



# laetus in praesens

Alternative view of segmented documents via Kairos

30 September 2012 | Draft

## In Quest of a Dynamic Pattern of Transformations

### Sensing the strange attractor of an emerging Rosetta Stone

-- / --

#### Introduction

Pattern of transformations as a dynamic quality without a name

Embodying the dynamic subtleties of living experience

Re-cognition of transformation in various domains

Interweaving fundamental patterning approaches to transformation

Modulating cognitive transformations: electrical metaphors and semiconduction

Potential emergence of coherent transformational connectivity

From polyocular Rosetta "stone" to complex polysensorial dynamic

Conclusion

References

## Introduction

The primary concern here is with the manner in which transformation occurs **under** a variety of guises, **but** it is the recognition of the generic form that is the key -- **although** the nature of that generic can **not** be adequately described through the language of any of those guises. Each is a way of **partially** experiencing the underlying existential pattern. This approach is consistent with the original quest of [general systems theory](#), with the exception of the emphasis on the cognitive and existential challenges and the implications for comprehension and communication with what can only be partially described.

[Christopher Alexander](#) emphasizes recognition of a "quality without a name" within well-designed environments -- environmental design perhaps to be understood as one of those guises (*The Timeless Way of Building*, 1979). The emphasis here however is on the dynamic nature of that "quality without a name". Each such guise may however cultivate a sense of its own completeness and adequacy -- in preference to others, or precluding consideration of them.

In particular, literacy and numeracy are derivatives of that underlying pattern, exemplified by the engagement with recreational mathematics or the insights associated with sacred alphabets, and embodied in them. The conventional preoccupation with either in education exemplifies cognitive inadequacy in "describing" and "re-cognizing" the subtleties of the underlying pattern of transformations. Any reconciliation of them implies a degree of "stereoscopic capacity" enabling a form of "depth perception" -- as emphasized in recognition of general systems. This then relates to current preoccupations with sensemaking, especially at the global level where what is "reasonable" is readily contested -- as in official US response to [widespread Muslim protests](#) against the American-made film *Innocence of Muslims*.

The argument here is that the educational focus on literacy or numeracy inhibits recognition of the dynamics associated with the underlying pattern. This pattern may well be manifest and familiar in other domains with which an individual may be variously engaged as a consequence of any process of "education" -- sport, cooking, music, etc. An individual may exhibit considerable innate talent in domains undervalued by conventional education -- as exemplified by the relative importance conventionally attached to the variety of forms of intelligence ([Howard Gardner](#), *Frames of Mind: the Theory of Multiple Intelligences*, 1983; [Daniel Goleman](#), *Emotional Intelligence: why it can matter more than IQ*, 1996). Consistent with the [kinesthetic intelligence](#) noted as one of Gardner's types, with which many are familiar through sport, aerobatics and dance, the argument takes account of emerging recognition of the embodiment of mind in movement ([Maxine Sheets-Johnstone](#), *The Primacy of Movement*, 2011; [Mark Johnson](#), *The Meaning of the Body: aesthetics of human understanding*, 2008).

The concern here is exemplified by the questionable importance attached conventionally to learning the "[multiplication table](#)" as being fundamental to numeracy. The question however is whether there is a more fundamental "table of transformations" which might be more fruitfully and readily learned as a form of "[Rosetta Stone](#)" -- of which the significance and pattern of the multiplication table is essentially derivative and partial. Just as education in numeracy necessarily endeavours to convert experience into quantitative form, the question is whether education in transformation more generally would offer a degree of access to the forms of transformation possible in a variety

of domains -- and common to them from a generic perspective.

The assumption is that greater understanding of transformation in generic terms, as a complex of processes, would enable and sustain new forms of development -- especially for the individual in times of crisis. With respect to its relevance to current global challenges, the approach takes its inspiration from the argument of Albert Einstein: *The significant problems we face cannot be solved at the same level of thinking we were at when we created them.*

This argument follows from issues raised previously (*Transforming the Art of Conversation: conversing as the transformative science of development*, 2012; *Interweaving Thematic Threads and Learning Pathways*, 2010). As a form of literature survey of possibilities, avoiding closure, the approach follows from a previous argument (*In Quest of Mnemonic Catalysts -- for comprehension of complex psychosocial dynamics*, 2007).

## Pattern of transformations as a dynamic quality without a name

This underlying pattern is most fruitfully understood as subtle and elusive in ways which preclude appropriate closure through the modalities of any one domain -- although such may be attempted and be held to be successful. It could be labelled for convenience as a cognitive variant of the traditional "black box" of systems analysis -- about which little can be effectively said.

As noted above, Christopher Alexander emphasizes recognition of a "central quality without a name" within well-designed environments (*The Timeless Way of Building*, 1979). This could be extended to cognitive environments. For him, a building or a town will only be alive to the extent that it is governed by the timeless way. He summarizes this as follows:

1. It is a process which brings order out of nothing but ourselves; it cannot be attained, but it will happen of its own accord, if "we" will only let it.
2. There is a central quality which is the root criterion of life and spirit in a man, a town, a building, or a wilderness. This quality is objective and precise, but it cannot be named,
3. The search, which we make for this quality, in our own lives, is the central search of any person, and the crux of any individual person's story. It is the search for those moments and situations when we are most alive.
4. In order to define this quality in buildings and in towns, we must begin by understanding that every place is given its character by certain patterns of events that keep on happening there.
5. These patterns of events are always interlocked with certain geometric patterns in the space. Indeed, as we shall see, each building and each town is ultimately made out of these patterns in the space, and out of nothing else: they are the atoms and the molecules from which a building or a town is made.

The emphasis in the argument which follows here is however on the **dynamic** nature of that "quality without a name". This emphasis is present to a degree in Alexander's subsequent points regarding how that quality without a name can be reached through building a "living pattern language as a gate":

9. This quality in buildings and in towns cannot be made, but only generated, indirectly, by the ordinary actions of the people, just as a flower cannot be made, but only generated from the seed.
10. The people can shape buildings for themselves, and have done it for centuries, by using languages which I call pattern languages. A pattern language gives each person who uses it the power to create an infinite variety of new and unique buildings, just as his ordinary language gives him the power to create an infinite variety of sentences.
11. These pattern languages are not confined to villages and farm society. All acts of building are governed by a pattern language of some sort, and the patterns in the world are there, entirely because they are created by the pattern languages which people use,
12. And, beyond that, it is not just the shape of towns and buildings which comes from pattern languages -- it is their quality as well. Even the life and beauty of the most awe-inspiring great religious buildings came from the languages their builders used.
13. But in our time the languages have broken down. Since they are no longer shared, the processes which keep them deep have broken down; and it is therefore virtually impossible for anybody, in our time, to make a building live.
14. To work our way towards a shared and living language once again, we must first learn how to discover patterns which are deep, and capable of generating life.

Alexander's sense of a pattern language could be fruitfully related to the argument by [Gregory Bateson](#) for recognition of a meta-pattern:

The pattern which connects is a meta-pattern. It is a pattern of patterns. It is that meta-pattern which defines the vast generalization that, indeed, it is patterns which connect. (*Mind and Nature: a necessary unity*, 1979)

And it is from this perspective that Bateson warns: *Break the pattern which connects the items of learning and you necessarily destroy all quality* (1979, pp. 8-11). This echoes Alexander's sense above that: *in our time the languages have broken down*. Again the emphasis in what follows is on a **dynamic** meta-pattern of connectivity, usefully understood through "transformations". Any particular transformation necessarily implies a dynamic. How the pattern of connectivity might itself be dynamic is necessarily a greater cognitive challenge.

The challenge to comprehension of such subtlety can be explored through the formalism of [q-analysis](#) developed by mathematician Ron Atkin (*Multidimensional Man; can man live in 3-dimensional space ?* 1981), as summarized separately (*Comprehension: Social organization determined by incommunicability of insights*, 1995). Its relevance to pattern language can also be explored (*Beyond Edge-bound Comprehension and Modal Impotence: combining q-holes through a pattern language*, 1981).

The seemingly abstract nature of these indications avoids the sense in which **individual cognition is intimately identified with these**

processes and carried by them. It is in this sense that any underlying pattern, and its dynamics, is effectively fundamental as a **dynamic meta-pattern of credibility and confidence**. Curiously current worldwide preoccupation with both "credibility" and "confidence" focuses on them in a static, unarticulated sense. They are framed simplistically as conditions or states to be achieved -- as with "goodwill", recorded as an "asset" in some financial balance sheets. **Any static focus could then be considered incompatible with the viability of the current approach to confidence-building in both global finance and nation-building.**

## Embodying the dynamic subtleties of living experience

The citation above indicates how Alexander offers a language through which to recognize both the "quality without a name" and its importance in sustaining a sense of being alive. That approach is complemented and further justified by the recent work of the biological anthropologist Terrence Deacon (*Incomplete Nature: how mind emerged from matter*, 2012; *The Symbolic Species: the co-evolution of language and the brain*, 1997). He argues that as physicists work toward completing a theory of the universe and biologists unravel the molecular complexity of life, a glaring incompleteness in this scientific vision becomes apparent. The **Theory of Everything** that appears to be emerging "includes everything but us: the feelings, meanings, consciousness, and purposes that make us what we are". These most immediate and incontrovertible phenomena are left unexplained because they lack the physical properties that are assumed to be necessary for explanation of any relevance.

Deacon provides a way of recognizing the role of physical processes in engendering the intangible processes of consciousness. He explores the paradoxical incompleteness of semiotic and teleological phenomena as a source of their unique influence in the world by tracing the emergence of this special causal capacity from simple thermodynamics to self-organizing dynamics to living and mental dynamics. He demonstrates how specific absences (or constraints) play the critical causal role in the organization of physical processes that generates these properties.

The fundamental value of focusing on what is "absent" from conventional explanation is introduced by Deacon by comparing it to the vital role of **zero** in the number system -- itself a great discovery (cf. Charles Seife, *Zero: the biography of a dangerous idea*, 2000; Robert Kaplan and Ellen Kaplan, *The Nothing that Is: a natural history of zero*, 2000). For Deacon:

Basically, it means that our best science -- that collection of theories that presumably comes closest to explaining everything -- does not include this one most defining characteristic of being you and me. In effect, our current "Theory of Everything" implies that we don't exist, except as collections of atoms. So what's missing? **Ironically and enigmatically, something missing is missing.** (p. 1) [*emphasis added*]

He uses this analogue to zero to demonstrate how a form of causality dependent on specifically absent features and unrealized potentials can be compatible with the best of science. Deacon sees this approach as offering a *glimpse of the qualitative outlines of a future science that is subtle enough to include us and our enigmatically incomplete nature, as legitimate forms of knotting in the fabric of the universe* (p. 17)

In his concluding paragraph he notes:

In the title to one of his recent books, **Stuart Kauffman** [*At Home in the Universe: the search for laws of self-organization and complexity*, 1995] succinctly identifies what has been missing from our current blinkered metaphysical worldview. Despite the power and insights that we have gained from this powerful way of conceiving of the world, it has not helped us to feel "at home in the universe". Even as our scientific tools have given us mastery over so much of the physical world around and within us, they have at the same time alienated us from these same realms. **It is time to find our way home.** (p. 545) [*emphasis added*]

A fruitful constraint on that conclusion might be the argument from a psychotherapeutic perspective by **James Hillman** and **Michael Ventura** (*We've Had a Hundred Years of Psychotherapy -- And the World's Getting Worse*, 1993).

## Re-cognition of transformation in various domains

Following Alexander, the question is then how to identify the range of domains in which processes of transformation are recognized in some way -- especially those which are familiar and of personal significance. Alexander's approach can, for example, be used as a template to explore the applicability of his pattern language in selected other domains, as with the experimental *5-fold Pattern Language* (1984):

- **Template:** This endeavours to describe the pattern in content-free terms as pure relationship. As such it is a guideline for the elaboration of patterns for other arenas.
- **Physical environment:** This is an adaptation of Alexander's own pattern description
- **Socio-organizational environment:** This describes the pattern as it applies to the organization of social groups, organizations and networks.
- **Conceptual environment:** This describes the pattern as it applies to the organization of a conceptual framework or a body of knowledge.
- **Intra-personal environment:** This describes the pattern as it applies to the organization of modes of awareness adopted by a person.

Again it needs to be stressed that that exploration focused on pattern in its **static** sense -- and not on the **dynamics** of a transformation, however much Alexander may have implied it through considering the manner in which design is engendered in practice (as in *The*

Oregon Experiment, 1975). Any transformation process might well be recognized as a kind of **standing wave**, and the transformation might indeed be given a label for communication purposes. However such devices dissociate the person engaging in the process from the cognitive intimacy required by engagement in the dynamics of the transformation. A similar point can be made with respect to human values (*Freedom, Democracy, Justice: isolated nouns or interwoven verbs? Illusory quest for qualities and principles dynamically disguised*, 2011).

A set of domains could be identified in which "transformation" is variously recognized -- each domain being variously suggestive of insights into the elusive nature of the dynamics of the underlying generic pattern. The insights would seem to be associated with the manner in which the more readily recognized transformation processes are employed as metaphors. The elusive dynamic is effectively "sensed" in ways which permit its nature to be communicated to a degree through metaphor (cf. *Metaphors as Transdisciplinary Vehicles of the Future*, 1991).

The domains for consideration could then include the following, tentatively clustered for convenience:

1. **Abstract / formalization**

- mathematics (as discussed below)

2. **Fundamental**, as in the preoccupations of fundamental physics, especially astrophysics (cf. *Towards an Astrophysics of the Knowledge Universe from astronautics to noonautics?* 2006):

- **light**: the transformations of light are most notably enabled by optical systems, typically with the use of mirrors and lenses, or the manner in which light is affected by matter (reflection, inversion, etc) -- as well as the possibility of creating "illusions". These transformations readily understood metaphorically as epitomized by acquisition or loss of "focus" (cf. *Circulation of the Light: essential metaphor of global sustainability?* 2010). The argument has been developed separately (*Patterning Archetypal Templates of Emergent Order: implications of diamond faceting for enlightening dialogue*, 2002)
- **energy / matter**: the transformations of energy, or matter, and of one into the other. These may well be valued and explored as metaphors (cf. *Reframing Sustainable Sources of Energy for the Future: the vital role of psychosocial variants*, 2006; *Massive Elicitation of Psychosocial Energy: requisite technology for collective enlightenment*, 2011)
- **information**: recognition of the fundamental nature of information (matter as information, for example) and therefore the possibilities of transforming it (cf. *Coherent Policy-making Beyond the Information Barrier: circumventing dependence on access, classification, penetration, dissemination, property, surveillance, interpretation, disinformation, and credibility*, 1999)

3. **Nature**, as in recognition of the non-biological processes of the environment (most notably by the "natural sciences"), their widespread use as metaphors (the "**winds of change**", "tide of public opinion", for example), and the sense in which they can be understood as implying a form of fundamental cognitive integration and mirroring, as articulated by authors such as **Gregory Bateson** (*Mind and Nature: a necessary unity*, 1979), **Henryk Skolimowski** (*The Participatory Mind: a new theory of knowledge and of the universe*, 1994) and **David Abram** (*The Spell of the Sensuous: perception and language in a more-than-human world*, 1996), and separately discussed (*Self-reflective Embodiment of Transdisciplinary Integration (SETI): the universal criterion of species maturity?* 2008).

