



laetus in praesens

Alternative view of segmented documents via Kairos

8 June 2019 | Draft

Experimental Visualization of Dynamics of the European Parliament in 3D

A 9-fold enneagram of political groups embedded in a 12-fold symbolic icosahedron in virtual reality

-- / --

Introduction

Conventional depictions of the European Parliament
Modelling the European Parliament -- otherwise
European Parliament as a viable system: enneagram embedded within icosahedron?
Aesthetic criterion: meaningful completeness and phi?
Hemispheric organization of the "European Brain"?
Visualization of enneagram in 3D and its icosahedral embedding
Modelling communication dynamics among EU political groupings?
Enabling the strategic "flight capacity" of the European Parliament?
Strategic "vehicle" of the European Parliament in communication and cognitive terms?
Navigating Europe's 12 "dimensional space": 12 rotating stars on icosahedron as "propellers"?
European futures: strategic drift versus multidimensional paradigm shift?
Dysfunctionally divisive political discourse and tendency to demonisation
Dynamic reframing of discourse polarization: clues from generation and use of electricity?
Archetypal irony of the relationship between competing strategic advocates
References

Annex: Coherent Representation of the European Union by Numbers and Geometry: mapping structural elements and principles onto icosahedron and dodecahedron

Produced on the occasion of the reconfiguration of political groupings following Europe-wide elections -- coinciding with an "optics" enhancing visit of Donald Trump to Europe -- raising the question of the necessary "optics" enhancement of the European Union

Introduction

It is surprising to note that an institution with a deep commitment to new information technology chooses to represent the structure of the European Parliament in the form of a two-dimensional hemicircle in which its 9 political groupings are indicated by distinctively coloured segments. This is consistent with the hemicircle of seats for the 700-plus Members of Parliament (MEPs) frequently depicted in photographs. Far less evident is the nature of the communication between those seated in that way, from whom formal consensus is supposed to emerge following negotiation and voting. There is little commentary regarding the efficacy of such communication, given the time constraints, and the numbers either desiring to speak or to inhibit the speaking time of others. The challenges of information overload, absenteeism, voter apathy and related issues are another matter. The potential role of online communication and voting are also a separate matter (*The Challenge of Cyber-Parliaments and Statutory Virtual Assemblies*, 1998; *Dubious Rejection of Electronic Voting*, 2016).

The question addressed here is whether new levels of insight into the complex communication dynamics of such a structure could emerge from their representation in 3D in virtual reality, with which Europeans are increasingly engaged -- and whose development the European Commission variously promotes. The exercise follows from a similar concern with respect to NATO and the Pentagon (*Envisaging NATO Otherwise -- in 3D and 4D? Potentially hidden faces of global strategy highlighted through polyhedra*, 2017).

The particular approach taken here focuses on the pattern of political groupings -- 9 in the previous session of the Parliament. This focus follows from a separate speculative argument regarding a systemic understanding of their relationship (*9-fold Political grouping within the European Parliament as a "Hundred Acre Wood"?* 2019). There the concern was with the coherence of the pattern of systemic



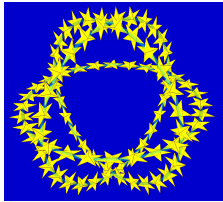

functions those groups distinctively constituted (*Enneagram roles and connectivity in Hundred Acre Wood*, 2019).

The 9-fold enneagram pattern considered in that exploration was the focus of previous exercises in 3D depiction in virtual reality (*Use of virtual reality for 3-dimensional articulation of connectivity*, 2014; *Imagining the nature of cognitive "flight" in terms of the enneagram*, 2014). The following argument is a further development of the models and animations in those exercises. The more general concern is with systemic connectivity in a seemingly fragmented psychosocial context, as argued separately (*Time for Provocative Mnemonic Aids to Systemic Connectivity? Possibilities of reconciling the "headless hearts" to the "heartless heads"*, 2018).

Aspects of this argument are discussed further with respect to emerging technical possibilities (*Visualization Enabling Integrative Conference Comprehension: global articulation of future-oriented 3D technology*, 2018). This was prepared on the occasion of the *International Conference on Future-Oriented Technology Analysis (FTA2018): future in the making* of the European Commission Joint Research Centre (Brussels, 2018).

Conventional depictions of the European Parliament

Flag of Europe: Potentially framing this discussion is the symbolic importance attached within the European Union to the 12-fold configuration of stars on the [Flag of Europe](#). This **static** configuration lends itself to exploration in 3D in its own right -- with the argument that the European Union merits comprehension as being **more than a purely "two-dimensional entity"**, one that is unfortunately reminiscent of a "flat Earth" mindset (*Irresponsible Dependence on a Flat Earth Mentality -- in response to global governance challenges*, 2008). An initial exercise gave rise to the following **animations**, with that on the right addressing the possibility that the requisite complexity of the relationship between member states might be more appropriately explored as a [Borromean ring](#) configuration.

Design exercises for animated 28-country Flag of Europe based on 28 rotating stars (Reproduced from <i>Imagining the Flag of Europe otherwise?</i> 2018)			
Simple rotating circle of 28	Counter-rotation of alternate stars	3-orthogonal circles of 28	Borromean ring configuration
			
	Interactive variant: X3D	Interactive variant: X3D	

Possible clues to retaining the 12-star format of the Flag of Europe are suggested by the unquestioned preference for 12-fold strategic organization (*Checklist of 12-fold Principles, Plans, Symbols and Concepts: web resources*, 2011). In the case of the European Union, these include the *12-Point EU Action Plan to support the Millennium Development Goals* (2010) and, more specifically, the *European 12-point plan to tackle antimicrobial resistance* (2011). De-escalation of the situation in the Ukraine was framed by the EU as a 12-point [Minsk Protocol](#) (2014).

Somewhat ironically, a 12-fold format was used by the UK to structure its Brexit negotiations with the EU (*The 12-point Brexit plan explained: Theresa May warns EU she will walk away from a 'bad deal' for Britain*, *The Telegraph*, 17 January 2017). More curiously, this has been followed by an analysis by Stephan Richter (*12 Rules for How Not to Negotiate a Successful Brexit*, *The Globalist*, 22 September 2018).

There seems to be no desire to analyze why this 12-fold pattern "works" in the elaboration of any coordinated strategic organization. In the case of the Flag of Europe, inherited from the [Council of Europe](#), the latter gave that flag a symbolic description in the following terms:

Against the blue sky of the Western world, the stars represent the peoples of Europe in a circle, a symbol of unity. Their number shall be invariably set at twelve, the symbol of completeness and perfection (*Council of Europe*, 1955).

