Graphically Presented, 2007, with an extensive range of applets (only viewable through Internet Explorer). Also available is an applet from the Wolfram Demonstration Project (Pascal's Mystic Hexagon, viewable through the freely downloadable Mathematica Player) which is far less complex but clarifies how the Pascal lines and hexagon relate to the different conic sections (circle, ellipse, parabola, hyperbola).

Such applet visualizations are reminiscent of diffraction patterns, especially those associated in crystallography with X-ray diffraction, neutron diffraction and electron diffraction. This raises the possibility that Steiner and Kirkman points should be considered as emerging in a pattern from some form of "cognitive diffraction".

The dual of Pascal's theorem, known as Brianchon's theorem shows that for a hexagon circumscribed on a conic section, the lines joining opposite polygon vertices meet in a single point.

## Mirroring, enantiodromia and the engine of change

Of special interest with respect to Pascal's theorem is its relationship to the mirroring which is so fundamental to the significance of both the patterns of the I Ching and the Star of David. Essentially this mirroring provides a context for the otherwise paradoxical relationship between challenging polarities: inner/outer, male/female, spirit/matter, etc. Mirroring is necessarily fundamental to psychological engagement with the environment (Psychology of Sustainability: embodying cyclic environmental processes, 2002).

It is the transformations between such polarized conditions which are the focus of the I Ching. Just as the two triangles of the Star of David hold one understanding of that mirroring, the two trigrams of a hexagram, hold a related understanding, articulated to a greater degree through the correspondences between the changing connotations of the lines in equivalent positions in each trigram.

To the extent that any hexagram is represented as a hexagon within a conic (as the generalization of a circle), Pascal's theorem points to the possibility of valuable insights in relation to such mirroring. It raises the question of how opposites, encoded by opposite lines of the hexagon, may understood to be related beyond that conic boundary. The conic boundary may be usefully understood as a system boundary -- not in a static sense (as conventionally represented), but rather as a dynamic cycle or process. Given the intimate relationship to living processes (whether in the Chinese understanding of change, the Tree of Life, or the role of the benzene molecule), the question is then how does this dynamic emerge?

In symbolic representations, typically the lines constituting the "sides" of a hexagon are of equalky length (whether broken or not), possibly inscribed in a circle. The regularity of such representation obscures any dynamic -- however much it is implicit in how the symbol is to be appropriately interpreted. The focus is on the ideal and not on the dynamic through which that ideal emerges and by which it may be sustained.

Pascal's theorem deals with the "non-ideal" situation where the conic can take the range of elliptical forms, and where the hexagon can have sides of a varying range of range of lengths. This offers an additional way of representing the lines of an I Ching hexagram such that their length may vary according to the condition or to the influence their position has (or represents) at that particular time (understood as their tendency to "move"). The image is then closely reminiscent of any piston engine in which the lines of the hexagram function like individual pistons extending or retracting (yang or yin) such as to drive the cyclic process. The applet of Alexander Bogomolny, mentioned above with respect to Pascal lines, is helpful in clarifying this motion under different conditions (as are the applets of Chris Fisher and Norma Fuller).

The driving pressure in the cycle is then precisely to be understood in terms of the momentary "preponderance" or "predominance" of the influence of any particular line, mirrored by the constraint or "repression" of the corresponding line, which -- like a compressed spring - - then reasserts itself to counteract the systemic imbalance. This is admirably modelled by spherically symmetrical tensegrity structures
and is the basis for the well-recognized dynamics of their integrity and robustness under varying conditions. It is the qualitative characteristics of such a cycle that may be fundamental to sustainability and indeed to more dynamics understandings of individual land collective identity (Emergence of Cyclical Psycho-social Identity: sustainability as "psychically" defined, 2007).

Of major interest is then the significance of Pascal lines as providing a line linking the intersections of the 3 pairs of mirroring lines of a hexagon. However, in I Ching terms, as the hexagon transforms from representing one condition to representing another the constituent lines of the hexagon necessarily change in length (in the proposed representation) -- shifting the set of mirror intersections to another of the 60 Pascal lines.