There is an unfortunate tendency to focus on "order" in nature as a **static** attribute thereby reducing recognition of the degree to which that order emerges from **dynamic** processes. This semblance is the case with the comprehensive overview offered by Christopher Alexander (*The Nature of Order: an essay on the art of building and the nature of the universe*, 2003-4). [see clarification below]

4. **Biology**, as in current recognition, through **biomimetics** and **biomimicry**, of process-related insights of relevance to the human condition. As with the apparent **static** focus of Alexander, the **dynamic** from which forms emerge is however less evident -- even in the remarkable review by **Keith Critchlow** (*The Hidden Geometry of Flowers: living rhythms, form and number*, 2012). By contrast, as might be expected, particular attention to dynamics is currently given to the complexity of **swarm behaviour** and **collective animal behaviour**.

5. **Verbally-related interaction**, involving variously familiar processes dependent on inter-personal skills:

- **conversation / dialogue**: understanding of conversation as involving processes of transformation, as separately discussed (*Transforming the Art of Conversation: conversing as the transformative science of development*, 2012). These can be reframed in proprioceptive terms, as articulated by Steven M. Rosen (*Practicing Proprioceptive Dialogue*).
- **persuasion / interrogation**: understood in terms of the extensively explored processes by which resistance is transformed through persuasion into conversion, including the devices of **brainwashing**, **propaganda** and **public relations**. These may of course vary to a degree according to whether the intention is framed (and perceived) as friendly, therapeutic, ideological, commercial, or otherwise (cf. Roger Fisher, et. al, *Getting to Yes: negotiating agreement without giving in*, 1981)
- **humour**: understood in terms of the widely explored processes which enable the humour of a situation to become apparent and for a joke to "work" (cf. *Recognized Role of Humour -- in politics, leadership, religion and creativity*, 2005; Matthew M. Hurley, et al., *Inside Jokes: using humor to reverse-engineer the mind*, 2011)
- **game-playing**, as well-recognized amongst those mobilized in support of any collective project, as is typical amongst those within any institution, between its departments, or in any process of inter-institutional, inter-disciplinary or inter-faith "collaboration". In interpersonal relations the processes have been extensively explored through the **transactional analysis** instigated by **Eric Berne** (*Games People Play*, 1964). A "game" is then understood as a series of transactions that is

complementary (reciprocal), ulterior, and proceeds towards a predictable outcome. These may be characterized by a switch in roles of players towards the end of the process. Many such games have been identified, with each game tending towards a very similar pattern in terms of the number of players or roles, the rules of the game, and its goals.

6. **Credibility and creditworthiness**, involving variously familiar processes through which either may be manipulated and transformed:

- **reputation / respect**, as considered of fundamental importance in social relationships, with the consequently attentive recognition of the processes through which it may be enhanced or undermined in sustaining an image. This applies as much to public figures and organizations -- hence the preoccupations of public relations -- as to individuals in their private lives.
- **confidence / credibility**, as made so dramatically evident in relation to preoccupations with rebuilding confidence in the financial community and in authorities considered complicit in the current global financial crisis (cf. *Varieties of Confidence Essential to Sustainability: surrogates and tokens obscuring the existential "gold standard"*, 2009; *Abuse of Faith in Governance*, 2009).

Represented by monetary tokens, the complex processes of finance also offer insights into transformation (cf. [George Soros](#), *The Alchemy of Finance: reading the mind of the market*, 1988; *The Economist*, *The Alchemists of Finance*, 17 May 2007; Luigi Zingales, *Europe's Financial Alchemy*, *Project Syndicate*, 23 December 2010; Tom Braithwaite, *Banks turn to financial alchemy in search for capital*, *Financial Times*, 24 October 2011; Carl Wennerlind, *How Alchemists Invented Modern Finance*, *Bloomberg*, 8 March 2012). The mysterious nature of these processes is also evident in the much challenged confidence-building efforts in relation to "nation-building" in Afghanistan.

7. **Performance art**, widely familiar processes, to whatever extent they are appreciated and understood:

- **music / song**, in which comprehension and appreciation of harmonic transformations and transpositions of key is instinctive if not innate, encouraging use of "harmony" as an aspiration for relations between groups and states (*Clues to patterns of dialogue from song*, 2011; *A Singable Earth Charter, EU Constitution or Global Ethic?* 2006; *Structuring Mnemonic Encoding of Development Plans and Ethical Charters using Musical Leitmotifs*, 2001).
- **dance**, namely the manner in which transformation processes can be understood as variously embodied in patterns of dance, or encoded by them -- and so recognized in metaphor. It is now remarkable the extent to which the range of these patterns has been embodied in libraries of animations readily accessible over the web (or [under development](#)). Of particular interest is the schematic approach (with music) used by [Dance Animations](#). Of relevance, given his more general concern with morphogenesis, are the reflections of Rene Thom (*La Danse comme Sémiurgie*, In: *Apologie du Logos*, 1990) and the related work of Giulia Ceriani (*Du Dispositif Rythmique: arguments pour une sémio-physique*, 2000).
- **poetry**, as a significant preoccupation of some leaders -- from statesmen, through tyrants, to warlords -- suggesting a degree of correspondence between the transformation processes in poetic associations and those in strategic design (cf. *Poetry-making and Policy-making: arranging a Marriage between Beauty and the Beast*, 1993; *Poetic Engagement with Afghanistan, Caucasus and Iran an unexplored strategic opportunity?* 2009; *Strategic Jousting through Poetic Wrestling: aesthetic reframing of the clash of civilizations*, 2009)
- **drama**, as through the insights offered by the systematic analysis of dramatic plots of various kinds, understood as transformations of relationships, such as that of [Georges Polti](#) (*The Thirty-Six Dramatic Situations*, 1916) who endeavoured to categorize every dramatic situation that might occur in a story or performance -- building on the earlier work of [Carlo Gozzi](#) (see separate discussion of *Taxonomies of dramatic situations*, 2009).

These are possibly to be seen as a valuable feature of governance of the future (cf. *Aesthetics of Governance in the Year 2490*, 1990)

8. **Physical interaction**, widely familiar processes for which skills in transformation typically require kinesthetic intelligence, as noted above (Maxine Sheets-Johnstone, *The Primacy of Movement*, 2011; [Mark Johnson](#), *The Meaning of the Body: aesthetics of human understanding*, 2008):

- **games / sport**: following recognition of biomimicry (and, by extension, technomimicry), insights into ball sports in particular could be extended in the light of "ludomimicry" -- following the critical arguments of [Roger Caillois](#) (*The Definition of Play and the Classification of Games*, 2006) regarding those of [Johan Huizinga](#) (*Homo Ludens: a study of the play-element in culture*, 1950), as discussed by [Andrew Brown](#) (*Agon, Alea, Mimicry and Ilinx, Embodied Knowers*).

As might be expected, a degree of mathematical insight has been brought to bear on team building and the effective operation of teams. This is most evident in the analysis of [passing patterns](#) in ball games, possibly to be understood in terms of forms of transformation.

- **"aerobatics"**, highlighting in each case the range of distinct transformations with which a practitioner is familiar, perhaps to the point of naming them, or aspiring to perform them:
  - [gymnastics](#), diving and skydiving
  - vehicle aerobatics:
    - [aircraft maneuvers](#), namely flight paths putting aircraft in unusual attitudes, enumerated in the [Aresti Catalog](#). Most of these can be entered either erect or inverted, flown backwards or have extra rolls added.
    - other vehicles, namely the use of a variety of technologies enabling aerobatics to be variously performed: skateboarding, motorbike aerobatics, bicycle aerobatics (bike aerobatics)

9. **Strategy**, in which transformation processes ("moves") are skillfully employed, using surprise and deception (preferably with elegance) to achieve competitive advantage:

- **strategy games**, including various board games and online interactive games
- **military strategy**, as long explored and widely understood (cf. (Sun Tzu, *The Art of War*)
- **business and marketing strategy**, as notably inspired by military strategy.
- **lifestyle strategy**, implying a comprehension of a pattern of transformation processes essential to viability (cf. Mary Catherine Bateson, *Composing a Life*, 1990, *Composing a Further Life: the Age of Active Wisdom*, 2010; Duane Elgin, *Voluntary Simplicity: toward a way of life that is outwardly simple, inwardly rich*, 2010)

It could be argued that so-called "**wicked problems**" are effectively engaged in strategic games with the initiatives of governance (cf. Nassim Nicholas Taleb, *The Black Swan: the impact of the highly improbable*, 2007)

10. **Environmental interaction / technology (I)**, with which there has long been widespread familiarity:

- **gardening**: for which the transforming and sustaining processes are widely understood and explored. The transformational preoccupations of **permaculture** are of particular relevance.
- **cooking**: this involves a set of transformational processes which are widely understood and explored through recipes. Metaphorical use is made of these processes as in the accounting phrase: "cooking the books"
- **beverage-making**: as with cooking, this involves a set of transformational processes which are widely understood and explored, most notably with respect to beer-making and wine-making. Metaphorical use is made of "old wine into new bottles" and "new wine into old bottles"
- **clothes-making**: of special interest as the origin of "pattern", and the process by which raw materials are transformed into what can be worn and considered attractive
- **arts and crafts**: most notably the processes whereby raw materials are transformed into desirable artefacts (ceramics, jewelry, paintings, etc).

11. **Environmental interaction / technology (II)**, using transformation processes arising, most notably, from the industrial revolution:

- **energy transformation** (water, wind, wave, solar, wood, coal, nuclear)
- **manufacture of artefacts**, especially including the transformation of materials through chemical processes
- **electricity and electronics** (discussed [below](#))

12. **Psycho-biological transformations**:

- **courtship and sexual intercourse**, of whose dynamics there is widespread awareness (notably those articulated in terms of feeling), and especially their characteristic transformation processes, all of which are extensively explored in the media and literature;
- **unconscious biochemical processes within the human body**, of which everyone necessarily has special, and deep-seated, understanding :
  - **digestion**, widely used as a metaphor with regard to digesting new circumstances and information
  - **respiration** / circulation, notably used as a metaphor, in the case of "inspiration", with regard to new insight
  - **health** / disease: involving transformative processes readily used as metaphors with regard to collectives and information (cf. *Cognitive Implications of Lifestyle Diseases of Rich and Poor: transforming personal entanglement with the natural environment*, 2010; *Remedies to Global Crisis: "Allopathic" or "Homeopathic"?* *Metaphorical complementarity of "conventional" and "alternative" models*, 2009; *Memetic and Information Diseases in a Knowledge Society: speculations towards the development of cures and preventive measures*, 2008)
  - **metabolic pathways**, namely the extensively studied transformation processes at the cellular level.
- **emotional transformation**, namely shifting moods, most notably evident in relation to bipolar disorder, perhaps best understood through **emotional intelligence**, as noted above (Daniel Goleman, *Emotional Intelligence: why it can matter more than IQ*, 1996).
- **development**:
  - biological, as most remarkably explored by D'Arcy Wentworth Thompson (*On Growth and Form*, 1917), and more generally by Rene Thom (*Structural Stability and Morphogenesis: an outline of a general theory of models*, 1972). The latter is especially relevant in endeavouring to extend its insights to semiotic possibilities (*Esquisse d'une Sémiophysique: physique aristotélicienne et théorie des catastrophes*, 1989). Some have explored the fundamental psychosocial implications of invagination (cf. *Engendering Invagination and Gastrulation of Globalization: reconstructive insights from the sciences and the humanities*, 2010)
  - psycho-spiritual, as notably explored in the various works of Carl Jung.

Each domain may be understood as offering a potential metaphor of the other -- but with each potentially offering a different kind of cognitive engagement -- and with every probability of each **not** being credible, meaningful or relevant to another.

With respect to any underlying pattern of transformation, there is a "cognitive equality" to the domains as experienced, contrasting with any "cognitive elitism" (or "pecking order") which may endeavour to rank one domain as superior (or more fundamental) than another. This is consistent with the insights of any general systems approach (noted above). It is also fundamental to the arguments of Paul Feyerabend (*Against Method: outline of an anarchistic theory of knowledge*, 1975; *Conquest of Abundance: a tale of abstraction versus*

the richness of being, 1999). These insights might be explored to clarify how such domains emerge and get distinguished.

## Interweaving fundamental patterning approaches to transformation

**Mathematics:** It is to be expected that mathematics, as the formal science of relationships, would be of most relevance to any understanding and representation of patterns of transformation. The difficulty for the purpose of this exercise is the extent to which such insight is "buried" in formalism through which people can engage with the experience of transformation processes only with difficulty. Mathematics as a discipline is only incidentally and indirectly interested in the experience of mathematics as it might serve as a carrier for the experiences of transformation, despite efforts to promote related understanding (cf. Jacques Hadamard, *The Psychology of Invention in the Mathematical Field*, 1949; Philip J. Davis and Reuben Hersh, *The Mathematical Experience*, 1981; George Lakoff and Rafael Núñez, *Where Mathematics Comes From: how the embodied mind brings mathematics into being*, 2000).