The number of stars on the flag is fixed at twelve, representing "perfection and completeness" (in the original French: *symbole de la perfection et de la plénitude*). It is not related to the number of member states of the EU (although the EU happened to have 12 member states at the time of [Maastricht Treaty](#)). To what extent **does such 12-foldness have any meaning beyond its superficial value for "decorative" purposes** -- surely an irresponsible indulgence at this time? Is there possibly a sense that the set of stars is valued as an inspiration for humanity's journey "to the stars" Is their circular configuration held to be indicative of some kind of portal -- a "gateway to the stars" -- a confluence of aspirations?


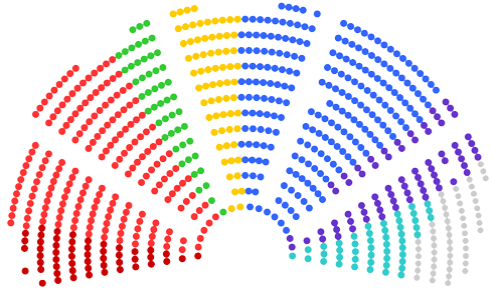
To the extent that the political groupings within the European Parliament is 9-fold, **is there any systemic understanding of why 9 distinctive orientations are seemingly required in the governance of Europe?** Is this an indication of [requisite variety](#) in a cybernetic sense?

In a time of remarkable incoherence in global governance, there is a case for exploring such preferences with any available tools, as was originally argued (*Patterns of N-foldness: comparison of integrated multi-set concept schemes as forms of presentation*, 1980; *Patterns of Conceptual Integration*, 1984). The somewhat desperate quest for 12-foldness can however be explored in terms of the need for viable connectivity, as noted above (*Time for Provocative Mnemonic Aids to Systemic Connectivity? Possibilities of reconciling the "headless*

hearts" to the "heartless heads", 2018). It is in this sense that the organization of the political groupings within the European Parliament is of interest.

Why indeed are the 12 stars of the Flag of Europe of pentagonal form, when other flags have 6-pointed and 7-pointed stars? The contrast between symbolic commitment to 5-pointed stars, rather than 6-pointed stars, has been explored with respect to the primary ongoing regional conflict which is a major challenge for Europe (*Middle East Peace Potential through Dynamics in Spherical Geometry: engendering connectivity from incommensurable 5-fold and 6-fold conceptual frameworks*, 2012).

Depicting the European Parliament: As widely disseminated, two typical approaches to the visualization of the European Parliament are reproduced below. Is there simplicity worthy of the complex challenges of governance for which the European Parliament claims responsibility? Or is it fundamentally misleading, effectively cultivating an illusion of coherence which is totally questionable in practice?

Conventional ways of depicting the European Parliament	
The Parliament's hemicycle (debating chamber) during a plenary session in Strasbourg.	Indication of composition of the European Parliament by political groups (<i>Elections to the Parliament</i>)
	
European Union, 2014 EP-012763	User:Gentamara [CC BY-SA 4.0], via Wikimedia Commons

Missing from such images is any sense of how the 700-plus MEPs communicate with each other in this configuration, given obvious time constraints -- even if person-to-person and person-to-groups, as well as group-to-group communications, are facilitated electronically. These are of course clearly possible even when MEPs are not assembled together physically. It is unclear whether these different modes of communications are subject to continuing assessment with regard to their efficacy. Of some concern would obviously be the dominance of speaking time by some MEPs, for whatever reason, and the marginalization of others.

Procedural rules may of course oblige MEPs to be physically present in order to vote, although the justification for this is less than obvious if there is no time for them to speak -- then to be interpreted as a misrepresentation of the democratic process. The possibility and incidence of absenteeism is clearly of concern. The implications are significant for the highly controversial displacement of the whole Parliament ("plenary sessions") between Strasbourg and Brussels, and for the Committee meetings of the Parliament held in Brussels (*Wallstrom: "Strasbourg has become a negative symbol"*. *EurActiv*. 5 September 2006).

Auditory "visualization"? Complementing the Flag of Europe is the formally recognized [Anthem of Europe](#). It is based on the *Ode to Joy* from the final movement of [Beethoven's 9th Symphony](#) (1823) and is played on official occasions by bodies of the European Union and by the Council of Europe. This Anthem could in turn be said to be complemented by the annual [Eurovision Song Contest](#) through which Europe is imagined and represented otherwise by its peoples -- although neither of those bodies is involved in its organization. Just as a flag may be reversed to signal distress, a case can be made for reversing the anthem to mark the recent European institutional crisis (*Reversing the Anthem of Europe to Signal Distress*, 2016).

Modelling the European Parliament -- otherwise

It would be instructive to see a communication systems diagram indicating the degree of communication between seats, between groups, and to-and-from the whole (in the person of its president) -- perhaps as it evolved over a single sitting or for a given configuration. This would be helpful in determining the manner in which that pattern enabled or inhibited debate on a given issue. Much of this data would of course be available from usage of mail facilities as well as from the requirements of speakers (and interpreters).

It could be asked to what extent such systemic insight informs initiatives to simulate for students the operation of a [Model European Parliament](#) (as distinct from the [Model European Communities Project](#) or the [Model European Union Strasbourg](#)). **Are the existing models designed to facilitate how the European legislative process currently works -- deliberately avoiding any implications of how it might work otherwise, and how it might be required to work more effectively in the future?** As such, can the parliamentary process be considered a learning organization appropriate to engagement with the future?

An early example of computer-enhanced modelling of a conference was provided at an event of the Society for General Systems Research by Stafford Beer and Gordon Pask (*Metaconferencing: discovering people / viewpoint networks in conferences*, 1980). Current possibilities are summarized separately (*Multi-option Technical Facilitation of Public Debate: eliciting consensus nationally and internationally*, 2018). These approaches are distinct from the possibility of using artificial intelligence to model possible configurations and operations of any European Parliament -- a logical application of computer simulation to improve the quality of parliamentary discourse and its outcomes.

Curiously the European Parliament is deeply involved in the application of advanced computer techniques in various areas (European Parliamentary Research Service, *European High-performance Computing Joint Undertaking*, *Briefing EU Legislation in Progress*, 2018). Despite the extensive commitment to artificial intelligence, these apparently do not include any consideration of the operational

modelling of the Parliament itself and what might be learned from doing so. Given the envisaged application to climate change with respect to the EU funding of supercomputers, the challenge could be provocatively framed as: *Superquestions for Supercomputers: avoiding terra flops from misguided dependence on teraflops?* (2010).

Despite any such conclusion, the European Union (and its European Parliament) could be understood as a focus of a quite different kind of modelling, most notably that associated with financial accounting and the preoccupation of the [European Court of Auditors](#).

Rather than "following the money", as is so widely advocated in modelling and determining system efficacy, **the approach here is one of "following the numbers" as they are reflected in the articulation of strategic initiatives** and their comprehensibility, as indicated in the annex (*Coherent Representation of the European Union by Numbers and Geometry: mapping structural elements and principles onto icosahedron and dodecahedron*, 2019).