Does each such line represent the limited possibility and credibility of "linear thinking" during a brief period in any transformation cycle? Are there 60 such essentially "linear" strategies obscuring the dynamics of the change by which they will shortly be undermined in the cycle? Are such inherently comprehensible "linear" strategic options a set of approximations to a more global strategy characterized by an as yet poorly understood form of "curvature"? Clearly the danger is that any such linear understanding -- as a particular balance between the mirrored polarities -- is held to be a reality that must necessarily be appropriately institutionalized. It is such thinking that dangerously obscures the dynamic realities of enantiodromia that may be the essence of sustainability understood dynamically (Psychosocial Energy from Polarization within a Cyclic Pattern of Enantiodromia, 2007).

It is much to be regretted that there is not greater interest or capacity to reconcile the rapidly developing field of algebraic and geometrical approaches to cycles with the challenges of psycho-social change and governance, despite NATO interest in the matter (B. Brent Gordon, et al. The Arithmetic and Geometry of Algebraic Cycles, proceedings of the NATO ASI/CRM Summer School at Banff, 2000). A similar lack of reconciliation is evident from the developing fruitful interactions between mathematics and chemistry, notably with respect to fullerenes (Pierre Hansen, et al. Discrete Mathematical Chemistry, 2000).

### Patterning 60 within 19x19

To the extent that the above patterning arguments have shown the capacity of 19x19 to hold a range of representations of patterns of change, how might the emergence of 60 then be situated within this context? Two approaches are of interest.

<table>
<thead>
<tr>
<th>Table 8: Alternative approaches to embedding 60 within 19x19</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong>: Exclusion of single cell external grey boundary and central cross (not to scale), reducing the table to 4 quadrants of 8x8 (as above) -- further excluding 2x2 positions at the centre of each, thereby creating 4 coloured quadrants, each of 60 cells</td>
</tr>
<tr>
<td><strong>B</strong>: Exclusion of one column and row of external boundary cells (either on the edge or through the centre as a cross) creating a 3x3 sets of 6x6 cells, using 324 cells (not to scale). Those excluded number a further 36(+1) totalling 360(+1) cells, namely 6x60 (+1) or 10x36(+1).</td>
</tr>
</tbody>
</table>

| 36 | 36 | 36 |
| 36 | 36 | 36 |
| 36 | 36 | 36 |

### Relevance of 19x19 to annual calendar and associated cycles

The 19x19 (=361) framework offers the closest regular tabular approximation to the 365 days of the year -- since 20x20 is clearly much greater. It is for this reason that it is closely related in some traditions with the design of calendars:

- the go board is understood as representing the 360 days in the lunar year (plus one); the division into four quarters symbolizes the four seasons; the 72 intersection points on the circumference represent the five-day weeks of the Chinese lunar calendar (notably discussed by Shirakawa Masayoshi (see Peter Shotwell, Go and Ancient Chinese Divination: a commentary on A Journey in Search of the Origins of Go by Shirakawa Masayoshi, 2006)
- the tabular Islamic calendar (or Fatimid calendar) has a 30-year cycle with 11 leap years of 355 days and 19 years of 354 days; it is accurate to one day in about 2500 years, deviating a maximum of 1 or 2 days in the short term.
- the Bahá’í calendar is structured such that a year contains 19 months of 19 days each, as well as a 19-year cycle and a 361-year (19x19) supercycle
- the Meyer- Palmen solihunar calendar

Given its relation to the calendar year, it is interesting to recognize its relevance to cycles of work and reporting within the year, as perceived by business:

- the four "quarters" are clearly highlighted
- the year may be understood as having 52 "weeks" of 7 days (namely 364 days), namely 13 weeks per quarter
- assuming a week of 5 working days that gives 260 days (with 104 holidays) per year or 65 days per quarter (with 26 holidays)

Such working and reporting cycles can be variously represented within the 19x19 framework

**Towards the specification of a pattern dancing applet**
The existing applelets indicated (above) with respect to comprehension of Pascal lines show the value of such tools. Elsewhere the value of an existing software application to explore hundreds of polyhedral patterns has been highlighted with respect to psycho-social organization (Polyhedral Pattern Language: software facilitation of emergence, representation and transformation of psycho-social organization, 2008). This implies extension of the above exploration into a third geometrical dimension or even a fourth (as is one of the specific merits of that software).