More focused efforts to explore possibilities of this kind tend to be treated as marginal, if not suspect. They might include:

- **geometry / topology**, as vehicles of meaning, as exemplified by the work of:
  - R. Buckminster Fuller (*Synergetics: Explorations in the Geometry of Thinking*, 1975) discussed separately (*Geometry of Thinking for Sustainable Global Governance: cognitive Implication of synergetics*, 2009)
  - Arthur M. Young (*The Geometry of Meaning*, 1976), as developer of the first Bell helicopter he endeavoured to derive insights from the dynamics of piloting it with a view to developing a "psychopter" (cf. *Engendering a Psychopter through Biomimicry and Technomimicry: insights from the process of helicopter development*, 2011)
  - Ron Atkin (*Multidimensional Man; can man live in 3-dimensional space ?* 1981), as summarized separately (*Comprehension: Social organization determined by incommunicability of insights*, 1995).
  - Rene Thom (*Structural Stability and Morphogenesis: an outline of a general theory of models*, 1972), who notably took account of the challenges of semiotics (*Esquisse d'une Sémiophysique: physique aristotélicienne et théorie des catastrophes*, 1989).
  - Christopher Alexander (*The Nature of Order: an essay on the art of building and the nature of the universe*, 2003-4), as mentioned above, who has interpreted this overview in terms of the dynamics of complexity theory (*New Concepts in Complexity Theory: an overview of the four books of the Nature of Order with emphasis on the scientific problems which are raised*, 2003; *Harmony-Seeking Computations: a science of non-classical dynamics based on the progressive evolution of the larger whole*, *International Journal for Unconventional Computing (IJUC)*, 2009). He emphasizes the importance of geometric adaptation in order to enable comprehension of a higher order, as discussed separately (*Harmony-Comprehension and Wholeness-Engendering: eliciting psychosocial transformational principles from design*, 2010)
  - Steven M. Rosen (*Topologies of the Flesh: a multidimensional exploration of the lifeworld*, 2006; *Dimensions of Apeiron: a topological phenomenology of space, time, and individuation*, 2004) who focuses on the engagement with paradox through the topology of the Klein bottle.
  - Douglas Hofstadter (*I Am a Strange Loop*, 2007) who has adapted a self-reflexive approach to paradox in terms of the Möbius strip, with implications discussed separately (*Sustaining a Community of Strange Loops: comprehension and engagement through aesthetic ring transformation*, 2010)
- **symmetry** of unusually higher order, as discussed separately with respect to:
  - Monstrous moonshine mathematics and Monster Group symmetry (*Potential Psychosocial Significance of Monstrous Moonshine: an exceptional form of symmetry as a Rosetta stone for cognitive frameworks*, 2007; *Dynamics of Symmetry Group Theorizing: comprehension of psycho-social implication*, 2008)
  - Mandelbrot set and its fractal organization (*Psycho-social Significance of the Mandelbrot Set: a sustainable boundary between chaos and order*, 2005)
- **probabilistic approach to truth**
  - Vasily V. Nalimov (*Realms of the Unconscious: the enchanted frontier*, 1982) provides a remarkable aesthetic synthesis of biological, mathematical, and linguistic manifestations of probability -- as previously summarized (*Probabilistic vision of the world*, 1995).
- **changing classificatory frameworks**
  - Patrick A. Heelan (*The Logic of Changing Classificatory Frameworks*, 1974; *Space-Perception and the Philosophy of Science*, 1983)
- **number**
  - Marie-Louise von Franz (*Number and Time; reflections leading towards a unification of psychology and physics*, 1974), most notably her comment to the effect:

When we take into account the individual characteristics of natural numbers, we can actually demonstrate that they produce the same ordering effects in the physical and psychic realms; they therefore appear to constitute the most basic constants of nature expressing unitary psycho-physical reality. Because of this I would conjecture that the task of future mathematicians will be to collect their characteristics and analyze, when possible, every number in its logical relationship to all others. This research should be undertaken in collaboration with physicists, musicians, and psychologists who are conversant with the empirical facts about the structural characteristics of numbers in different mediums.

- the cognitive implication of the organization of sets with various numbers of elements may also imply a dynamic between those elements (cf. *Representation, Comprehension and Communication of Sets: the role of number*, 1978; *Patterns of N-foldness; comparison of integrated multi-set concept schemes as forms of presentation*, 1980). Irrespective of the

seemingly **disparate nature** of observed phenomena in different domains, if it proves appropriate in practice to the human brain to group the processes of each domain into the **same number** of clusters, then this establishes a **degree of correspondence** between those domains -- a **pattern of connectivity** calling for consideration as an artefact of human consciousness (cf. *Theories of Correspondences -- and potential equivalences between them in correlative thinking*, 2007).

As emphasized, **the approaches cited above tend to be framed statically -- implying a dynamic**, if at all. This is epitomized by names attributed to the necessarily dynamic **elementary catastrophes** (fold catastrophe, cusp catastrophe, swallowtail catastrophe, butterfly catastrophe). It is of course with the dynamics of breaking waves that surfers develop their expertise. Although seemingly "ludicrous", it is such cognitive capacity that is required of governance in navigating a crisis -- namely a **dynamic** process, not a **static** condition. **Less evident is the nature of any psychological engagement with transformative processes described in this way.**

Especially interesting is the case of **sacred geometry**, given the significance attributed to it in terms of spiritual experience and theology. In the latter case dynamics might be understood as more explicitly carried by associated **sacred music** and dance. Given the continuing incidence of conflicts sustained by faith-based governance, there is a case for exploring the dynamic implied by mathematical theology, as discussed separately (*Mathematical Theology: Future Science of Confidence in Belief -- self-reflexive global reframing to enable faith-based governance*, 2011).

As many have remarked, mathematicians would be much challenged to represent and solve in mathematical terms the aerobatics enacted by those with developed kinesthetic intelligence. Expressed otherwise and more provocatively, can mathematicians -- as mathematicians -- "do" mathematics? Or otherwise, what is it that is "done" in aerobatics that is considered irrelevant by mathematicians -- as partially highlighted by the above-mentioned efforts of Arthur Young? How does this relate to the arguments (above) of Deacon?

**General systems theory:** As noted above, the possibility of this paper was partially inspired by the original articulation of this theory, most notably in *General Systems: Yearbook of the Society for General Systems Research*. That inspiration is less evident in its subsequent embodiment in the *International Society for the Systems Sciences*. As mentioned above, the dynamics of "transformation" processes are effectively implicit in the dynamics of such systems, as distinctly explored by **cybernetics** notably through the *International Society for Cybernetics and Systems Research*. Although traditionally indifferent to cognitive and existential issues, these have however emerged more recently (cf. *Cybernetics and Human Knowing: a Journal of Second Order Cybernetics, Autopoiesis and Cyber-Semiotics; European Society for the Study of Cognitive Systems*). The early assertion of John Casti that "behaviorist/cognitive debates are vacuous at the system-theoretic level" seems to have been indicative of future preoccupations (*Connectivity, Complexity, and Catastrophe in Large-Scale Systems*, 1979, p. 86). Ironically, "vacuous" may turn out to be an essential prerequisite for further understanding -- notably in the light of the arguments for an equivalent to "zero" of Terrence Deacon (above).

It would appear that the progressive formalization within the **objectivity** of cybernetics has effectively excluded consideration of the **experiential subjectivity** through which individuals control their relation with the world. Casti (1979) celebrates this transition in the dedication of his study (*To Rudolf Kalman, who transformed systems theory from a mystical art into a mathematical discipline*). As with mathematicians, it might be asked whether cyberneticians exhibit unusual skill in "doing" cybernetics -- in comparison with the control skills of those exhibiting kinesthetic intelligence, perhaps then to be understood as a "mystical art". Casti's arguments may well exemplify the manner in which cybernetics has been purged of existential significance.

Casti prefaces his own study with a quotation from Ludwig Boltzmann: *There is much that is appropriate and correct in the writings of these philosophers. Their remarks, when they denounce other philosophers, are appropriate and correct. But when it comes to their own contributions, they are usually not so.*

**Pattern language:** As noted above, a quite distinct approach is that of **pattern language**, as developed by Christopher Alexander and colleagues to provide a structured method of describing good design practices within a field of expertise. The original study describes and interrelates 253 patterns -- understood as together forming a language. Curiously, like all languages dealing with a complex activity, it has vocabulary, syntax, and grammar, but it is specifically noted as not applied to communication itself. Domains to which the approach has been applied include **software engineering** and, more generally, **computer science**, as well as **interaction designs**. **Pedagogical patterns** are used to document good practices in teaching. A set of some 136 patterns for using information and communication to promote sustainability, democracy and positive social change has been produced by Douglas Schuler (*Liberating Voices: a pattern language for communication revolution*, 2008).

**Classical Chinese encodings:** Perhaps most remarkable in terms of combining systematic formalization -- and a preoccupation with comprehensible relevance to individual and collective decision making -- are the several distinct encodings, highly esteemed over centuries within China. These most notably include the:

- **I Ching** (or *Yi Jing*), also known as the *Book of Changes*. This identifies 64 patterns (encoded in the form of hexagrams) and the relationships between them (*Diagram of 384 Relationships between I Ching Hexagrams*, 1983). The original commentary makes extensive use of metaphor to facilitate comprehension -- in contrast with conventional systems initiatives. This is a mode which can be adapted to current preoccupations (*Transformation Metaphors -- derived experimentally from the Chinese Book of Changes (I Ching) for sustainable dialogue, vision, conferencing, policy, network, community and lifestyle*, 1997)
- **Tao Te Ching** (*9-fold Higher Order Patterning of Tao Te Ching Insights*, 2003; *Commentary on Tao Te Ching Interpretation -- and the possibility of higher order patterning*, 2003). Navigational implications are explored in *Hyperspace Clues to the Psychology of the Pattern that Connects*, 2003).
- **Taixuanjing** (or *T'ai Hsüan Ching* or *Canon of Supreme Mystery*). It is also known in the West as *The Alternative I Ching* and

*The Elemental Changes*. This identifies 81 situations and the relationships between them.

The relationship between these patterns is notably a current preoccupation in terms of the mathematics of [magic squares](#) (*9-fold Magic Square Pattern of Tao Te Ching Insights: experimentally associated with the 81 insights of the Tai Hsüan Ching*, 2006; *Reframing the Dynamics of Engaging with Otherness: triadic correspondences between Topology, Kama Sutra and I Ching*, 2011). A remarkable effort has been made by [Maurice Yolles](#) and colleagues to relate the Chinese *yin-yang* insights to those of cybernetics (*Toward a Formal Theory of Socioculture: a yin-yang information-based theory of social change*. *Kybernetes*, 2008).

It is most curious that the [sudoku](#) puzzle -- intimately related to the mathematics of the magic square and its origins in these encodings -- should currently be such a [recreational preoccupation worldwide](#) (*The Appeal of Sudoku*, *Psychology Today*, 19 July 2009). Whilst there is no explicit link to such encodings, of concern here is the nature of the "satisfaction" in successfully completing such a puzzle and driving the continuing effort to do so. This is of relevance to recognition and appreciation of an underlying pattern of transformation. Of relevance to the argument of Deacon (above), regarding the role of absence and constraint, is recognition of [constraint satisfaction](#).

## Modulating cognitive transformations: electrical metaphors and semiconduction

Very extensive use is made of metaphor in discussion of systems of every kind. A valuable summary of the relevance of metaphor, including electrical metaphor (in passing), is provided by Samuel McNerney (*A Brief Guide to Embodied Cognition: why you are not your brain*, *Scientific American*, 4 November 2011) in the light of the work of George Lakoff and colleagues on cognitive linguistics. This has notably given focus to the [conduit metaphor](#) valued in the experience of flows in systems.

In the midst of a global financial crisis that has been compared to a hurricane -- and a major concern with liquidity -- it is appropriate to note early efforts to articulate understanding of complex systems through meteorology by John W. Thompson (*Meteorological Models in Social Dynamics*, *Human Relations*, 1961; *Mental Science, Meteorology and General Systems Theory*, *General Systems*, 1960; *Modes of Thought in Meteorology*, *General Systems*, 1967). Exposure to weather transformative processes readily leads to comparison with cognitive experience, exemplified by "pressure" and "depression".

**Electrical metaphors:** Even more extensive use is variously made of electrical metaphors. As noted by Marlene Johansson Falck (*Electrifying Performances and Brains that Fuse: metaphor and the cognitive function of electricity*, 2005):

As is evident from my material, which consists of a large number of metaphorical expressions from the OED, CIDE and 20th CW1, there is remarkable consistency among the instances with respect to the kinds of experiences that may be structured by means of our experiences of electricity. Almost all the mappings exemplify the use of electricity to conceptualise people's actions or emotions. (pp. 52-53)

In an extensive review, [Dedre Gentner](#) and P. Wolff (*Metaphor and Knowledge Change*, 2000) discuss the subsequent implications of the widely-cited earlier work on comprehension of electricity (D. Gentner and D. R. Gentner, *Flowing Waters or Teeming Crowds: mental models of electricity*, 1983). Much of this literature offers insightful comment on the cognitive implications, notably for learning and comprehension (cf. John M. Carroll and John C. Thomas, (*Metaphor and the Cognitive Representation of Computing Systems*, *IEEE Transactions on Systems, Man, and Cybernetics*, 1982, 2; Aristotle Tympas and Dina Dalouka, *Metaphorical Uses of an Electric Power Network*, *metaphorik.de*, 2007, 12)

In the light of Freud's own use of such a metaphor, Don M. Tucker and Phan Luu discuss *An Electrical Metaphor for the Neurophysiological Mechanisms* (In: *Cathexis Revisited: corticolimbic resonance and the adaptive control of memory*, *Annals of New York Academy of Sciences*, 1998). They note:

In drawing from the models of neuronal function of his day, Freud considered their properties as electrical, and theorized about their operations as involving the storage and management of quantity of energy. (p. 137)

In the daily organization of experience, the limbic networks seem to resonate to the motivational (i.e., personal) significance of each event. In doing so, they engage the consolidation of that event in proportion to its significance. Because the adaptive control is integral to the representational process, the phenomenon of "memory" could be redefined as "motive-memory." The significance of each event is integral to the representation itself. In Freud's terms, an event becomes organized in memory to the extent that it is affectively "cathected." (p. 139)

Curiously it would appear that there is surprisingly little effort to explore systematically the correspondences between electrical phenomena and psychosocial phenomena, whether to enable comprehension or as characteristic of cognitive processes and their transformation. As indicated by the reference above to "flowing waters", widespread use is made of the so-called [hydraulic analogy](#), treating electrical circuits as water flows:

- [Electric potential](#), corresponding to [hydraulic head](#)
- [Electric charge](#), corresponding to the quantity of water.
- [Current](#), corresponding to quantity of flowing water over time.
- [Voltage](#), or potential difference, corresponding to a difference in pressure between two points: the higher the water, the higher the voltage. Negative voltage could then correspond to having water levels lower than some arbitrary zero level.
- [Resistance](#), corresponding to the degree of constriction in the water conduit
- [Inductance](#), corresponding to a second loop of water that must be sped up or slowed down by the circuit and that resists the

change in current.