European Parliament as a viable system: enneagram embedded within icosahedron?

Viable system: This argument follows from the work of [Stafford Beer](#) as a management cybernetician, especially known for his role in the development of a [viable system model](#) (*Brain of the Firm*, 1972). This raises the provocative question as the extent to which the European Parliament is a "viable system". His reference to the brain metaphor in relation to institutions raises the further provocative question as to how the "brain of Europe" is to be understood at this time -- potentially in relation to any [global brain](#) in the emerging knowledge-based society.

Curiously references to "European brain" are primarily by artists or with respect to [brain research by European neurologists](#), notably funded by the European Commission, as with the [Human Brain Project](#). The [European Brain Council](#) funded by the European Parliament invites the question as to the extent to which the European Parliament can itself be understood to "have a brain" -- especially in the light of its far greater preoccupations with a "brain drain" (*How To Solve Europe's Brain Drain Problem*, *Foreign Affairs*, 5 January 2016; *Brain drain tearing Europe apart*, *Express*, 8 October 2017)?

Is the complex of European institutions now to be understood as "brainless" -- or is the [Joint Research Centre](#) to be understood as constituting its "cerebral" locus -- with [CORDIS](#) serving as a form of "spinal cord"? Curiously the [JRC website](#) notes that it contributes to only 9 of the [10 political priorities for 2015-2019](#) of the European Commission, but not to that of *Democratic Change: making the EU more transparent and democratically accountable*.

In the case of the European Parliament alone, it is noteworthy that it is endowed with a [European Parliament Think Tank](#), presumably to be understood as functioning as its "brain". However, although the public is invited to ask questions of it in the expectation of an answer from its experts, the website does not appear to have any facility for acquiring input from the public -- which may be otherwise informed. Has it been designed as a "brain" to provide output without any need for input from the public -- anticipating one of the fears with regard to artificial intelligence, of which such a "tank" is effectively a precursor? This could be seen as symptomatic of the disconnect to which eurosceptics so frequently allude. The tank metaphor is perhaps especially unfortunate in its implication of the brain being heavily "armoured" as a protection against the public, as separately challenged (*"Tank-thoughts" from "Think-tanks": metaphors constraining development of global governance*, 2003).

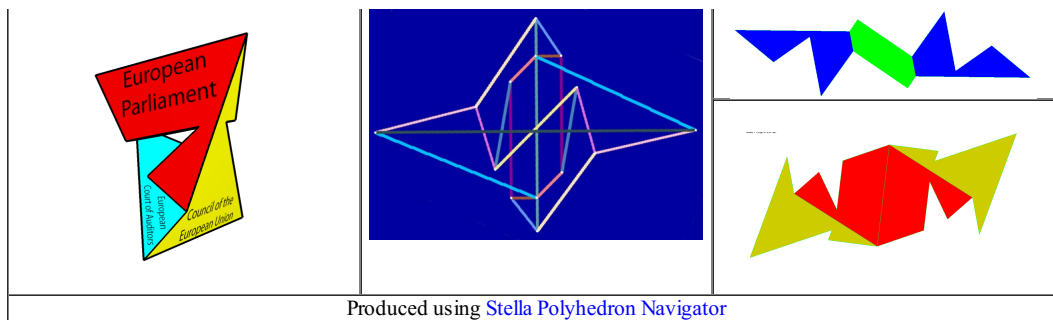
How might the functioning of a "European brain" be understood from an institutional perspective in the cybernetic context of the future? The coordination of the European intelligence services would be but one aspect of this, as would the [Supreme Headquarters Allied Powers Europe](#) (SHAPE). Rather than imagining it to be physically localized it could be more appropriately understood as decentralized, as with the understandings of the distributed nature of any global brain. In that sense it could also be understood as outsourced by Europe to a degree, as with the [FuturICT Knowledge Accelerator](#) in which the EU has been expected to invest heavily over an extensive period.

It is curiously symptomatic that the European Parliament has a formally instituted [Spokesperson's Service](#) in order to communicate with the wider world, but (as with other institutions) there is no formally instituted "Listeningperson's Service". This reinforces the view of the wider public that institutions of governance may indeed "listen" (surreptitiously via surveillance processes) but they are effectively unable to "hear". The challenge in both cases is processing a flood of information -- beyond ignoring it, or responding in an automated manner, such as to be able to claim the adequacy of such communication.

Representing the EU institutional complex: Central to this argument is the organization of the European Parliament into 9 political groupings in practice and how this might be understood to relate to the 12-fold symbolism expressed through the Flag of Europe and otherwise, as noted above. This focus avoids consideration of the institutional complex of the [EU's principal decision-making bodies](#) within which the European Parliament is itself embedded.

Being 7-fold, as defined by the [Treaty on European Union](#) (2007), the contextual complex raises considerable problems regarding how its coherence is to be represented, especially for popular comprehension. Although unrelated to the following polyhedral argument, it is of some interest that perhaps the only polyhedron on which the 7 institutions can be appropriately represented in 3D is the [Szilassi polyhedron](#). It is unique in that each of the 7 faces of this polyhedron shares an edge with each other face -- potentially appropriate to a representation of the interrelationship between those institutions. Its 21 edges are of 12 distinct types. Topologically it is a torus, each of its faces being hexagonal.

Indicative mapping of the EU's principal decision-making bodies onto a Szilassi polyhedron		
Rotation (paired sides similarly coloured)	12 types of the 21 edges (highlighted by colour)	Unfolding of 2 nets of polyhedron (flat on left; folded on right)



Related applications of the Szilassi polyhedron of potential relevance are considered separately (*Mapping of WH-questions with question-pairs onto the Szilassi polyhedron*, 2014; *Dynamics of discord anticipating the dynamics of concord*, 2018).

Another exercise in mapping the EU institutional complex is presented as an annex (*Coherent Representation of the European Union by Numbers and Geometry: mapping structural elements and principles onto icosahedron and dodecahedron*, 2019).

Icosahedron: One justification for this exploration is the recognition by Stafford Beer of the association between the 9-fold **enneagram** and the 12-fold **icosahedron** as being central to his investigation of the possibility of handling disagreement otherwise (*Beyond Dispute: the invention of team syntegrity*, 1994). Beer describes these insights as emerging from collaboration with **Joseph Truss**, who had brought the existence of the embedded enneagram to his attention, as articulated in a chapter on *The Dynamics of Icosahedral Space* (*Beyond Dispute*, 1994, pp. 196-209). For Beer:

But it is a matter of great interest that in the whole of the literature... the enneagram occurs as a *plane figure*. Nowhere had there been the slightest hint that a three-dimensional manifestation existed... No wonder the search took so long, given that the diagram was discovered spread across four vertical planes... The icosahedron is the actual *origin* of the enneagram... (p. 206)

In the quest for richer and more meaningful ways to map the features of the European Parliament in the light of Beer's studies, it is appropriate to note that the properties of the icosahedron central to his modelling efforts are characterized by both 12 vertices and 30 edges -- the latter being of potential value in any mapping of the circa 28 EU member countries. With respect to comprehension of how the European Parliament might "work", the 20 faces of the icosahedron invite further reflection in terms of another unquestioned collection of strategic sets (*Requisite 20-fold Articulation of Operative Insights? Checklist of web resources on 20 strategies, rules, methods and insights*, 2018).