But, with respect to a 19x19 framework, the design elements to be considered in exploring the possible patterns (of a "polygonal pattern language") and the dynamics interrelating them include:

- in any number-based representation of the cell, colour code the cells according to the factors of the numbers therein (2,3,5, etc) so that such "valencies" highlight any patterns across the board (of which possibilities are implied by the screen shots of the computer games Predator Winner and Terminator Winner played in a 19x19 matrix)
- enable representation of the cells according to different codes numbers, lines (as in a hexagram), triangles, or combinations
- facilitate understanding of the organizing principle engendering any given pattern or cycle of patterns, notably the transformations or morphing principle
- highlight mirroring transformations and enantiodromia
- relate the patterns, to the extent possible, to patterns understood in other contexts (tartans, Chladni patterns, flags, etc)

Aspects of this approach have of course been considered in the Game of Life (mentioned above), as initially developed by mathematician John Conway as a cellular automaton -- for which variants have since been elaborated (described as Life-like). Particular attention has been given by mathematicians to the various possible alternative rule sets, some of which are the basis of these variants (for example, HighLife, which is distinguished by pattern replication after 12 generations). Such two-dimensional cellular automata can be used to evaluate final board positions in the 19x19 game of go (Eric Rollins, Cellular Automata and the Game of Go)

Of interest is the extent to which such an applelet generates (or cycles through) well-known patterns characteristic of square dancing or national flags with which people variously identify (as "flags of identity") -- thereby placing specific identities within a larger, generic, dynamic context. Of interest is the possibility of generating alternative calendars -- as alternative organizations of time, as a context for transactions, whether business or otherwise.

Also of interest are possibilities relating to:

- a degree of mapping of the fractal Mandelbrot set across the quadrants, and the relationship to the phases of the Carnot heat engine cycle, as discussed in (Cardioid Attractor Fundamental to Sustainability: 8 transactional games forming the heart of sustainable relationship, 2005)
- patterns associated with the sequence of Fibonacci numbers

**Sustainability: sudoku, go, chess, yantras, sigils and bagua**

Whether as games of various kinds (go, chess, etc), intellectual recreation (sudoku, Rubik's Cube, etc), symbols (sigils, yantras, bagua, etc), there is a commonality to the attraction offered by the patterns they offer. In each case this attraction may engage people in somewhat related processes over extended periods of time. Although the engagement may be of a different nature and vary greatly with individual disposition, the engagement tends to be of a long term nature and as such is potentially associated with understanding of a form of sustainability. The emphasis may of course be on intellectual challenge and "winning", or it may be on the evocation of meditative insight, or on some combination.

Whilst go and chess may apparently emphasize visual patterns, for players these translate into patterns of influence felt as the pressure of forces in play. Such games, as with sudoku, emphasize logical relations and patterns of connectivity through "valencies" of elements acting over space and/or time. All these factors may be present in sigils, yantras and bagua, with the potential additional evocation of meditative insight. In these cases however, visual patterns may provide focus, with the configured elements (and the boundary) functioning to some degree as a container within which a form of transformation of understanding may take place -- through a form of alchemy.

Conventional explanations in linguistics and semiotics, notably those of Ferdinand de Saussure, make a distinction between such patterns as "signifiers" indicative of whatever is considered to be "signified" by such patterns. This fails to highlight the degree of "significance" associated with recognition of whatever is "signified" -- namely how people are affected by such symbols, as discussed elsewhere (How people are "moved" by symbols, 2008). How indeed are people "drawn into" the game, pattern or symbol? What is the excitement or energy they derive from such engagement? This is not a matter of explanation but of "implantation", namely how the dynamics of experience are embodied in such patterns. This might even be described as a form of "incarnation" -- a period ending with exhaustion or even "extermination" (as in a game).