- **Capacitance**, corresponding to a dam preventing water from crossing and allows a buildup of different water heights on either side.

Yet to be articulated is a systematic adaptation to psychosocial transformation processes -- most notably in relation to the **movement of individual or collective attention** (as discussed below). There are however many indications of this possibility, as with respect to dialogue (*Electrical Systems as a Guiding Metaphor for Stages of Group Dialogue*, 2001) or optimizing the organization of an initiative (*On Mind, On Play and Productivity*, 2010). How many characteristics are theoretically significant to description of electrical phenomena? How many of these might offer insights into the transformation of attention, and the flow of communications in social networks? Perhaps most intriguing is the possibility that the variety of well-defined **electronic symbols** used in **circuit diagrams** could be decoded with respect to attention and communications flows.

**Modulating communication:** The comparison may be taken further in terms of understanding of the full range of ways in which a signal can be manipulated -- as a guide to understanding of the variety of ways in which communication (more generally) can be transformed or deformed. In the case of signal **modulation in telecommunications and electronics**, this is the process of varying one or more properties of a high-frequency periodic waveform. The properties subject to modification are recognized as corresponding to those of **modulation in music** -- more readily understood by many. They are **amplitude** ("volume"), **phase** ("timing") and **frequency** ("pitch"). Eight types are recognized in the case of music:

- **Common chord modulation**
- **Enharmonic modulation**
- **Common-tone modulation**
- **Chromatic modulation**
- **Phrase modulation**
- **Sequential modulation**
- **Chain modulation**
- **Parallel key modulation**

These distinctions are readily perceptible to the ear (hence the case for **sonification**), whereas the waveform modulation of a telecommunications signal would be comprehensible to a lesser degree when visualized on an **oscilloscope**.

Clearly music enables a degree of identification with the transformation process which is less evident in the case of signal transformation. Arguably however, "resistance" and "capacitance", whether so named or not, are characteristic of common experience in cognitive processes and interpersonal communication, notably in social networks.

The metaphor offers the fascinating possibility that in a computer-enabled knowledge-based society, any articulated text -- such as this one -- could be understood as a form of "printed circuit board". This possibility could be further developed in the light of current research on contested discourse (Anna De Liddo, Agnes Sandor and Simon Buckingham Shum, *Contested Collective Intelligence: rationale, technologies, and a human-machine annotation study*, *Computer Supported Cooperative Work (CSCW)*, 2012). There is the considerable irony that global agreements merit exploration in such terms -- as cognitive "printed circuit boards", whereby "hard-wired applications" can be run.

**Matching patterns in communication:** Anticipating the argument to follow, it is appropriate to note a degree of recognition from an electrical perspective between switching and the Chinese denotation of *yin-yang* (Ian Wright and Rob Newman, *Electrical or photonic ying and yang of switching*, *Lightwave*, 18, 2001, 6; Ting Cao, Stephen Blackburn, et al. *The Yin and Yang of Power and Performance for Asymmetric Hardware and Managed Software*, National Science Foundation of China, 2012).

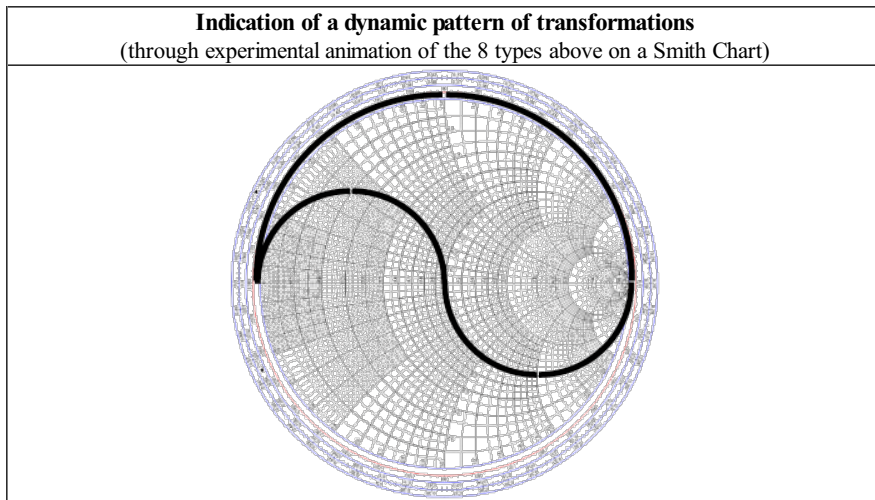
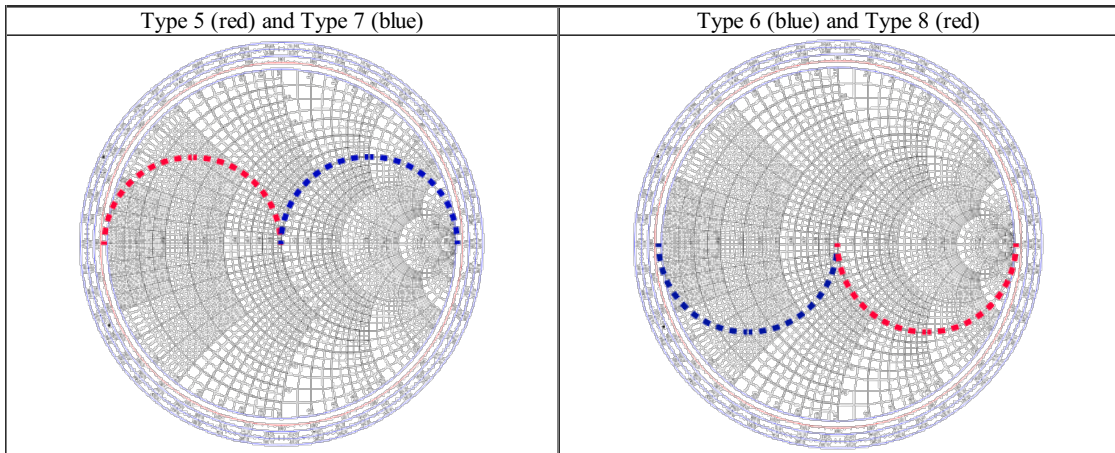
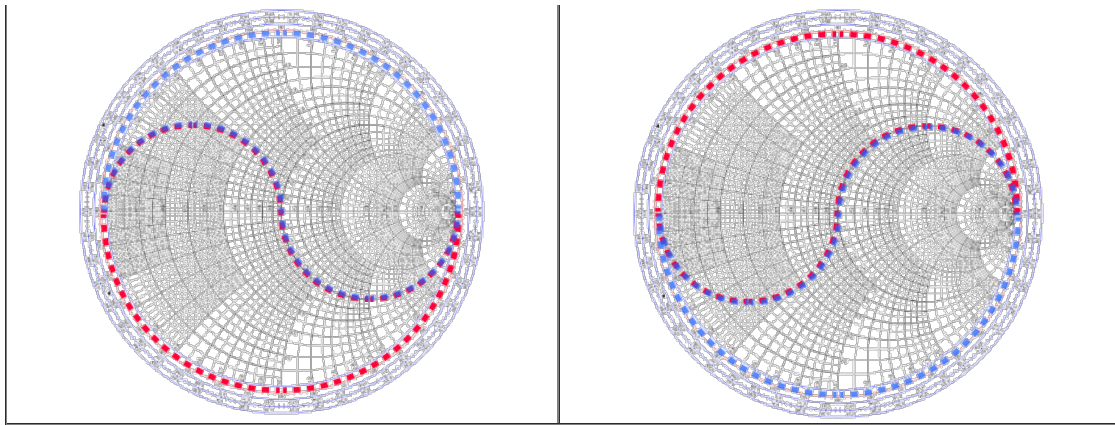
This "*yin-yang*" switching perspective is especially striking in relation to the widely used **Smith Chart**, invented by the electrical engineer **Phillip H. Smith** (and independently by Kaneyuki Kurokawa, a Japanese engineer). This is a graphical aid for electrical and electronics engineers specializing in radio frequency engineering to assist in solving problems with transmission lines and matching circuits. A generalized **3D Smith Chart** based on the extended complex plane (**Riemann sphere**) and inversive geometry has recently been proposed (as discussed below). Using the 2D chart, Randy Rhea notes:

Any impedance with a positive real part may be displayed on the standard, unity radius Smith chart. The horizontal line is pure resistance. Circles with a center on this line are constant resistance. Arcs converging at center right are constant reactance. The top half of the chart is inductive and the bottom half is capacitive. (*The Yin-Yang of Matching*, *High Frequency Electronics*, **Part 1: Basic Matching Concepts**, March 2006, **Part 2: Practical Matching Techniques**, April 2006):

Rhea explores the matching of both real and complex impedances in networks. Of potential relevance to social networks? At a single frequency, any positive-real complex impedance can be matched to any other positive-real complex impedance using no more than two reactive elements. He presents Smith Chart diagrams of matchable impedance space for 8 types of conditions -- whose resemblance to distinct features of the **Tao symbol** he describes in the following terms:

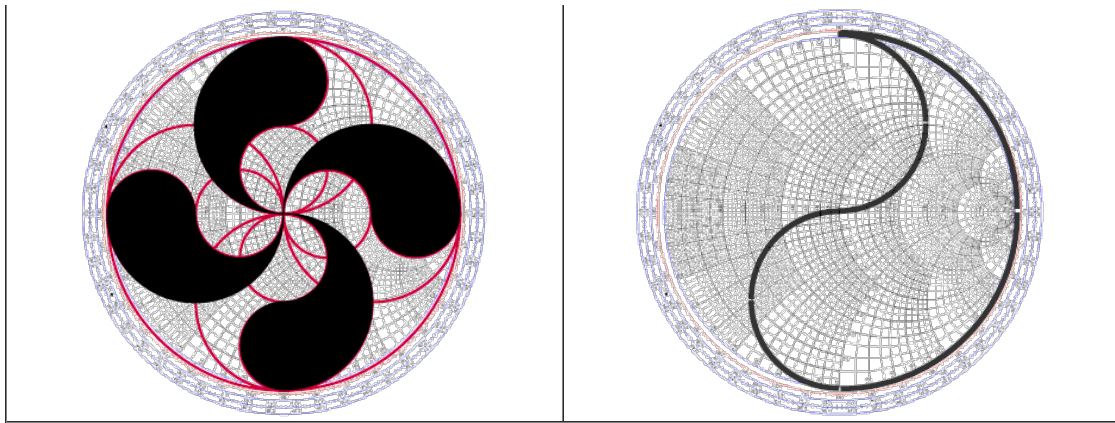
Notice these curves are the familiar shape of the Chinese Yin-Yang for the four topologies that include both an inductor and a capacitor.... Smith's unique ability to graphically express important concepts encompasses yin-yang!

<b>8 elements of Tao symbol represented on a Smith Chart</b> (redrawn versions, using dashed lines, of the 8 figures by Randy Rhea in <i>The Yin-Yang of Matching</i> , <i>High Frequency Electronics</i> , 2006)	
Type 1 (blue) and Type 3 (red)	Type 2 (blue) and Type 4 (red)



In the light of potential implications regarding recognition of elements of the symbol of the Tao in relation to the Smith Chart, what further insights might be suggested by the superposition of the ("right-facing") **Lauburu** on the Smith Chart in the left-hand image below? The animation above may then be understood in relation to the **horizontal branches** of the Lauburu. The animation in the right-hand image below then corresponds to the geometry of the **vertical branches** of the Lauburu -- potentially indicative of a further "8 types". Note that the animation encompasses both right- and left-facing variants of the Lauburu.

<p><b>Experimental superposition of Lauburu on Smith Chart</b>          (including geometry by which the Lauburu is constructed)</p>	<p><b>Animation indicative of a "complementary" pattern of transformations</b>          (modifying the orientation of the 8 types on the Smith Chart above)</p>

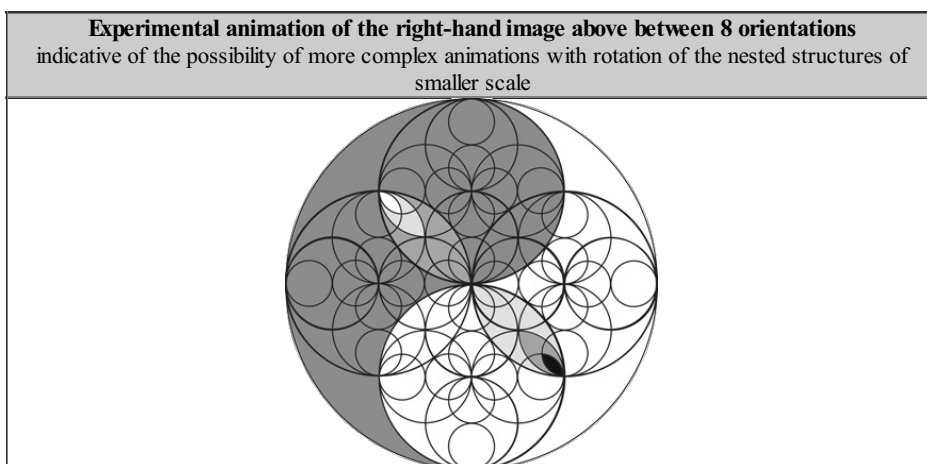


Of particular interest is that the geometry of the construction of the Lauburu in the left-hand image above contains the **larger scale** geometry of the Tao symbol, **presented twice** (namely vertically as well as in the horizontal form recognized by Randy Rhea). In addition this is indicative of the possibility of articulation on a **smaller scale** of that geometry (as shown below), through which the Tao symbol is presented:

- **4 times**, namely on each of the 4 branches of the Lauburu (as shown in the left-hand image above).
- **16 times**, on an even smaller scale (namely 4 Tao symbols **within** each of the branches of the Lauburu)

Of particular interest is how the "eyes", traditionally associated with the Tao symbol, emerge from the geometry as a consequence of the last articulation. Further animations could be produced to clarify and explore the associated dynamics on the different scales.