Pentagonal stars: Whilst the EU option for 12-foldness is explained to some degree above, more mysterious is the derivation of the pentagonal form of the 12 stars. One approach is to consider their relationship to birds and their capacity for flight, as separately argued (*Star symbols as schematic birds?; Star rotation: achieving and sustaining controlled flight?* 2018)

Implications of a star might be clarified by the geometry of the icosahedron, as it may be analyzed and presented visually in terms of its **stellation diagram** and **faceting diagram** -- as illustrated below. A faceting of a polyhedron is one which shares the same vertices, but has different faces connecting them; faceting is the dual process to stellation, the former keeps the vertices while the latter keeps the facial planes.

Geometrical clues to the origin of the pentagonal stars in the Flag of Europe			
Faceting diagram for icosahedron	9-fold Stellation diagram for icosahedron	Pentagonal prism with faceting diagram	Pentagonal stephanoid by faceting pentagonal prism ,

Produced using Stella Polyhedron Navigator

The depiction of the **pentagonal prism** followed from the role it plays in the extensively patented lens systems of the widely known Pentax cameras, enabling management of light and imagery under a variety of circumstances. It has 7 faces, 15 edges and 10 vertices, properties of interest to the development of the following argument; its faceting diagram is 9-fold. From the prism, the pentagonal stephanoid -- a **crown polyhedron** -- can be derived by a **faceting process**. This is a **toroidal polyhedron**, of which one perspective is of a pentagonal star with a central hole. Given the use of pentagonal prisms in cameras, it is metaphorically suggestive of the role the 12-stars of Europe might be expected to play. In building the animated 3D models of the 12 stars, as shown below, use was made of the dual of the pentagonal prism, namely the **pentagonal bipyramid** (7 vertices, 15 edges, 10 faces).

The 7-fold argument with respect to the Szilassi polyhedron above, can be explored further when 6 Szilassi polyhedra are linked into a circular "crown" via a Schatz linkage enabling the inversion of the ring, as illustrated separately (*Association of the Szilassi polyhedron*

with cube inversion; *Dynamics of discord anticipating the dynamics of concord*, 2018). Relevant to any such discussion, given the long-standing symbolic importance attached to a crown, is its potential cognitive implications (*Engaging with Globality through Cognitive Crowns -- 3rd Dimension: All-encompassing, well-rounded experience*, 2009).

There is a curious historical irony to the discoveries in Europe of an artefact from the Roman Empire. Known as a [Roman dodecahedron](#), its function in that civilization has not yet been determined. With 20 vertices, as the [geometric dual](#) of the icosahedron, its potential relevance to enabling comprehension of coherence is discussed separately (*Roman dodecahedron, Chinese puzzle balls and Rubik's Cube?*, 2018).

Aesthetic criterion: meaningful completeness and phi?

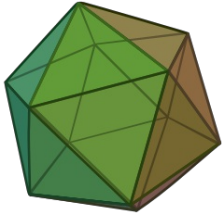
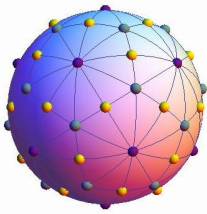
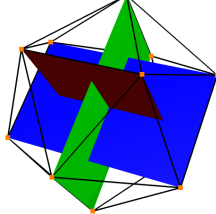
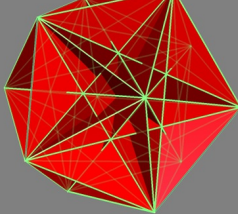
Completeness of sets through "magic numbers"? The focus here on 9-fold organization could of course be challenged as an arbitrary fad -- as with the proclivity for 12-fold and 20-fold organization. This emphasis is however consistent with the insights into information chunking in memory in what is recognized as the most cited paper in psychology ([George Miller, *The Magical Number Seven, Plus or Minus Two: some limits on our capacity for processing information*, *Psychological Review*, 63, 1956, 2](#)).

Chunking is used by the brain's short-term memory as a method for keeping groups of information accessible for easy recall. It functions and works best as labels that one is already familiar with. It could be argued that the viability of any political process involving a greater number of "chunks" (political parties, issues, etc) would be questionable, especially in engaging the general public. In a political process, bedevilled by short-termism, what role might chunking play in the collective memory of the European Parliament?

Given their purportedly fundamental significance for global governance, it could be asked why the UN's 8-fold [Millennium Development Goals](#) (2000) and the 17-fold [Sustainable Development Goals](#) (2015) have been configured in that way -- from both a systemic and a cognitive perspective. With similar aspirations, the separate [Millennium Project](#) has articulated a 15-fold set of [Global Challenges](#).

Following the 4-volume study by [Christopher Alexander \(*The Nature of Order: an essay on the art of building and the nature of the universe*, 2006\)](#), he produced a synopsis in the form of *The Fifteen Properties Are the Glue which Binds Wholeness Together*. These then pose the challenge of their relevance to psychosocial organization (*Comprehending Alexander's transformation principles within the psychosocial realm*, 2010). The 15-fold Global Challenges are discussed separately from that perspective (*From poster sessions to stellar futures via aesthetic visualizations*, 2015).

Golden ratio and golden rectangles? Of relevance to this argument is the geometrical configuration of these properties, given that there are 15 different [great circles](#) through the pairs of opposite edges of the icosahedron of 12 vertices. These are associated with 15 [golden rectangles](#) (*Geometrical configuration of Alexander's 15 transformations*, 2010). Through its relation to the [golden ratio](#), widely esteemed in design for its aesthetic proportions (and represented by the Greek letter *phi*), this suggests some understanding of why 12-foldness offers a sense of integrative "completeness" -- and is experienced as "working" in relation to 15-foldness. As discussed below, two of the lines of the enneagram structure form the sides of a golden rectangle.

Indication of why the 12-fold and 15-fold may be perceived as meaningfully complete (Reproduced from commentary in <i>Geometrical configuration of Alexander's 15 transformations</i> , 2010)			
Icosahedron	15 Great circles of icosahedron (click for dynamic variant)	Icosahedron showing single golden rectangle	Icosahedron showing all 15 golden rectangles
			
Reproduced from <i>Wikipedia</i>	Reproduced from <i>Wolfram Mathematica</i>	Produced with <i>Stella Polyhedron Navigator</i>	

As noted by Jackson (2019), Stafford Beer was actively interested in the relation between the enneagram structure and the mandala -- as one approach to coherent cognitive organization. This 9-fold constraint is a feature of a separate argument (*Concordian Mandala as a Symbolic Nexus: insights from dynamics of a pentagonal configuration of nonagons in 3D*, 2016; *Speculation on Potential Symbolic Relevance of the Concordian Mandala*, 2016).