The excitement, or motivating engagement, may be associated with the challenge and self-affirmation of being able to "do it", as with sudoku, or to "win", as with chess or go. More subtly, both may involve an emergent capacity to "get it" in terms of comprehending advantageous strategies -- possibly involving a sense of "grasping it", of cathartic completion and closure (Hilary Lawson, Closure: a story of everything, 2001). However the engaging excitement may derive more from the imaginatively elicited sense of potential and possibility arising from meditative speculation.

In the case of both games and sudoku, emphasis may be on identifying what moves are strategically appropriate -- on what is "right" as opposed to "wrong". This may be closely associated with a sense of whether the challenge of resolution is "easy" or "hard". The "moves" in a game (against an opposing "other") may take the form of logical explorations (as in sudoku) or be transformed into intuitive, self-reflexive explorations transcending such conventional polarities (as in the case of symbols). All these emphases may however be present
in the different cases.

The question, possibly implicit in the engagement with any of these modes, is the nature and significance of the dynamic experienced -- its self-reflexive implications. This question may be found in its primordial form in the fascination of a baby with the pattern of movement of a rattle. It may be found in the engagement elicited by the patterns of movement associated with sexual attraction -- hence the framing offered by *tantra* (and possibly by pejorative references to "conceptual masturbation" and "mind fucking"). More generally these may be understood in terms of *morphogenesis* and the forms identified in *catastrophe theory* (as explored by Rene Thom and Christopher Zeeman).

These issues point onward to the challenge of sustainability -- to the psychology of sustainability, as noted above (*Psychology of Sustainability: embodying cyclic environmental processes*, 2002). What sustains engagement in a game, in sudoku, or in a symbol -- whether such as to extend a session (possibly for an improbable or inexplicable period of time) or to ensure future engagement in such a dynamic? What is the self-energizing nature of the engagement? How is this associated with cognitive exploration of the dancing patterns over time? Curiously the secret of the dynamic may lie in the Chinese account of the process promoted by Carl Jung (*The Secret of the Golden Flower* or *Tai Yi Yin Hua Zong Zhi*). A less overtly meditative process pointer is that of the coaction cardioid (*Cardiod Attractor Fundamental to Sustainability: 8 transactional games forming the heart of sustainable relationships*, 2005) with the suggestion that the "secret" may even be implicit in the Carnot heat engine cycle. In the case of sustainability, however, the "secret" may not be in the secret -- and may be openly associated with a more simply comprehensible dynamic.

The patterns discussed above, from a design perspective, are a challenge as to how little can imply more -- a minimalist aesthetic of economy of form. This is the pattern equivalent of *Small is Beautiful* (1970) of E. F. Schumacher.

**Sustainable "cognitive engine" and emergent "wisdom engine"?**

The advantage to the non-traditionalist, with little attraction to symbols and associated mystification, is the direct experience of psycho-social engagement offered by the games mentioned (go, chess, sudoku, etc). More generally there is the associated direct experience of dialogue with oneself or another.

This experience involves a set of polarities which might be articulated as including: knowing/not-knowing, asserting/denying, creativity/passivity, question/answer, respect/disrespect, insight/blockage, agreement/disagreement, right/wrong, excitement/boredom, etc. Of course the process of selecting and presenting these very terms, and their framing as polarities, is self-reflexively part of the dynamic through which that particular understanding is appreciated and challenged. These and other polarities are intrinsic to sustaining engagement in the games named and appreciation of the emergent patterns and challenges, as discussed elsewhere (*Alternating between Complementary Conditions -- for sustainable dialogue, vision, conference, policy, network, community and lifestyle*, 1983).