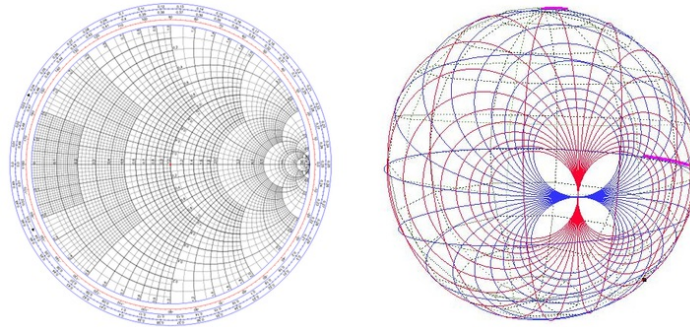
Superposition of a reduced version of the geometrical construction of the Lauburu as a whole <b>within</b> each branch of the Lauburu (as with a fractal)	Shading of the geometry of the Lauburu (left-hand image) to highlight one orientation of the Tao symbol and emergence of the "eyes" from the geometry



The value of the Smith Chart has been frequently noted in relation to transmission problems -- readily understood more generally as communication problems (cf. [Smith Chart Resources](#); *Smith Chart and Matching Transformers*, 30 June 2011; Jay M. Jacobsmeyer, *What you see is what you get*, *Urgent Communications*, 1 June 2012).

As indicated, the [3D Smith Chart](#) (and associated [free Java demo](#)) is a new telecommunications design tool. It was presented at a European Microwave Week (Manchester, 2011). The question with respect to the above argument is how its primary applications in high frequency engineering could offer indications of relevance to comprehension of psychosocial transformations. A new application of the chart is to be presented at the [Asia-Pacific Microwave Conference](#) (Taiwan, December 2012).

### Comparison of 2D and 3D Smith Charts



Relevant articles: *The 3D Smith Chart and Its Practical Applications* (July 2012);  
*A 3-D Smith Chart Based on the Riemann Sphere for Active and Passive Microwave Circuits* (June 2011);

The remarkably unusual images, by which the 2D Smith Chart is represented as circles on the unit sphere, are powerful triggers for the imagination. The 3D representation is based on a mathematical "trick" notably used by Escher in his paradoxical images and by Mandelbrot in fractal rendering. With respect to the insights of recent research by Stephen Hawking and colleagues, have shown that the universe may have the same surreal geometry as some of art's most mind-boggling images (Lisa Grossman, *Hawking's 'Escher-verse' could be theory of everything*, *New Scientist*, 9 June 2012). This offers a way of reconciling the geometric demands of string theory, a still-hypothetical "theory of everything", with the universe as observed -- through a negatively-curved Escher-like [hyperbolic geometry](#) (essentially a [hyperbolic space](#)). Their results rely on a mathematical twist previously considered impossible.

Similar insights might apply to a pattern of cognitive transformations, especially since the implications of hyperbolic geometry offer a cognitive reconciliation with what is otherwise understood as a form of "netherworld" and its challenges (cf. *Designing Global Self-governance for the Future: patterns of dynamic integration of the netherworld*, 2010).

The commentary in relation to the demo notes:

- The north hemisphere is only for passive circuits.
- The south hemisphere is for active circuits
- The West of Greenwich meridian is made of capacitive circuits.
- The East of Greenwich is made of inductive circuits
- The perfect matching point is the north pole of the sphere
- The infinite mismatch is in the south pole of the sphere
- Moving along a transmission line is represented by the movement on a latitude circle
- Stability circles are very easy to be seen in a compact manner on the 3D Smith chart.

What do these indications suggest for conscious engagement in transformation processes? The "geographic" language suggests the possibility of exploring these in terms of [cerebral hemispheres](#) and the long-standing interest in [lateralization of brain function](#), if only for mnemonic purposes. That language also recalls the continuing Chinese interest in the correspondence between the aspects of life represented by the trigrams of the *Ba Gua* (discussed below) and the cardinal directions.

**Technomimetic challenge of electronics:** Given its fundamental role in a computer-enabled knowledge-based society, electronics merits careful consideration as a carrier of insights into processes of transformation and their representation. The argument can be developed in the light of that made for technomimicry as a source of insight -- for the same reasons as are more commonly recognized in the case of biomimicry (as mentioned above). The question is **what is the pattern of thinking which enables emergence of such a technical application** -- and what other insights might potentially emerge from its application as a "carrier" or "vehicle"?

Whilst selected attributes of electrical circuits are discussed as metaphors (resistance, etc), of relevance to the argument here is the degree to which any experiential identifications with these attributes and processes are **implicit** (if considered) in contrast with the manner in which they serve as **explicit** explanatory devices (as favoured by the **objectivity** of conventional science). It is unclear whether there is any effort to identify systematically any correspondences between **subjective** experience and the range of processes of electrical circuits. How might such processes be internalized or matched to subjective experience?

Is the use of such metaphors itself indicative of how thinking is able to comprehend within an **internal** "language" what is conventionally articulated in an **external**, formal, technical "language"?

The concern here, however, is not whether the metaphor is useful for **objective** explanation but rather whether it enables more fruitful **subjective** engagement in the transformational processes experienced cognitively. To the extent that "objectivity" itself implies a cognitive process, there is also the question as to how the complementarity of these processes might be more fruitfully understood (cf. [Defining the objective ∞ Refining the subjective ?!: Explaining reality ∞ Embodying realization](#), 2011).

**Semiconductors:** There is little reference to the [semiconductor](#) as a metaphor, although in a paper to a colloquium at the Max Planck Institute for History of Science, Andrew S. Reynolds (*Metaphors and Models in Cell Communication Science*, September 2011) notes that the most dominant metaphor construes cell communication on the model of electronics and computer engineering. The signalling mechanisms by which cells communicate with one another are conceived on the model of an electronic circuit, hence the centrality of the concept of signal "transduction". Attempts to understand the intra-cellular signalling pathways by which messages are received at the cell membrane (amplified and transduced) involve computer model simulations and actual attempts to re-engineer cells as logic gates and transistor-like circuits.

A semiconductor (as the term indicates) is intermediate between a conductor and an insulator. It is significant as the foundation of modern telecommunications, including radio, computers, and telephones. In the form of a [transistor](#), used to amplify and switch electronic signals and electrical power, it is typically embedded in [integrated circuits](#) on [printed circuit boards](#). Light signals may also be modulated in [optical modulators](#) with the aid of semiconductors.

Of particular interest, in relation to indications above regarding (Chinese) encoding of transformations, is the role of the semiconductor. The Chinese encodings use either a binary system (as in the *yin-yang*, characteristic of the *I Ching*) or a ternary system (as in the *Tao Te Ching* or the *T'ai Hsüan Ching*). The distinctions are typically represented by an **unbroken line**, or a **line broken once (binary) or twice (ternary)**.

**Pattern comprehension: "connecting the dots":** The question then is whether the very extensively studied operation of a "semiconductor" offers otherwise unrecognized insights into the distinctions between:

- **comprehension / agreement / bonding**, understood as "connectivity" (through conduction), potentially to be represented by an **unbroken line**. The connectivity implies (collective) knowledge and intelligence through adequate explanation, and consequently a degree of closure against alternative interpretations. This is what is so desperately sought as the only basis for viable global initiatives, however questionable the assumption may be (cf. *The Consensus Delusion*, 2011).
- **incomprehension / disagreement / alienation** -- namely the lack of "connectivity" (through insulation), potentially to be represented by a **broken line**. The lack of connectivity implies ignorance. It may well be characterized by logical *non sequitur*. Desperate efforts may be made to ignore or overcome this (cf. *Social organization determined by incommunicability of insights*, 1995). As disconnectedness, the lack of connectivity may however imply a degree of openness and variety, perhaps in the form of "unknowing".

Whilst the contrasting conditions invite binary representation (the broken or unbroken line of the *I Ching*), the dynamic between them could be represented by a **twice broken line** (as in the *T'ai Hsüan Ching*). The latter is then indicative of **partial comprehension or partial agreement**, namely a degree of connectivity exemplified existentially by the experience of **liminality** (cf. *Living with Incomprehension and Uncertainty: re-cognizing the varieties of non-comprehension and misunderstanding*, 2012; *Towards the Systematic Reframing of Incomprehension through Metaphor*, 2012; *Living as an Imaginal Bridge between Worlds: global implications of "betwixt and between" and liminality*, 2011).

This is consistent with the role of **incompleteness** central to the argument above of Terrence Deacon (*Incomplete Nature*, 2012). Apparent *non sequitur* may however obscure the non-linearity of Knight's move thinking, whether in its creative or pathological sense (*Knight's move thinking: appreciated or deprecated*, 2012; *Reframing "monkeying" in terms of Knight's move patterns*, 2011). The cognitive implications of this line coding -- in making or breaking a psychosocial connection -- are usefully to be contrasted with the seemingly similar **Morse Code**, offering no such connotations.

The Chinese encoding is reminiscent of some qualities attributed to a **sacred language**. It can be seen as a representation of **the flow of attention or attentive connectivity** characteristic of the organization of knowledge in memory. As an experience, "attention" embodies interest, curiosity, communication, receptivity and sensitivity to difference.

This suggests the possibility of "re-cognizing" self-reflexively the cognitive processes of:

- **pattern recognition** as a form of closure through an assumption of connectivity -- having "got it" -- namely recognizing a "fit" with an explanation and assuming it to be adequate. This is evident in making use of a metaphor -- thereby enabling assumption of knowledge and associated clarity
- **pattern rejection** through dissatisfaction with the adequacy of any proposed pattern, namely an absence or loss of connectivity -- effectively acknowledging ignorance and confusion

Any condition of **partial comprehension** then involves alternation between several possible patterns, or none at all, namely a condition of questioning doubt and uncertainty -- potentially creative, as with the classic argument for so-called "**negative capability**", as the ability to transcend and revise contexts. The transformational dynamic between these conditions is evident in considering the implications of any complex argument (as with this text).

**Geometrical interrelationship of quantitative and qualitative information:** Rhea's matching argument, and its representation on the Smith Chart, would appear to be potentially related to the argument from a quite distinct perspective offered by [Peter Collins](#) (*Number and Transformation, Integral Science*, 22 September 2012). He is fascinated by the fact that the two binary digits (1 and 0) when used in a quantitative manner can potentially encode all information processes. He therefore considers that the same two digits when used in an appropriate qualitative manner can likewise potentially encode all transformation processes:

So transformation itself (in all its manifestations) is basically encoded in number when appreciated in a qualitative manner. Now as geometrical symbols, 1 can be identified with the straight line and 0 with a circular circumference. So the relationship of 1 and 0 in qualitative terms implies the relationship between (rational) linear and (intuitive) circular understanding. (In this context circular refers to the indirect rational attempt through paradox to portray the nature of intuitive understanding).

From a physical perspective this would imply that all transformation processes entail the interaction of a visible phenomenal aspect together with an equally important invisible holistic dimension. At a deeper level this circular aspect relates to the manner in which the fundamental polarities - which necessarily underlie all phenomenal relationships - are configured.

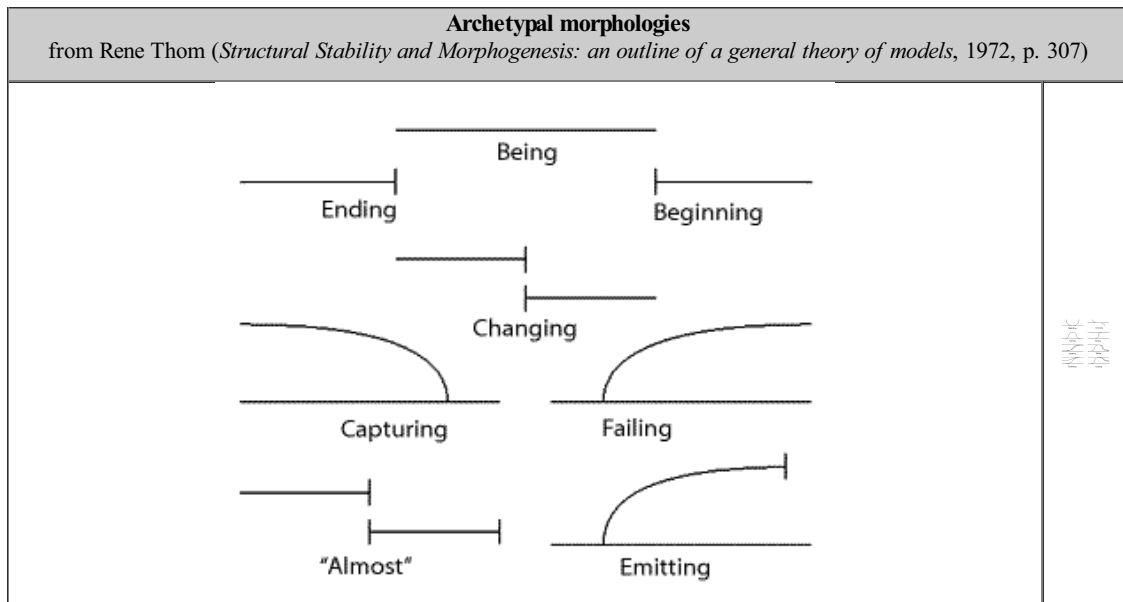
With the 0 as circle, there is an alternative representation as suggested by the *I Ching*, where the broken line implies a space which could

be a circle more elusively understood. The break is occasionally represented by a small circle on a continuous line.

## Potential emergence of coherent transformational connectivity

The connectivity implied by the pointers above suggests the possibility of further coherence through the interrelationship of:

- **archetypal morphologies**: the set of 16 archetypal morphologies identified by Rene Thom (*Structural Stability and Morphogenesis: an outline of a general theory of models*, 1972), especially understood in terms of their cognitive implications as processes, following his semiotic generalization (*Esquisse d'une Sémiophysique: physique aristotélicienne et théorie des catastrophes*, 1989).