There is the curious possibility that **what is experienced as a meaningful goal, in a well-formed global set of goals, may be somehow characterized by an appropriately proportioned relationship between four distinctive insights -- effectively constituting a golden rectangle**, whether in a 12-fold pattern, a 15-fold, or a 20-fold pattern of four such rectangles (see *Fifteen Great Circles on a Sphere, Wolfram Demonstration Project*).

Icosahedral dynamics and group consciousness: Through his insight into how a collectivity can be defined in icosahedral terms, as a formal articulation of what is experienced as *esprit de corps*, Stafford Beer develops the insight beyond conventional understandings of group consciousness through the protocols of an integration process:

Moreover, a syntegeation seeks something more than a set of 12 statements to which everyone has assented (perhaps with some reluctance). It seeks to create an integral statement that is more than a list of aphorisms or separable intentions... Then the

reverberation of ideas would be label for the humming and buzzing experienced over time by a static set of relationships made dynamic through the operation of protocols (*The Dynamics of Icosahedral Space [Beyond Dispute: the invention of team syntegrity]*, 1994, pp. 196-197)

He explores whether a closed dynamic pathway exists within the 12-fold pattern which would characterize such reverberation, noting that only the fraction of sevenths generates such a closed path -- exemplified by elements of the enneagram. With the icosahedron as the actual origin of the enneagram (as noted above), and with the latter being ubiquitously present therein, Beer points out:

Thus it comes about that points 4 and 5 on the enneagram refer to *any* side of the icosahedron -- which therefore enfolds 30 three-dimensional, four-planar, enneagrams... the icosahedral model conceived as a spinning sphere could be regarded as 'an interpenetration of phi-ness'. But phi is simply a one-dimensional length, even when used to demarcate the orthogonal configuration of three golden rectangles. That the spinning sphere is an interpenetration of three-dimensional enneagrams is... something else (Beer, 1994, p. 207)

Recalling the relevance of the 7-sided Szilassi polyhedron of toroidal form (above), Beer takes his argument further by reference to [Arthur Young](#) (*The Theory of Process*, 1991) who had pointed out that more than seven elements cannot be connected. Mathematically, seven triangles can be achieved from seven points, but the pattern splits with the addition of an eighth -- with implications for any structure based on eight principles. The two different circularities of the torus make it possible to have separateness and connectedness at the same time -- a point well-illustrated by the [mapping of seven colours on a torus](#).

Aspects of this argument have been developed further (Joseph Truss, A. Leonard, and Christine Cullen, *The Coherent Architecture of Team Syntegrity: from small to mega forms*, 2003; Joseph Truss, *The Enneagram in the Icosahedron and the Enneagrammatic "3D-Six" circuitry in the Team Syntegrity Icosahedron*, 2011).

Beer has advanced a stronger hypothesis regarding group consciousness:

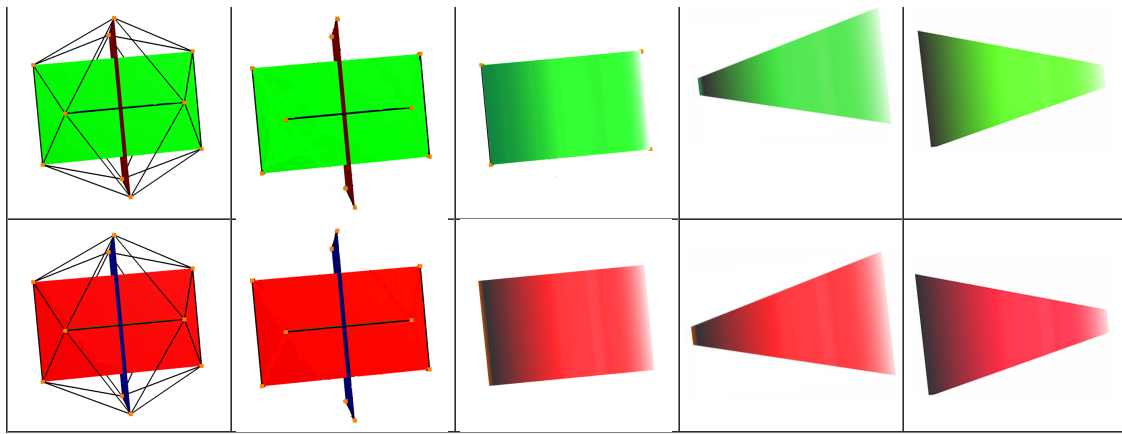
It is that there is such an entity as a *group* mind that operates at a different level from group consciousness as [conventionally] defined. It would operate, if it exists, as a self-conscious entity. The difficulty with this concept is that such a mind could not be independent of the mentation of the members of the group, but would transcend their individual abilities.... It is at least possible that the multiple enneagrammatic structure, reverberating as it does, provides a complex of linkages to constitute such a 'corporate brain' that would then give rise to its own consciousness... more competent than its component member consciousness, or even the group consciousness [conventionally] defined. (Beer, 1994, pp. 207-208)

Missing from such articulations of syntegrity is how the argument applies to distinctive political groups constituting a larger collectivity, as with the European Parliament. Even more challenging is its potential relevance to the set of major religions, as discussed by [Stephen Prothero](#) (*God Is Not One: the eight rival religions that run the world -- and why their differences matter*, 2010).

Questionable reduction of complexity: The animation of mutually orthogonal golden rectangles (above) can be used in an exercise in depicting how complexity may be progressively reduced in practice by selective perspectives on the interrelationships represented there. The red, green and blue rectangles can be taken as indicative of three contrasting political perspectives (which those colours may represent), or of three contrasting religions (as with the Abrahamic three-some Christianity, Islam and Judaism).

The first column (below left) indicates how each would then prefer to see the animation above, reducing "alternatives" to an ("irritating") trace within the contextual icosahedral framework -- each then to be understood as an aspiration in strategic terms to **full-spectrum dominance**. The second column eliminates that framework as superfluous -- with only traces of the inconvenient alternatives remaining (possibly as a means of claiming democratic diversity). The third suggests (having eliminated all trace of alternatives) how each might be characterized by variations, extending to the most radical (from the "heavy" to the "light"). The last two indicate how one or other extreme might be preferentially prioritized. These various options could then feature in an animation more reflective of the challenging reality of the political or religious contrasts as variously perceived -- with or without the contextual icosahedral framework. Inclusion of the last columns would then require that that framework be understood as topologically flexible (as in the [tensegrity](#) structures studied by Stafford Beer), rather than as rigid in ideal geometrical terms.