Any assertions about how the polarities might be ordered to sustain the dynamic are therefore themselves necessarily questionable -- as thereby triggering one pole of a polarity (assertion, creativity, insight, knowing, agreement, etc) and evoking its counterpart (denial, passivity, blockage, not-knowing, disagreement, etc). Consideration of how the "cognitive engine" operates is therefore delightfully problematic and elusive, however readily closure may be asserted (prematurely) to compensate for openness (held to be excessive).

The matrix-based patterns above clearly do function as a container for these processes -- perhaps as models for less formalized containers. Curiously the challenge of "escaping" some such matrix, in some way, is now widely accepted as a desirable challenge (*The Matrix* movie series; Richard Moore, *Escaping the Matrix: how we the people can change the world*, 2005) -- even though "escape" might be seen as an instance of polarized understanding avoiding some form of "embodiment". Despite the paradoxical constraints of self-reflexivity, there is therefore a case for exploring various pointers towards such a possibility and their, perhaps elusive, commonalities and subtly contrasting emphases. The possibilities have been discussed in more detail elsewhere (*Discovering Richer Patterns of Comprehension to Reframe Polarization*, 1998), notably in relation to 2-phase, 4-phase, 8-phase, and 16-phase modes -- on the understanding that the *I Ching* represents a 64-phase mode.

Fruitful possibilities include:

- **BaGua**: this classical 8-fold organization of trigrams is a focus of a vast literature and continuing reflection. It clearly emphasizes and encodes 4 fundamental polarities (or classes of polarities) whose dynamic relationships are only to be explained for wider understanding through an array of complementary metaphors.

- **Word-pair analysis**: William Huff (*Homonym, Homonym and Homonym, and Other Word Pairs*, 1992) has made creative use of the 8 trigrams of the BaGua to distinguish 8 types of word pair (such as "peace" and "piece") according to *meaning, pronunciation* and *spelling*. He has extended his work to interlingual word pairs. The approach could be used as a wy of encoding signifier, significance, and motivational significance.

- **Interparadigmatic dialogue**: Kinhide Mushakoji (*Global Issues and Interparadigmatic Dialogue; essays on multipolar politics*, 1988), from the perspective of some Eastern cultures, has stressed the importance of the 4-phase pattern to interparadigmatic dialogue by focusing on the tetra-lemma: affirmation, negation, non-affirmation and non-negation, affirmation and negation (see review). The second two are unacceptable to formal logic.

- **Psychological function**: Carl Jung's work on psychological functions distinguished four types: Thinking (T), Intuition (I), Feeling (F) and Sensing (S) which may be organized into polarities -- notably as later developed as part of the *Myers-Briggs Type Indicator*.

- **Mindscapes**: Magoroh Maruyama (*Mindscapes in Management: use of individual differences in multicultural management*, 1994) distinguishes four types of epistemological mindspace.

- **Complementary languages**: Antonio de Nicolas (Meditations through the Rg Veda, 1976/2000) recognizes four complementary languages (see review: *part 1* and *part 2*) as underlying the structure of the *Rig Veda*.
• AQAL: Ken Wilber, in his magnum opus on Sex, Ecology and Spirituality (1995), articulates a four-fold schema based on two dimensions or polarities (exterior - interior; individual-social). Combined these give four "quadrants": exterior-individual (behavioural), interior-individual (intentional), exterior-social (social system), and interior-social (cultural workspace).

• Axes of bias: The set of polarized pre-logical biases typical of academic discourse, as identified by W. T. Jones (The Romantic Syndrome: toward a new method in cultural anthropology and the history of ideas, 1961) offers useful pointers to the dynamic within which conventional dialogue is embedded.