- **psychological types**: the set of 16 psychological types identified by the [Myers-Briggs Type Indicator](#) (MBTI) as an elaboration of the typology of Carl Jung. Following from the above argument, rather than the **static** pattern denoted by "type", it is fruitful to understand these as implying distinctly **dynamic** cognitive processes. The MBTI types are reviewed in the social agency meta-model developed by Maurice Yolles and Gerhard Fink from cybernetic "living systems" theory to provide a coherent framework for normative personality and agency theory (*Personality, Pathology and Sagiv-Schwartz Mindscapes*, *Social Science Research Network*, 2012). They argue:

That personality can be represented as a system is not new (Pervin, 1990), but representing it as a living system is. Such an approach can respond to the needs of complexity and uncertainty, and embed features of adaptation and autonomous self-control. In the modelling approach that we shall take, personality controls derive from formative traits. There is only [one] cybernetic personality theory available to us that has a similar frame of reference to our modelling approach is Maruyama's mindscape theory, which unlike the classificational MBTI, is relational in nature (Maruyama, 2001)... This allows one to visualize the set of personality modes that can emerge, and further allows one to discuss typology formation from a coherent platform that can integrate different mindscape concepts.

Referring to Thom, they note that each of these contexts creates proprietary imperatives for the mindscape modes to be adopted catastrophically. They provide a more transparent mindscape theory than that of Maruyama, based on the Sagiv-Schwartz (2007) empirical study of cultural values (paired as a set of 6 bi-polar relationships), demonstrating that the Maruyama and [Sagiv-Schwartz mindscape](#) mindscapes are equivalent. Through consideration of personality enantiomers, 8 possible cognitive mindscape modes are identified with 32 possible meta-types. However, although the system dynamics are emphasized, the distinct cognitive processes are considered as characteristic of "types" and "mindscapes", thus obscuring understanding of the nature of engagement in those processes.

In the language of drama, personalities are identified and characterized (the *dramatis personae* of the system), but how an actor might embody one or other role -- "getting into it", or even "modelling it" -- remains necessarily elusive. Maruyama has himself always stressed the difficulty for those of one mindscape to even comprehend the epistemological organization and cognitive processes of another -- occasionally referring to the proclivity of western culture for classification as being reflective of but one modality. In a sense each is deeply unfamiliar to the other. There is a marked tendency to become behaviorally "typecast" and readily perceived in terms of a "stereotype" (in the absence of the "stereoscopic" insight discussed below).

There is the intriguing possibility that Thom's archetypal morphologies, and the process of morphogenesis from which they variously emerge, should bear a degree of correspondence to the varieties of possible modulation of signals or sound. Together these might well characterize the cognitive processes associated with distinct personality types and mindscapes. Of potential relevance is the body of literature on the "modulation of morphogenesis" in biological development.

Of further interest is the relationship established by Thom between the morphologies and the seven elementary catastrophes of catastrophe theory -- given the implications for the (epistemic) pathologies explored by Yolles and Fink (2012). Such catastrophes can also be explored in terms of the cognitively disruptive nature of the seven basic styles of question (*Conformality of 7 WH-questions to 7 Elementary Catastrophes: an exploration of potential psychosocial implications*, 2006; *Cognitive Feel for Cognitive Catastrophes: Question Conformality*, 2006).

Is there a sense in which **the cognitive processes characteristic of particular types have characteristic patterns of bias** as usefully explored by W. T. Jones (*The Romantic Syndrome; toward a new methodology in cultural anthropology and the history of ideas*, 1961), as previously summarized (*Axes of Bias in Inter-Cultural Dialogue*, 1993)? Would this imply engagement with particular questioning processes and indifference to others ?

There is also the interesting possibility, suggested by modulation of waveforms, that **brain wave** research might highlight the characteristic attention style (as a process of cognitive engagement) associated with the types, whether a set of 4, 8, 12, 16 or 32. This would have implications for **music therapy** and processes of meditation -- especially through any insights to be derived from analogues to the three signal controlling factors cited above: amplitude ("volume"), phase ("timing") and frequency ("pitch").

Relevant research would include that on the manner in which transformation process are understood through music (Carol L. Krumhansl, *The Geometry of Musical Structure: a brief introduction and history*, *Computers in Entertainment*, 2005). Especially relevant to this argument is the work of Dmitri Tymoczko (*The Geometry of Musical Chords*, *Science*, 2007) who notes:

A musical chord can be represented as a point in a geometrical space called an **orbifold**. Line segments represent mappings from the notes of one chord to those of another. Composers in a wide range of styles have exploited the non-Euclidean geometry of these spaces, typically by utilizing short line segments between structurally similar chords. Such line segments exist only when chords are nearly symmetrical under translation, reflection, or permutation. Paradigmatically consonant and dissonant chords possess different near-symmetries, and suggest different musical uses.

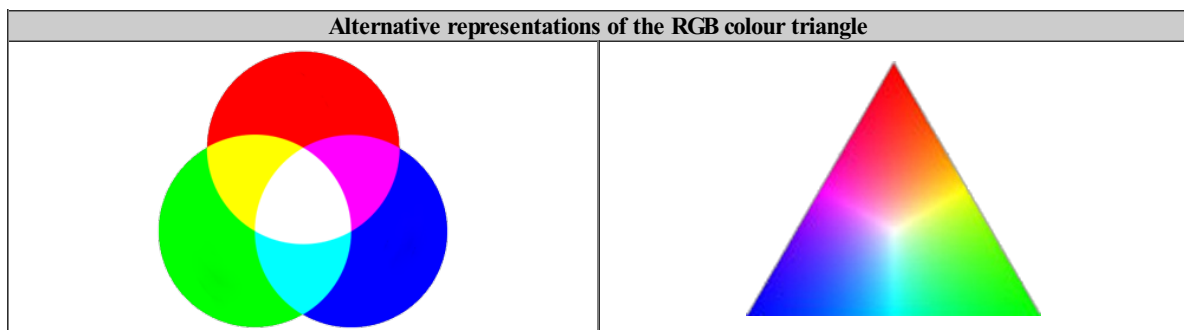
## From polyocular Rosetta "stone" to complex polysensorial dynamic

**Polyocular vs. Polysensorial cognition:** For Maruyama the global challenge is epitomized by the restrictive tendencies associated with the cognitive processes of any particular epistemological style. Using stereoscopic vision as a metaphor, he has promoted the need to develop "polyocular vision" (*Polyocular Vision or Subunderstanding? Organization Studies*, 2004). Separately it has however been argued that the "vision" metaphor is itself an inadequate indication and that the requirement, as for survival in nature, is for a "polysensorial" modality -- effectively interweaving the cognitive processes of different types (*Strategic Challenge of Polysensorial Knowledge: bringing the "elephant" into "focus"*, 2008; *Beyond strategic "vision" to polysensorial strategic metaphors*, 2009).

In this light it could be argued that (ironically) **"global" governance has entrapped itself unfruitfully in "one-eyed" vision** -- as cultivated by a singular worldview dominating the international community and its academic apologists (cf. *Cyclopean Vision vs Polysensual Engagement*, 2006).

Of relevance to this argument are the skills in which the emphasis in learning is on "getting a feel" for a process to be controlled, as in piloting a helicopter, for example. Like Alexander's "quality without a name", this intangible "feel", integrating information from multiple sources, cannot be described but its vital importance is stressed in some instances. It is recognized to a degree in some non-pathological uses of the term "cognitive fusion" (cf. *Enactivating a Cognitive Fusion Reactor*, 2006).

**Triadic cognition:** The "polyocular" vision metaphor may however be exploited further given the emphasis above on three factors by which modulation may be distinctly effected. A familiar illustration is provided by the standard **RGB colour model** in which red, green, and blue light are added together in various ways to reproduce a broad array of colours



Atkin uses this model to clarify his mathematical representation of the challenges of comprehending a whole -- exemplified by white at the centre, namely the balanced combination of the three primary colours (cf. *Comprehension: Social organization determined by incommunicability of insights*, 1995). Others have explored triangulation and triadic articulation in ways of relevance to this argument, as summarized separately (*Triangulation of Incommensurable Concepts for Global Configuration*, 2011).

**Eightfold cognition:** The recognition of four or more "types", suggests the need for embodying a larger variety of cognitive processes -- a **requisite variety** in cybernetic terms -- to enable a viable "living system". Hence the value of exploring 8-fold systems as variously cited, most notably the **Noble Eightfold Path** of Buddhism, the **Eightfold Way** of particle-physics theory, the **Eight-circuit Model** of consciousness, and the **Eightfold Path** of policy analysis.

The first in particular could be interpreted as indicating a complex balance between contrasting cognitive modalities -- again with the emphasis on the associated cognitive **processes** rather than on the **pathway**, too readily understood in conventional static terms. Buddhism corrects the latter tendency by emphasis on "laying down a path in walking", a central theme of the work on **cognitive enactivism** of **Francisco Varela** (*Laying Down a Path in Walking: essays on enactive cognition*, 1997), discussed separately (*En-minding the Extended Body: enactive engagement in conceptual shapeshifting and deep ecology*, 2003).

Combining the core insights of the *Tao Te Ching* and of **Alfred Korzybski**, it might then be suggested that: **The Way that can be indicated is not the Way**. Indicating a path to be followed to a dog, by pointing, illustrates the dilemma -- given the attentively enthusiastic focus of the dog on the pointing finger itself and not on the direction to which it points (with implications for a vertically pointing finger as the characteristic gesture accompanying religious injunction ! ).

Yolles and Fink (2012) also address the question of an 8-fold balance in relation to potential collective pathologies. There is then some irony to an 8-fold system in the light of the argument of **Stephen Prothero** (*God Is Not One: the eight rival religions that run the world -- and why their differences matter*, 2010). It would then follow that any argument for man having been created "in the image of God" (*Genesis 1:27*) suggests that "Man is Not One" -- at least cognitively, until a way is found to integrate the eight distinct cognitive processes appropriately, with full recognition as to "why their differences matter". In the absence of any 8-fold "polyocular vision", man is otherwise condemned to "subunderstanding" -- in Maruyama's terms.

Given the need for an 8-fold approach (at least), there is then an immense irony to the fact that the global knowledge-based civilization (increasingly preoccupied by "spin") should be so firmly founded on the metaphor of a **world wide web**. From it information is systematically collected for search engines by **web crawlers** (aka "spiders") through a procedure termed "spidering". A spider has of course 8 legs. There is now extensive investigation of artificial spiders (*High-tech spider for hazardous missions*, *Research News*, 2 November 2011). As yet to be explored is the requisite design of cognitive variants appropriate to exploration of (potentially hazardous) alternative realities (cf. *Navigating Alternative Conceptual Realities: clues to the dynamics of enacting new paradigms through movement*, 2002).

**Eightfold representation:** The original **Rosetta Stone** provided the key to the relationship between three distinct scripts. Exploited as a metaphor, **the challenge is now to articulate a dynamic "relationship" between eight distinct cognitive processes**. Through what form will an emergent "Rosetta Stone" be sensed? In contrast, the inadequacy of the original stone is evident in that:

- "script" is no longer adequate, or favoured, as a form of presentation -- given the transition from: text > table > graph > animation (YouTube) > simulation > game
- any 8-fold configuration is geometrically problematic in practice, if appropriately distinct, transforms between the facets are to be enabled
- it is questionable whether the distinct cognitive processes can be given adequate expression in any conventional form -- given the inherent complexity of their dynamics

The quest is then for clues as to how the pattern of transformations might be represented. Examples might include

- **Cultural symbols:** The possibility, and the challenge, can be highlighted through traditional static symbols of the fundamental "elements" of both climate and of psychic integration (whether individual or collective), in each case implying a dynamic and cognitive identification with it:
  - **Ba Gua:** This is the classical Chinese circular array of 8 trigrams. These are indeed traditionally understood as an interrelated set of transformational possibilities about which is there is very extensive commentary
  - **Lauburu:** In the case of the four-fold **lauburu** (the Basque cross), itself reminiscent of the Tao symbol, each head (or arm) is drawn with three sweeps of a compass (upon a scribed cross, employing in each head a common center but two settings, one the half of the other). (cf. *Playful exploration of ecopsychological embodiment of climate change pathways*, 2005). Imanol Mujica (*The Lauburu and Its Symbolism*) considers that the lauburu symbolizes mankind, made up of four elements: Form, Life, Sensibility and Conscience. The first head symbolizes form or density, the second head symbolizes life or vitality, the third head symbolizes sensibility and the fourth head is the conscience state. Together they are held to represent nature in action and can be associated with the movement of the Earth around the Sun.
  - **Swastika:** The traditional Eastern understanding of this (right-facing) symbol (and the **Sauwastika**, as its left-facing variant) also offers possibilities, as separately discussed (*Swastika as Dynamic Pattern Underlying Psychosocial Power Processes: implicate order of Knight's move game-playing sustaining creativity, exploitation and impunity*, 2012)
- **Transactional games:** The cognitive process could be understood as transactional games which can be configured as a set, itself related to the *Ba Gua* pattern (*Cardioid Attractor Fundamental to Sustainability: 8 transactional games forming the heart of sustainable relationship*, 2005)
- **Cut stones:** The facetting of diamond, through which the movement of light is enabled, enhanced and focused, offers further possibilities (*Patterning Archetypal Templates of Emergent Order: implications of diamond faceting for enlightening dialogue*, 2002; *Circulation of the Light: essential metaphor of global sustainability?* 2010)

**Eightfold dynamics?** As representations, all these examples may well imply the transformational processes they endeavour to map. However, as argued above, their imagery tends to obscure the nature of that dynamic as it might be experienced. They are unfortunately "frozen" as with the "types" with which their geometry may be associated. Other imagery, preferably animated, may better catalyze imaginative insight into the dynamic complex of transformation processes. As noted earlier, Hofstadter has explored and identified with the paradoxes of the Mobius strip (*I Am a Strange Loop*, 2007).

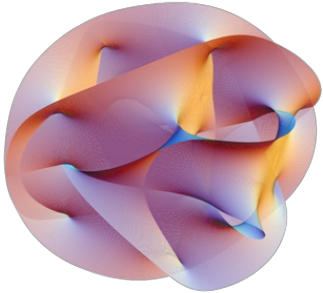
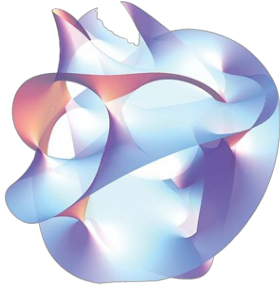
The experiential point to be made is the challenge of recognizing the cognitive process that might bear resemblance to a paradoxical form of the **aerobatic maneuver** "looping the loop", or -- even more complex -- any corresponding process mapped by a Klein bottle (cf.