Progressive reduction in complexity of strategic worldview (left to right) (based on selective modification of animation of orthogonal rectangles above)				
Preferred perspective in context	No context; only traces of alternatives	Gradient between extremes	Prioritizing "light" extreme	Prioritizing "heavy" extreme



Sonification: There are many studies of the relationships between mathematics and music, some of which note the importance of the golden ratio in certain compositions. The remarkable aesthetic achievement of Beethoven's 9th Symphony has been studied in that light, especially since it was created when he was nearly deaf. **Sonification** is used to render patterns meaningful to the ear, when they are far less evident otherwise -- notably in fundamental physics projects funded by the EU. As yet to be explored is the extent to which sonification can complement the articulation of goals and strategic initiatives, as argued separately (*A Singable Earth Charter, EU Constitution or Global Ethic?* 2016).

Hemispheric organization of the "European Brain"?

The "Brain of Europe"? Given the inspiration offered by a global brain with respect to global governance and the future of artificial intelligence, it is appropriate to ask where and in what form the "Brain of Europe" is to be found. Is the hemicycle pattern of the European Parliament suggestive of its role in that respect? Is this a crude 2D approximation to what is recognized as the organization of the human brain into **cerebral hemispheres**?

It is curious that parliamentary democracies exploit some of the terminology associated with organization of the human brain. Thus a **bicameral legislature** divides the legislators into two separate assemblies, chambers, or houses. In the case of the brain, the term **bicameral mind** was coined as a radical hypothesis regarding psychological development by **Julian Jaynes** (*The Origin of Consciousness in the Breakdown of the Bicameral Mind*, 1976).

Jaynes uses **governmental bicameralism** as a metaphor to describe a mental state in which the experiences and memories of the right hemisphere of the brain are transmitted to the left hemisphere via auditory hallucinations. As a consequence of **lateralization of brain function** each half of the normal human brain is constantly communicating with the other through the **corpus callosum**. The metaphor is not meant to imply that the two halves of the bicameral brain were "cut off" from each other but that the bicameral mind was experienced as a different, non-conscious mental schema wherein volition in the face of novel stimuli was mediated through a linguistic control mechanism and experienced as auditory verbal hallucination.

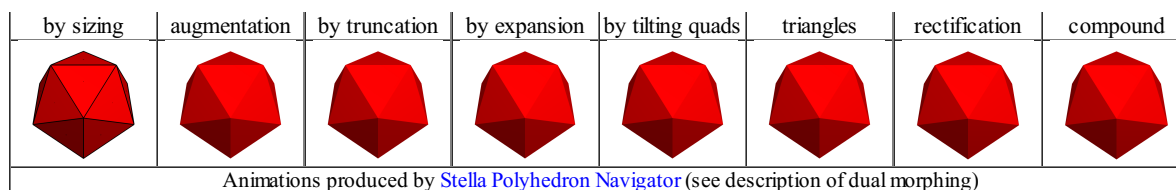
Prior to its "breakdown" in a past era, bicameral mentality would be non-conscious in its inability to reason and articulate about mental contents through meta-reflection, reacting without explicitly realizing and without the meta-reflective ability to give an account of *why* one did so. The hypothesis raises the provocative question as to whether bicameral legislatures are indicative of a state subsequent to the emergence of collective consciousness -- or prior to it, as might be inferred from the argument of **John Ralston Saul** (*The Unconscious Civilization*, 1995). From this perspective it is strange that the European Parliament is essentially unicameral -- unless its periodic alternation between the chambers in Brussels and Strasbourg can be effectively bicameral in dynamic terms. It could of course be argued that the **Council of the European Union**, the **European Council** and the **European Commission** constitute other legislative "chambers", making the European Union as a whole bicameral, tricameral or quadricameral.

Of some relevance to the psychological argument is the role of bicameral organization in enabling stereoscopic vision. If understood as unicameral, how such vision might be claimed of the European Parliament merits reflection, when metaphorically understood.

Somewhat ironically the European Commission funded a project of some relevance to the question of a global brain through its **INFO2000 program** from 1997-2000 (*Simulating a Global Brain: using networks of international organizations, world problems, strategies, and values*, 2001). In metaphoric terms, does an enneagram/icosahedron configuration offer clues to the "**corpus callosum**" of the European brain -- of relevance to its deeply problematic right/left divisions (*Corpus Callosum of the Global Brain? Locating the integrative function within the world wide web*, 2014).

Depiction of the enneagram: Various efforts have been made to depict the enneagram in 3D -- readily available on *You Tube* (Francisco Meana, *Enneagram from 3D perspective*, 2007; Francisco Meana, *Sufi Enneagram*, 2009; Chuck Middaugh, *3D Enneagram MOD 9*, 2013). The degree of relationship to the icosahedron is not especially evident.

Beer provided no depiction, but this is offered in subsequent documents (Joseph Truss, A. Leonard, et al, *The Coherent Architecture of Team Syntegrity: from small to mega forms*, 2003; J. Baldwin, *BuckyWorks: Buckminster Fuller's Ideas for Today*, 1996, p. 220). The Beer/Truss argument is also discussed by Andrew Pickering (*The Cybernetic Brain: sketches of another future*, 2010). Since those promoting syntegrity are especially sensitive to copyright issues, a different depiction is offered in the following generated with virtual reality software. The relevance of syntegrity to management is indicated by a study by other studies (Allenna Leonard, *Team Syntegrity: a New Methodology for Group Work*, *European Management Journal*, 14, 1996, 4; A. Espinosa and R. Harden, *Team Syntegrity and Democratic Group Decision Making: theory and practice*, *The Journal of the Operational Research Society*, 58, 2007, 8).



Transposition of key? In the auditory mode of sonification, such seemingly unusual transitions, are familiar to the ear through [transposition of musical key](#). Would shifts in perspective regarding the strategies of the European Parliament be more readily accepted when illustrated by musical means?