In each of these cases the experiential challenge of the dynamic between the modes -- the "implanation" -- is significantly obscured by the explanation of the modalities (as distinguished in written articulations and diagrams). And it is of course what is distinguished in this way that triggers that experiential dynamic -- through disagreement with any such assertions, etc. A specific challenge is then how to embed, or embody, the dynamic of the implanatory dimension into any explanatory articulation -- a challenge effectively recognized by such as George Lakoff and Mark Johnson (Philosophy in the Flesh: the embodied mind and its challenge to western thought, 1999), as discussed elsewhere (Conditions of Objective, Subjective and Embodied Cognition: mnemonic systems for mmetic coding of complexity, 2007). A great merit of the simplicity of the BaGua encoding is the manner in which it disassociates itself from particular verbal articulations -- in which some exponents have a heavy proprietary investment as representative of their sense of identity.

With respect to "escaping" the artificial constraints of any matrix-style explanation, characteristic of the above patterns, the challenge is fruitfully reframed by arguments of 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) questioning fundamental assumptions regarding use of the plane surface typical of most articulations.

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....

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....

These considerations relate to the possibility of escaping the cognitive matrix by use of a torus, and the associated challenge of self-reflexive embodiment, as extensively discussed elsewhere (Comprehension of Requisite Variety for Sustainable Psychosocial Dynamics: transforming a matrix classification onto intertwined tori, 2006).

But such abstractions easily obscure the direct experience of engagement in games and the like in which the dynamics of some form of cognitive engine are directly accessible. However the nature of this access is more appropriately associated with the delights, excitement and challenges of "surfing" "cognitive catastrophes" on which commentary is in many ways pointless. Does such "pointlessness" relate to the paradox of how the observing individual specificity is both transcended and embodied in that experience? As an existential dilemma, this has been well expressed by Reshad Feild (The Last Barrier: A Journey into the Essence of Sufi Teachings, 2002) as that of "removing the point from which we view" -- and the assumptions relating to any such meta-systemic perspective.

The challenge, as with sustainability, is to keep the "ball in play" -- whether or not the "ball" is fruitfully to be described as the ch'i of East Asian tradition. One much-cited, culturally specific articulation is that of Chuang-tzu.

### The Pivot by Chuang-tzu

Tao is obscured when men understand only one of a pair of opposites, or concentrate only on a partial aspect of being. Then clear expression also becomes muddled by mere wordplay, affirming this one aspect and denying the rest. Hence the wrangling... each denies what the other affirms, and affirms what the other denies. What use is this struggle to set up "No" against "Yes," and "Yes" against "No"?....

When the wise man grasps this pivot, he is in the center of the circle, and there he stands while "Yes" and "No" pursue each other around the circumference.

This articulation may be related to any array of the 4-fold instances above into 4 quadrants, or (more fruitfully) to representing 8-fold instances, such as the trigrams of the BaGua, in a 3x3 matrix with an empty central cell -- the pivotal central position identified by Chuang-tzu, or the centre of the BaGua in conventional circular array. The dynamics of enantiodromia between the polarities then function as a cognitive engine to define that central space -- through which "energy" is engendered to sustain the process.

The major challenge is to avoid the cycles of enantiodromia "crashing" in ways that are so typical of dysfunctional polarization in which "catastrophe" terminates the dynamic -- the epitome of unsustainability. The design challenge is elegantly represented by the challenge of energy generation through nuclear fusion, as a metaphor for the "cognitive fusion" associated with the operation of a "cognitive engine".
In the nuclear fusion process -- on which so many hopes for future energy are currently based -- it becomes nonviable if the circulating plasma comes into contact with the walls of the toroidal container. This is appropriately known as "quenching". This is an excellent analogue to the situation in a cognitive engine when the circulating attention (the meditative focus of the Secret of the Golden Flower mentioned above) becomes inappropriately fixed on one or other polar extreme, as discussed elsewhere (Enactivating a Cognitive Fusion Reactor Imaginal Transformation of Energy Resourcing (ITER-8), 2006).

To sustain the attention cycle, the opposing trigrams must then function appropriately as both attractors and repulsors -- as circumstances require in order to prevent fixation and quenching. This ensures a process of (eternal) return that is the essence of the cycle of sustainability. The sense of such return and returning has been repeatedly evoked in poetry, notably in the verse of T. S Eliot:

'We shall not cease from exploration
And the end of all our exploring
Will be to arrive where we started
And know it for the first time.'