*Intercourse with Globality through Enacting a Klein bottle Cognitive: implication in a polysensorial "lens"*, 2009; *Strategic Complexity 8 Attracting Consensus: Klein is beautiful 8 Sustaining identity in time*, 2011). The framing offered by the paradoxical Klein bottle is central to the explorations of Steven M. Rosen (*Topologies of the Flesh: a multidimensional exploration of the lifeworld*, 2006; *Dimensions of Apeiron: a topological phenomenology of space, time, and individuation*, 2004).

Perhaps most striking, and with the greatest potential in the light of the argument above, is exploration of the array of broken and unbroken lines in the 8-fold *Ba Gua* array -- reframed as an array of semiconductor transistors -- even taking the form of a wiring diagram permitting some form of simulation. The merit of the *Ba Gua* array is that it has been very extensively explored through metaphor to form **a cognitive bridge between external (objective) environmental phenomena and internal (subjective) experience**. The possibility of internalizing the language offered by electrical metaphors -- notably the semiconductor -- offers new possibilities for engagement with the differences and dilemmas which bedevil psychosocial processes at this time. Considerable research has of course been done on [neural network modelling](#) and [neural pathways of the brain](#), most notably in cybernetic terms. The concern here is to what extent the many sophisticated models can be "flown" by those who comprehend them.

There is even the speculative possibility that its complex "circuitry", married with the electrical interpretation, could effectively articulate a form of "radio" -- complete with the "earth" required for "grounding", and "air" consistent with need for an "aerial" (or "antenna"). There is a degree of charm to the possibility that -- beyond the arguments made above for diamond faceting -- that the result could be explored as a simple [crystal radio receiver](#) with its [antenna](#), [ground](#) and [circuit tuning](#) (and the requirement for [impedance matching](#) and [selectivity](#)). The tuned circuit has a natural [resonant frequency](#), and allows radio signals at this frequency to pass while rejecting signals at all other frequencies (suggestive of the function of a Rosetta "stone"). The crystal functions as a [semiconductor](#) detector, extracting the [audio signal \(modulation\)](#) from the radio frequency [carrier wave](#).

With respect to attention, this design merits exploration both in terms of the receptive capacity of any social network as well as in terms of the receptive capacity of an individual -- even privately in meditation. For some, in the latter case especially, it potentially reframes understandings of how the "Word of God" might be "heard" (on different "frequencies" !) -- or reading of the "Akashic Record" (cf. [Ervin Laszlo, Science and the Akashic Field: an integral Theory of Everything](#), 2004).

<b>Images of the Calabi-Yau manifold of string theory</b> as being appropriately suggestive of the dynamic pattern of cognitive transformations	
Reproduced from <i>Wikipedia</i> entry on <a href="#">membrane theory</a> Originally on the cover of <a href="#">Scientific American</a> (November 2007)	Reproduced from <i>Wikipedia</i> entry on <a href="#">Calabi-Yau manifold</a>
	
See also speculative exploration of <a href="#">Global Brane Comprehension Enabling a Higher Dimensional Big Tent?</a> <a href="#">Strategic implication in encompassing nothing and coming to naught</a> (2011)	

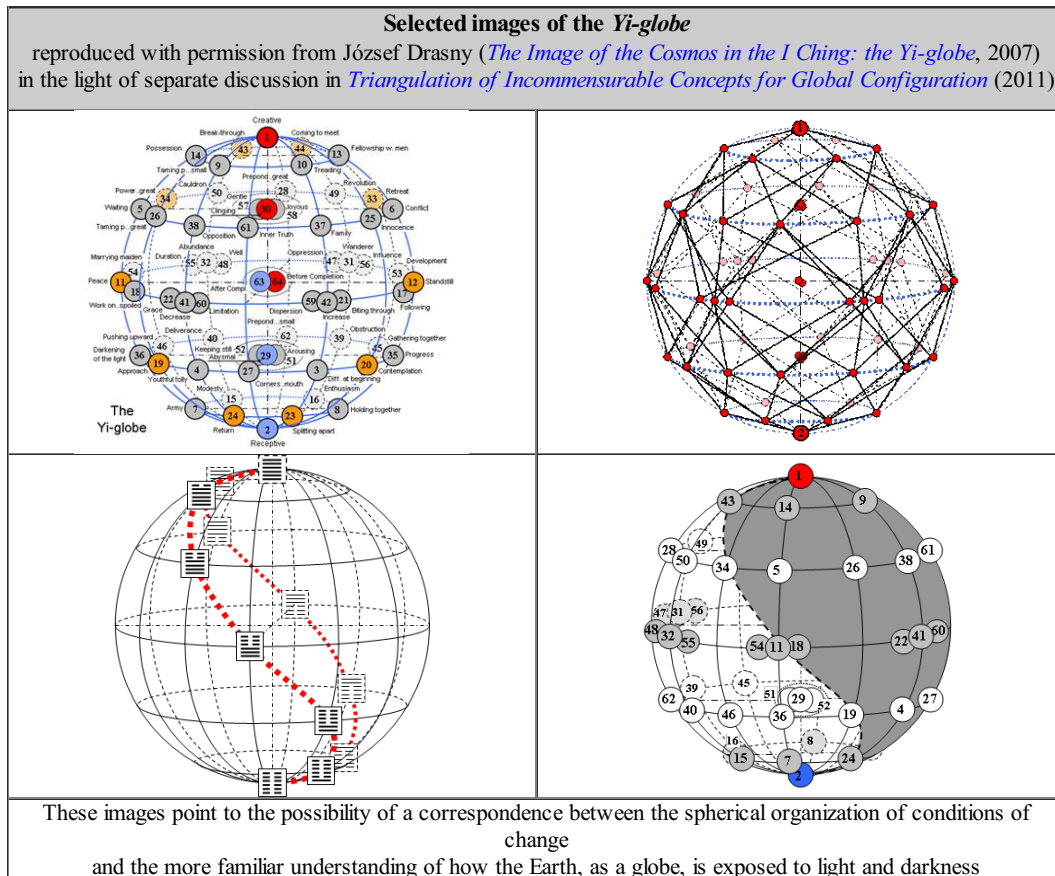
"Transformation table"? The theme of this argument has been the possibility of imaginative representation of a qualitative analogue of the "multiplication table" (currently serving to reinforce quantitative thinking) or the "alphabet" -- which enables a form of literacy increasingly dissociated from the transformational challenges with which people are faced. The question is how such a "table", supportive of the transformations essential to a sustainable quality of life, might be imagined. Although the [binary multiplication table](#) is intimately related to the so-called [truth table](#) of [logical conjunction](#) operation, it is clearly not in such terms that more conscious engagement with cognitive transformation processes has been enabled.

The imagery of the *Ba Gua*, a semiconductor array, or a 3D Smith Chart, all offer suggestive pointers. Missing is the articulation evident in both the multiplication table and any alphabet. Another "table" does however offer suggestive enhancements of this imagery, namely the standard [periodic table of chemical elements](#).

Just as the 8-fold *Ba Gua* can be "expanded" into the "table" of 64 hexagrams of the *I Ching*, the 8 classical groups of elements are "expanded" within the periodic table to enable representation of the complete array of elements. Intriguingly, with the development of the 3D variant of the Smith Chart, it might be asked as to whether its mathematical "trickery" would enable a 3D variant of past attempts at a circular representation of that table (cf. A. Piutti, [Circular presentation of periodic table of chemical elements](#), 1925). Such a development would be consistent with recent explorations of the mathematics of the table (Denis H. Rouvray and R. Bruce King (Eds.), *The Periodic Table: Into the 21st Century*, 2005; *The Mathematics of the Periodic Table*, 2005). Of great interest are the many variants of the periodic "table" in [The INTERNET Database of Periodic Tables](#).

**The question is how cognitive transformation processes could be mapped onto some such array -- in a manner meaningful to those intimately familiar with such processes in their daily lives.** Indications of possibilities are discussed separately ([Periodic Pattern of Human Knowing: implication of the Periodic Table as metaphor of elementary order](#), 2009; [Towards a Periodic Table of Ways of Knowing -- in the light of metaphors of mathematics](#), 2009). This is another approach to an argument initially developed in [Periodic Pattern of Human Life: the Periodic Table as a metaphor of lifelong learning](#) (2009). The Periodic Table is especially

significant in that it is considered to be one of the most comprehensive generalizations of science. The mapping below of the 64 hexagrams of the *I Ching* onto a sphere will no doubt be further developed in the light of the above-mentioned 3D variant of the Smith Chart.



The "harmonic" organization of any periodic "table of transformations" could then be fruitfully explored in musical terms -- in the light of the forms of modulation indicated above. This would then frame the possibility of "tuning" it -- if only according to the tastes of an individual, as previously discussed (*Tuning a Periodic Table of Religions, Epistemologies and Spirituality -- including the sciences and other belief systems*, 2007). [See, for example, D. C. Harvey, *The I Ching Hexagrams Directly Translated Into Music, Math, Geometry And The Zodiac Calendar*]

NB: These possibilities have been further developed in a subsequent document (*Eightfold Configuration of Nested Cycles of Cognitive Transformations: Meta-pattern of connectivity through a hypersphere?* 2012).

## Conclusion

The evident failure of governance and authority, and its implications for the livelihood of individuals worldwide, encourages many to believe that they have no future -- despite their dreams (cf. *Enstoring through imagination, dreams, drugs and imbibing*, 2012). The recent socio-political critique of *Slavoj Žižek* (*The Year of Dreaming Dangerously*, 2012) therefore merits consideration:

In 2011, we witnessed (and participated in) a series of shattering events, from the Arab Spring to the Occupy Wall Street movement, from the UK riots to Breivik's ideological madness. It was the year of dreaming dangerously, in both directions: emancipatory dreams mobilizing protesters in New York, on Tahrir Square, in London and Athens; and obscure destructive dreams propelling Breivik and racist populists across Europe, from the Netherlands to Hungary....

Only... an approach which combines the universality of the "public use of reason" with an engaged subjective position can offer an adequate "cognitive mapping" of our situation. (pp. 3-5)

The situation for change agents has been usefully clarified from a management cybernetics perspective by [Stafford Beer](#) in the light of what he terms Le Chatelier's Principle:

Reformers, critics of institutions, consultants in innovation, people in sort who 'want to get something done', often fail to see this point They cannot understand why their strictures, advice or demands do not result in effective change. They expect either to achieve a measure of success in their own terms or to be flung off the premises. But an ultrastable system (like a social institution)... has no need to react in either of these ways. It specialises in equilibrial readjustment which is to the observer a secret form of change requiring no actual alteration in the macro-systemic characteristics that he is trying to do something about. (*The cybernetic cytoblast - management itself*. Chairman's Address to the International Cybernetics Congress, September 1969).

This insight is partially confirmed by former US Senator [Ted Kaufman](#) (chairperson of the Congressional Oversight Panel) identifies The Blob (it's really called that), namely the government entities that regulate the finance industry -- like the banking committee, Treasury Department and S.E.C. -- and the army of Wall Street representatives and lobbyists that continuously surrounds and permeates them. The Blob moves together. Its members are in constant contact by e-mail and phone. They dine, drink and take vacations together. Not surprisingly, they frequently intermarry. (*The Payoff: why Wall Street always wins*, 2012).

Zizek himself concludes:

Say, in today's apocalyptic global situation, the ultimate horizon of the future is what [Jean-Pierre Dupuy](#) calls the dystopian "fixed point", the zero-point of the ecological breakdown, of global economic and social chaos -- even if it is indefinitely postponed, this zero-point is the virtual "attractor" towards which our reality, left to itself, tends. The way to combat the catastrophe is through acts that interrupt this drifting towards catastrophic "fixed point" and take upon themselves the risk of giving birth to some radical Otherness "to come". We can see here how ambiguous the slogan "no future" is: at a deeper level, it does not designate the closure, the impossibility of change, but what we should be striving for -- to break the hold of the catastrophic "future" and thereby open up a space for something New "to come"....

All we can be certain of is that the existing system cannot reproduce itself indefinitely: whatever will come after will not be "our future". A new war in the Middle East or an economic chaos or an extraordinary environmental catastrophe can swiftly change the basic coordinates of our predicament. We should fully accept this openness, guiding ourselves on nothing more than ambiguous signs from the future. (pp. 134-5)

[George Monbiot](#) notes that "subversion" is not the term relevant to the current crisis, since it means "to turn from below" (*A rightwing insurrection is usurping our democracy*, *The Guardian*, 1 October 2012). He argues that we need a new word, meaning "to turn from above", since the primary threat to the democratic state and its functions comes not from mob rule or leftwing insurrection, but from the very rich and the corporations they run. He provides documentary evidence, from a UK perspective, in partial support of the following point.

In considering the options for individuals within that context, there is now a strong case for adopting the strategy seemingly favoured by American [neocons](#), as explained by [Ron Suskind](#) (*Without a Doubt*, *The New York Times*, *In The Magazine*, 17 October 2004) in reporting an exchange with an aide in the decision-making circle of President Bush:

The aide said that guys like me were "in what we call the reality-based community," which he defined as people who "believe that solutions emerge from your judicious study of discernible reality." I nodded and murmured something about enlightenment principles and empiricism. He cut me off. "That's not the way the world really works anymore," he continued. "We're an empire now, and when we act, we create our own reality. And while you're studying that reality -- judiciously, as you will -- we'll act again, creating other new realities, which you can study too, and that's how things will sort out. We're history's actors . . . and you, all of you, will be left to just study what we do."

There is a curious irony to the fact that individuals and groups are now free fruitfully to adopt an equally radical approach -- as "history's actors" -- with any authorities (of whatever persuasion) "left to just study" what they do (cf. *Existential Embodiment of Externalities: radical cognitive engagement with environmental categories and disciplines*, 2009; *Reinventing Your Metaphoric Habitat*, 1992). The apparently behaviour of other groups merits comprehension in this light (cf. *Cultivating Global Strategic Fantasies of Choice: learnings from Islamic Al-Qaida and the Republican Tea Party movement*, 2010).

Given the argument above for an identification with transformational dynamics, there is a further irony to the tendency to associate change with a "movement" of opinion or a workers "movement". That "opinion" may be unfortunately fixed and unchanging -- to whatever it points. The trajectory with which a "movement" tends to identify is at risk of emulating that of the *R.M.S. Titanic* -- with "change" focused on "rearrangement of the deckchairs".