Visualization of enneagram in 3D and its icosahedral embedding

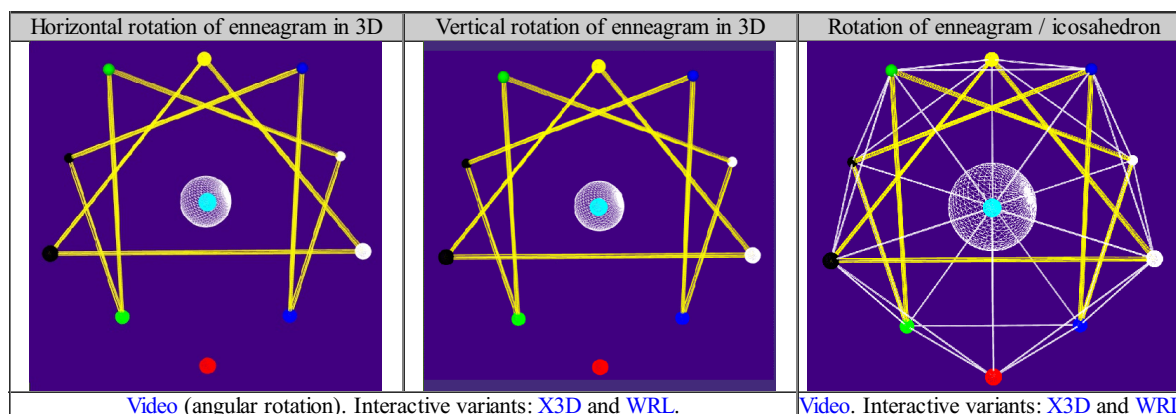
As noted above, the following animations of virtual reality models are a further development of those presented in the previous exercise (*Imagining the nature of cognitive "flight" in terms of the enneagram*, 2014). Here, however, the argument is that the 9 political groupings of the European Parliament (plus-or-minus 1) could be associated with the 9 coloured vertices of the enneagram. As embedded in the 12-vertex icosahedron, three vertices do not form part of the enneagram pattern as presented. However Beer noted the possibility of embedding multiple enneagrams in a single icosahedron -- one centered on each of its 12 vertices. Brief mention is made of resonance between such positions, recalling the structural integrity provided by a so-called [resonance hybrid](#) in organic molecules -- clearly a valuable metaphor for exploration of variable geometry (*Operational insight sets as resonance hybrids?* 2018) .

With the 12-fold pattern seemingly fundamental both to the EU symbolism and its global strategic engagement -- as indicated by the aforementioned *12-Point EU Action Plan to support the Millennium Development Goals* (2010) -- **how is the association of the 9-fold pattern of political groupings to be explored in relation to such a 12-fold configuration?**

It is appropriate to note that the focus of Beer's work with respect to disputing groups was on the 12-fold icosahedron, through what became known as the [Syntegration™](#) process (Gunter Nittbaur, *Stafford Beer's Syntegration as a Renaissance of the Ancient Greek Agora in Present-day Organizations*, *Journal of Universal Knowledge Management*, 2005). Most unfortunately further exploration of this process has become constrained by copyright and licensing restrictions, although there is a [metaphorum community](#) on [Syntegration](#) endeavouring to further Beer's initiative,

Presented as simple [gif animations](#) in 2D, the following suffer from technical inadequacies, most notably the jerkiness which is absent from manipulation of the models in 3D with virtual reality software. Presented as videos, they tend to be excessively heavy. As such they are therefore simply an indication of the points made in this argument -- enabling a degree of comprehension of the three-dimensionality implied by the reconciliation of the 9-fold and 12-fold patterns -- both its complexity and its coherence.

The central white sphere is merely included as a visual convenience and to suggest the integrity of the whole. It could have been displayed as a relatively transparent circumsphere for similar reasons.



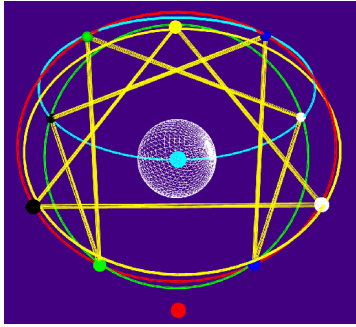
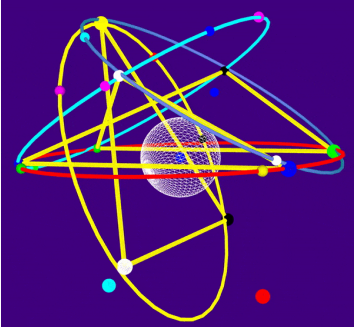
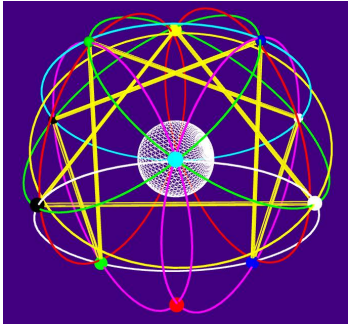
It should be stressed that those primarily interested in the enneagram, as used in business as a coaching and leadership development tool, have typically taken little account of Stafford Beer's recognition of the potential significance of its embedding within an icosahedron. Similarly those exploring Beer's syntegrity work, organized in terms of the icosahedron, have taken little account of the potential significance of the enneagram embedded within it. No reference was made to the enneagram in the use of Beer's icosahedral insights in the analysis of the UN's Earth Summit (*Configuring Globally and Contending Locally: shaping the global network of local bargains by decoding and mapping Earth Summit inter-sectoral issues*, 1992).

Musical renderings of the enneagram: A number of efforts to associate styles of music with features of the enneagram are available. Given the importance of Beethoven to representation of the values of the European Union, it is appropriate to note that one such initiative identifies the distinctive enneagram types in his piano concertos ([Elizabeth Wagele](#), *The Beethoven Enneagram*).

Modelling communication dynamics among EU political groupings?

The conventional depiction of the planar hexagram in 2D has it embedded in a circle, with the whole then constituting the enneagram as a symbol. Following the arguments of Stafford Beer, there is a case for exploring the selective addition of circles to the models above. Beer stressed his surprise in discovering that the enneagram in 3D was a **pattern in 4 distinct planes**.

There is therefore case for treating each such plane (relating a subset of points) as associated with a distinct circle through the points in question. The result is presented as the animation on the left below. There it is apparent that three of the circles offer the appearance of a "band" around the enneagram seen -- but from one perspective only. The fourth circle, completely absent from the conventional 2D representation, is of distinctive orientation (namely that of cyan colour).

Rotation of enneagram in 3D with planar circles	Enneagram in 3D with circulating spheres on circles	Enneagram in 3D with all circles (icosa)
		
Video. Interactive variants: X3D and WRL .	Video. Interactive variants: X3D and WRL .	Video. Interactive (w/o icosa): X3D and WRL . Video. Interactive (with icosa): X3D and WRL .

The question is how to use such models to offer comprehensible indications of possible communication patterns between the 9 political groupings -- within a coherent framework. One approach is to move spheres along the pathways of the enneagram, whether its straight or curved portions. This is suggested by the animation on the right above. Clearly such spheres are suggestive of specific communications which complexification of the model could enhance in various ways (rate of movement, phasing, colouring of spheres, bidirectionality, etc).

A cyclic pattern of communications is valuable in shifting the focus beyond the the binary "two-stroke" approach to groups which in practice have barely disguised distaste for each others perspective -- even extending to demonisation, manipulative exclusion, shunning, and the like (as discussed below). This as may be speculatively explored (*Destabilizing Multipolar Society through Binary Decision-making: alternatives to "2-stroke democracy" suggested by 4-sided ball games*, 2016).