T S Eliot, *Little Gidding*

As the strangest attractor, of the most fundamental nature, this cycling process of return effectively embodies time in a manner quite distinct from the peripheral linear preoccupations of short-term polarized understanding, whatever role it may play. This has been variously discussed elsewhere (The Isdom of the Wisdom Society: embodying time as the heartland of humanity, 2003; Engaging Macrohistory through the Present Moment, 2004; Potential Misuse of the Conveyor Metaphor: recognition of the circular dynamic essential to its appropriate operation, 2007). Its power is partially evident in the political importance currently attached to the "right of return" by some displaced peoples -- notably indigenous tribes.

It is in this sense that the sustainability of dialogue with any "other" -- notably as formalized in go or chess -- is a requisite for forms of sustainability more conventionally understood (Sustainable Dialogue as a Necessary Template for sustainable global community, 1995). Such dialogue is typically subject to "quenching" -- as implicit in the explorations of Edward de Bono (I Am Right and You Are Wrong, 1990 -- later appropriately entitled From Rock Logic to Water Logic, 1993). The 8 trigrams of the I Ching might indeed be fruitfully understood as indicative of the variety of forms of "agreement" and "disagreement" and the nature of the "water logic" dynamic between them -- especially when further articulated in the 64 interrelated conditions of the I Ching (as explored elsewhere)

**Conclusions**

It is helpful to recognize how a 19x19 framework is already a major stretch for the comprehension of patterns. However, given its popular use as a game board, it is clearly an acceptable challenge. Analogous acceptable challenges are of course the 8x8 chess board, the 9x9 patterns of sudoku and those of crossword puzzles. It is within such numeric limits that the human cognitive capacity must evidently struggle to derive meaningful patterns. This is especially vital to sustaining collective memory (Societal Learning and the Erosion of Collective Memory a critique of the Club of Rome Report: No Limits to Learning, 1980).

As is evident from the challenges of these games, any forms of governance in quest of sustainability must either be bound by such constraints in eliciting fruitful patterns, or find ways of enhancing capacity to detect, comprehend and render credible any subtler patterns of larger scale that may be vital to such a quest. Mnemonic catalysts are therefore vital, as argued elsewhere (In Quest of Mnemonic Catalysts -- for comprehension of complex psychosocial dynamics, 2007).

A major concern in identifying patterns as a basis or guide for action is the degree to which the links "between the dots" are sufficiently credible to elict any figure from the background of noise -- and to whom that figure is then sufficiently credible to constitute a delicate bridge across which travel is possible between seemingly disparate fragments of reality, whether "in reality" or only "in imagination". From a mathematical perspective it is exemplified by the quality of "monstrous moonshine" (Potential Psychosocial Significance of Monstrous Moonshine: an exceptional form of symmetry as a Rosetta stone for cognitive frameworks, 2007) and more generally in the challenge across of "correspondences" disciplines (Theories of Correspondences and potential equivalences between them in correlative thinking, 2007). In the challenges to governance in matching the resolutique with the problematic, imagination is an important factor as may be highlighted diagrammatically in a figure based on the hyperbola (Imagining the Real Challenge and Realizing the Imaginal Pathway of Sustainable Transformation, 2007)-- to which the discussion above relating to Pascal lines may be relevant.

The argument here is that a dynamic framing of a set of arrangements is especially helpful as a catalyst for new styles of thinking about the relationship between frameworks that are heavily associated with conceptual and cultural rigidification. This is therefore a means of transforming any "clash of civilizations" into an aesthetically comprehensible and justifiable dynamic between civilizations -- honouring emergent arrangements whilst demonstrating how they are particular manifestations of a larger dynamic whole. This is not to deny the degree to which particular arrangements mirror this larger dynamic within their frameworks in particular ways. It highlights however the manner in which that dynamic is mirrored in the relationships between the arrangements.

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