In either case a singular transformation may be what the movement seeks as a well-defined actor, but the static identification of "movement" dissociates it from any complex of cognitive transformational processes, potentially to be understood dynamically as a cyclic sense of identity (cf. *Emergence of Cyclical Psycho-social Identity: sustainability as "psychically" defined*, 2007; *Embodiment of Change: Comprehension, Traction and Impact? Discovering enabling questions for the future*, 2011).

Indications of the dynamic could be considered implicit in the "dangerous dreaming" of those participating in the Occupy Movement -- in contrast to more conventionally static uses of "movement". The term is too readily associated with the linear movement of ranks of demonstrators -- as with a marching army in which "stepping out of line" is condemned -- in contrast to the elegantly complex swarming behaviour of flocks of birds or schools of fish. The latter is suggestive of the future possibility of cognitive equivalents, for which traces may be evident in social networking (cf. *Re-Emergence of the Language of the Birds through Twitter?* 2011). It is such embodied "movement" that is a theme of recent studies (Maxine Sheets-Johnstone, *The Primacy of Movement*, 2011; Mark Johnson, *The Body in the Mind: the bodily basis of meaning, imagination, and reason*, 2008).

The challenge of any effort at collective conscientization is however the expectation that significant consensus can be achieved. As noted, this can be fruitfully considered a delusion undermining any possibility of effective collective action or appropriate governability (cf. *The Consensus Delusion*, 2011; *Ungovernability of Sustainable Global Democracy?* 2011). In this sense it is useful to review "who" is seeking vainly to "explain" "what" to "whom" -- in an effort to "convince" them -- and "why":

- is "who" convinced that "whom" is wrong and would benefit from the explanation ?

- why is "what" of such importance to "who", irrespective of its questionable importance to "whom" ?
- although "explain" is a preferred mode for "who", is this perceived as desirable by "whom" ?
- to what extent does "convince" result in a problematic loss of requisite variety ?
- to whom is "why" a matter of any importance ?

It is in the light of such questions that the processes embodied in a more cognitively fundamental "transformation table" merit consideration -- in contrast to the purely quantitative transformations associated with a "multiplication table". As the root cause of so many of the resource-related problems of the world, deeper understanding of "multiply" should be fruitful (cf. *"Be Fruitful and Multiply": the most tragic translation error?* 1995). This suggests the possibility of fruitfully reframing Zizek's concern that the "existing system cannot reproduce itself indefinitely".

---

## References

David Abram:

- The Spell of the Sensuous: perception and language in a more-than-human world. Vintage, 1996
- Depth Ecology. In: Taylor and Kaplan (Ed.), *The Encyclopedia of Religion and Nature*, Continuum, 2005 [text]

Christopher Alexander:

- The Timeless Way of Building. Oxford University Press, 1979
- A Pattern Language: towns, buildings, construction. Oxford University Press, 1977 [summary]
- The Oregon Experiment. Oxford University Press, 1975
- The Nature of Order: an essay on the art of building and the nature of the universe. Center for Environmental Structure, 2003-4. [summary]
- New Concepts in Complexity Theory: an overview of the four books of the Nature of Order with emphasis on the scientific problems which are raised. 2003 [text]
- Harmony-Seeking Computations: a science of non-classical dynamics based on the progressive evolution of the larger whole. *International Journal for Unconventional Computing (IJUC)*, 5, 2009 [text]

W. Ross Ashby. The Effect of Experience on a Determinate Dynamic System. *Behavioral Science*, 1, 1956, 1, pp. 35-42 [abstract]

Ron Atkin:

- Combinatorial Connectivities in Social Systems; an application of simplicial complex structures to the study of large organizations. Birkhauser, 1977
- Multidimensional Man; can man live in 3-dimensional space ? Penguin, 1981
- Mathematical Structures in Human Affairs. Heinemann, 1974

Gregory Bateson. Mind and Nature: a necessary unity. Dutton, 1979

John Casti. Connectivity, Complexity, and Catastrophe in Large-Scale Systems. Wiley, 1979 [text]

Mary Catherine Bateson:

- Composing a Life. Dutton, 1990
- Composing a Further Life: the Age of Active Wisdom. Dutton, 2010

Giulia Ceriani. Du Dispositif Rythmique: arguments pour une sémio-physique. Editions L'Harmattan, 2000

Tom Cheetham:

- The World Turned Inside Out: Henry Corbin and Islamic Mysticism. Spring Journal, 2003
- All the World an Icon: Henry Corbin and the Angelic Function of Beings. North Atlantic Books, 2012

Henry Corbin:

- Man of Light in Iranian Sufism. Omega Publications, 1994
- Alone with the Alone. Princeton University Press, 1998

Keith Critchlow. The Hidden Geometry of Flowers: living rhythms, form and number. Floris Books, 2012

Philip J. Davis and Reuben Hersh. The Mathematical Experience. Mariner, 1981

Anna De Liddo, Agnes Sandor and Simon Buckingham Shum. Contested Collective Intelligence: rationale, technologies, and a human-machine annotation study. *Computer Supported Cooperative Work (CSCW)*, 21, 2012, 4-5, pp. 417-448 [text]

Terrence W. Deacon:

- Incomplete Nature: how mind emerged from matter. W. W. Norton, 2012
- The Symbolic Species: the co-evolution of language and the brain. W. W. Norton, 1997

Keith Devlin. Introduction to Mathematical Thinking. Privately published, 2012

Duane Elgin. Voluntary Simplicity: toward a way of life that is outwardly simple, inwardly rich. Harper, 2010

B. Eylon and F. Reif. Effects of internal knowledge organization on task performance. Paper presented at the meeting of the American Educational Research Association, April 1979.

Marlene Johansson Falck. Electrifying Performances and Brains that Fuse: metaphor and the cognitive function of electricity. In: Technology, Language and Thought: Extensions of Meaning in the English Lexicon. Luleå University of Technology, 2005 [\[text\]](#)

Paul Feyerabend:

- Against Method: outline of an anarchistic theory of knowledge. Verso, 1975
- Conquest of Abundance: a tale of abstraction versus the richness of being. University of Chicago Press, 1999

Roger Fisher, William L. Ury and Bruce Patton. Getting to Yes: negotiating agreement without giving in. Penguin, 1981

R. Buckminster Fuller with E. J. Applewhite:

- Synergetics: explorations in the geometry of thinking. Macmillan, 1975 [\[contents\]](#)
- Synergetics 2: further explorations in the geometry of thinking. Macmillan, 1979 [\[contents\]](#)

Howard Gardner. Frames of Mind: the Theory of Multiple Intelligences. Basic Books, 1983

D. Gentner and D. R. Gentner. Flowing Waters or Teeming Crowds: mental models of electricity. In: D. Gentner and A. L. Stevens (Eds.), Mental Models. Lawrence Erlbaum Associates, 1983, pp. 99-129 [\[text\]](#).

D. Gentner and P. Wolff. Metaphor and Knowledge Change. In: E. Districh and A. Marbnau (Eds.). Cognitive Dynamics: conceptual change in humans and machines. Lawrence Erlbaum Associates, 2000, pp. 295-342 [\[text\]](#)

D. Gentner and J. Grudin. The Evolution of Mental Metaphors in Psychology: a 90-year retrospective. *American Psychologist*, 40, 1985, 2, pp. 181-192

R. W. Gibbs, Jr. Poetics of Mind: Figurative Thought: language and understanding. Cambridge University Press, 1994

Daniel Goleman. Emotional Intelligence: why it can matter more than IQ. Bantam Books, 1996

Jacques Hadamard. The Psychology of Invention in the Mathematical Field. Princeton University Press, 1949

Patrick A. Heelan:

- The Logic of Changing Classificatory Frameworks. In: J A Woicichowski (Ed). Conceptual Basis of the Classification of Knowledge. K G Saur, 1974, pp. 260-274 [\[text\]](#)
- Space-Perception and the Philosophy of Science. University of California Press, 1983
- The Role of Consciousness as Meaning-Maker in Science, Culture, and Religion. *Zygon*, 44, 2009, pp. 469-488. [\[text\]](#)

James Hillman and Michael Ventura. We've Had a Hundred Years of Psychotherapy -- And the World's Getting Worse. HarperOne, 1993

Douglas Hofstadter. I Am a Strange Loop. Basic Books, 2007

Matthew M. Hurley, Daniel C. Dennett and Reginald B. Adams Jr. Inside Jokes: using humor to reverse-engineer the mind. The MIT Press, 2011

Mark Johnson:

- The Body in the Mind: the bodily basis of meaning, imagination, and reason. University of Chicago Press, 1987
- The Meaning of the Body: aesthetics of human understanding. University of Chicago Press, 2008

W. T. Jones. The Romantic Syndrome; toward a new methodology in cultural anthropology and the history of ideas. Martinus Nijhof, 1961

Stuart A. Kauffman. At Home in the Univeset: the search for laws of self-organization and complexity. Oxford University Press, 1995

G. V. Kondrask. Cognitive performance modeling based on general systems performance theory. *Conf Proc IEEE Eng Med Biol Soc*, 2010 [\[abstract\]](#)

George Lakoff and Rafael Núñez. Where Mathematics Comes From: how the embodied mind brings mathematics into being. Basic Books, 2000

Y. Lazebnik. Can a biologist fix a radio? - Or, what I learned while studying Apoptosis. *Biochemistry*, 69, 2004, 12, pp. 1403-1406

Magoroh Maruyama:

- Polyocular Vision or Subunderstanding? *Organization Studies*, 25, 2004, pp. 467-480
- Individual Types: Subcultural or Transcultural. *The General Psychologist*, 36, 2001, 3, pp. 64-67
- Mindscapes, social patterns and future development of scientific theory types. *Cybernetica*, 1980, 23, 1, pp. 5-25

Gregory Mitchell. Bertalanffy's General Systems Theory: the topology of mind development. Tans4Mind [\[text\]](#)

V. V. Nalimov. Realms of the Unconscious: the enchanted frontier. Philadelphia, ISI Press, 1982

Stephen Prothero. God Is Not One: the eight rival religions that run the world -- and why their differences matter. HarperOne, 2011

Jenny Quillien. Delight's Muse on Christopher Alexander's The Nature Of Order: a summary and personal interpretation. lulu.com, 2010

Steven M. Rosen:

- Topologies of the Flesh: a multidimensional exploration of the lifeworld. Ohio University Press, 2006 [[text](#)]
- Dimensions of Apeiron: a topological phenomenology of space, time, and individuation. Value Inquiry Book Series, 2004 [[text](#)]
- The Self-evolving Cosmos: a phenomenological approach to nature's unity-in-diversity. World Scientific, 2008

Denis H. Rouvray and R. Bruce King (Eds.):

- The Periodic Table: Into the 21st Century. Research Studies, 2005
- The Mathematics of the Periodic Table. Nova Science Publishers, 2005

Chris Schlottmann. Embodiment and Embeddedness in Philosophies of Ecology: deep ecology, Confucian ecology, and Maurice Merleau-Ponty's phenomenology, 2002 [[text](#)]

D. A. Schon. Generative Metaphor: a perspective on problem-setting in social policy. In: A. Ortony (Ed.), Metaphor and thought. Cambridge University Press, 1979

Douglas Schuler. Liberating Voices: a pattern language for communication revolution. The MIT Press, 2008

Maxine Sheets-Johnstone. The Primacy of Movement. John Benjamins, 2011

M. Joseph Sirgy. Toward a General Systems Theory of Social Behavior: a psychocybernetic perspective. *Systems Research*, 4, 1987, pp. 93-110 [[abstract](#)]

Henryk Skolimowski. The Participatory Mind: a new theory of knowledge and of the universe. Arkana, 1994

George Soros. The Alchemy of Finance: reading the mind of the market. Simon and Schuster, 1988

Nassim Nicholas Taleb. The Black Swan: the impact of the highly improbable. Random House, 2007

Rene Thom:

- Structural Stability and Morphogenesis: an outline of a general theory of models. W. A. Benjam, 1972
- Esquisse d'une Sémiophysique: physique aristotélicienne et théorie des catastrophes. Interéditions, 1989
- Apologie du Logos. Hachette, 1990

D'Arcy Wentworth Thompson. On Growth and Form. Dover, 1917

John W. Thompson:

- Mental Science, Meteorology and General Systems Theory. *General Systems*, 5, 1960, pp. 21-26
- Meteorological Models in Social Dynamics. *Human Relations*, 14, 1961, pp. 43-62
- Meteorological Models in the Social Sciences: complex processes in meteorology and sociology. *General Systems*, 7, 1962, pp. 283-291
- Modes of Thought in Meteorology. *General Systems*, 12, 1967, pp. 201-208

J. E. Trosko. The gap junction as a "Biological Rosetta Stone". *Journal of Cell Communication and Signaling*, 5, 2011, pp. 53-66

Dmitri Tymoczko:

- The Geometry of Musical Chords. *Science*, 313, 5783, 7 July 2006, pp. 72-74 [[text](#)]
- A Geometry of Music. Oxford University Press, 2011

Francisco Varela:

- Laying down a path in walking. In W. Thompson (Ed.), Gaia: A way of knowing. (pp. 48-64). Lindisfarne Press, 1987.
- Laying Down a Path in Walking: essays on enactive cognition. Zone Books/MIT Press, 1997

Marie-Louise von Franz. Number and Time; reflections leading towards a unification of psychology and physics. Rider, 1974.

Maurice I. Yolles. Knowledge Cybernetics: a metaphor for post-normal science. In: Steve Wallis (Ed), Cybernetics and Systems Theory in Management: Tools, Views and Advancements, IGI Global, Hershey, 2010

Maurice Yolles, B.R. Frieden and G. Kemp. Toward a formal theory of socioculture: a yin-yang information-based theory of social change. *Kybernetes*, 37, 2008, 7, pp. 850 - 909 [[abstract](#)]

Maurice Yolles and Gerhard Fink. Personality, Pathology and Sagiv-Schwartz Mindscapes. *Social Science Research Network*, 2012 [[abstract](#)]

Arthur M. Young. The Geometry of Meaning. Delacorte Press, 1976

L. A. Zadeh. From Circuit Theory to System Theory. *Proceedings of the IRE*, May 1962, pp. 856-865 [[text](#)]



This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](#).

For further updates on this site, [subscribe here](#)