Enabling the strategic "flight capacity" of the European Parliament?

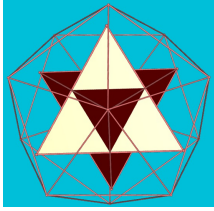
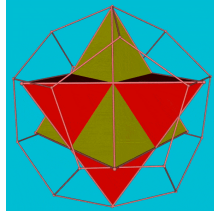
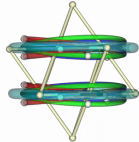
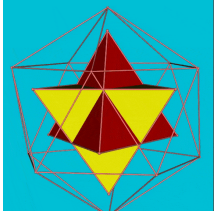
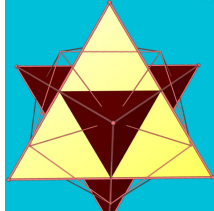
Through metaphor, reference is frequently made to ensuring the capacity of strategic initiatives to "get off the ground" and to "fly" -- even to "soar like an eagle" (especially when "surrounded by turkeys"). Clearly the metaphor can be confused with any strategic proclivity to "flee" -- as is so frequently evident nationally and globally.

Given the inspiration of [biomimetics](#) for the development of flight, the models above invite further exploration in terms of technomimicry (*Engendering a Psychopter through Biomimicry and Technomimicry: insights from the process of helicopter development*, 2011). This followed from the reflections of [Arthur Young](#), developer of the Bell helicopter (*The Geometry of Meaning*, 1976; *The Bell Notes: a journey from physics to metaphysics*, 1979). In relation to the circles circumscribing the enneagram above in 3D, it could be asked -- speculatively -- whether these could each be understood in terms of rotary motion of propellers -- as with a helicopter (*Necessary cognitive twist: star symbols as bladed propellers -- for propulsion in 3D?* 2018; *Direction of propulsion in a global context -- as enabled by configuration of symbolic stars*, 2018).

The possibility of equivalent animations has been explored -- again speculatively -- with respect to the traditional structure of the Merkaba, understood as a [stellated octahedron](#) (*Framing Global Transformation through the Polyhedral Merkabah: neglected implicit cognitive cycles in viable complex systems*, 2017). That structure is notably a focus of a Biblical vision (*Book of Ezekiel, chapter 1*) -- inspiring so-called [Merkabah mysticism](#) (or Chariot mysticism). Over centuries the symbolism of the Merkabah has attracted speculative reflection, most notably by mystics in all the Abrahamic religions sharing the insight it offers into the so-called "Chariot of God", as described by [Ezekiel](#). In that sense it merits recognition as potentially the only fundamental symbol reflective of the unexplored commonality of those eternally quarrelling religions. Ironically appropriate for the times, the main [battle tank of the Israel Defense Forces](#) has borne that name since the 1970s.

The previous experimental modelling of the Merkabah is specifically discussed separately, with animations and screen shots (*Cognitive implication in Merkabah as configuration of cycles essential to systemic viability*, 2017). One result (central image below) is indicative of animation techniques to be explored with respect to the enneagram/icosaedron configuration. The other images frame the stellated octahedron rotated within the dodecahedron or the icosahedron -- with whose 12-foldness it then variously "connects".

Animation of stellated octahedron (12 vertices, 12 edges, 8 faces)				
Framed by dodecahedron (alternative view)	Framed by dodecahedron (animation)	Framed and enhanced by spheres rotating in toroidal cycles	Framed by icosahedron (animation)	Framed by icosahedron (enlarged)

				
Video: MP4 . Interactive variant: X3D Produced using Stella Polyhedron Navigator		Interactive variants: X3D and WRL Videos: triangular view , side view or vertical view	Video: MP4 . Interactive variant: X3D Produced using Stella Polyhedron Navigator	

Irrespective of secular deprecation of the mystical interpretations of the configuration, of particular interest is the sense in which it offers a way of exploring the unquestioned symbolic value attached by Europe to the 12 stars of the Flag of Europe. With its 12 edges it offers a means of considering the systemic coherence of what is held to be significant, problematically or otherwise, in the 12 [Tribes of Israel](#) - a tribal configuration, however named, common to the Abrahamic religions. It is of course these, through the absence of insights into their reconciliation, which are the primary drivers of conflict at this time. This suggests the value of exercises such as the [Generic Reframing of the 12 Tribes of "Israel"](#) (2009), or even more generally ([Mathematical Theology -- Future Science of Confidence in Belief: self-reflexive global reframing to enable faith-based governance](#), 2011).

Following the insights of George Miller into memory chunking (noted above), of particular interest is the manner in which this effects comprehension of any 12-fold organization in practice ([Eliciting a 12-fold Pattern of Generic Operational Insights: recognition of memory constraints on collective strategic comprehension](#), 2011; [Comprehension of Numbers Challenging Global Civilization](#), 2014).

Strategic "vehicle" of the European Parliament in communication and cognitive terms?

So framed, it might then be asked what form the strategic "vehicle" of the European Parliament might take -- if it is to be "flight enabled". The Merkabha as a "chariot of light" has been described as a four-wheeled vehicle driven by four *hayyot* ("living creatures"), each of which has four wings, and the four faces of a man, lion, ox, and eagle (or vulture). There are numerous [Talmudic](#) interdictions (widely respected) concerning merkabah speculation. The vehicle metaphor is discussed separately ([Embodying a navigable cognitive vehicle; Organizing, starting and driving a cognitive vehicle](#), 2014).

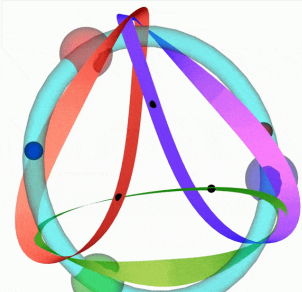
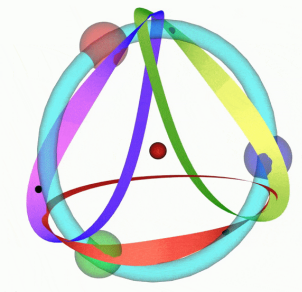
As a metaphor, "chariot of light" can be understood as some form of "communication vehicle", as could be readily recognized in relation to the need to navigate through cyberspace, "[knowledge space](#)", and "[communication space](#)" -- even insight spaces ([Transforming Static Websites into Mobile "Wizdomes": enabling change through intertwining dynamic and configurative metaphors](#), 2007) .

"Wings": The wing metaphor is especially intriguing given its extensive use in relation to the right and left [wing spectrum in politics](#), notably given the challenge of extremism ([Coordination of Wing Deployment and Folding in Politics: bird flight and landing as complementary metaphors of global strategic coherence](#), 2018; [Counteracting Extremes Enabling Normal Flying: insights for global governance from birds on the wing and the dodo](#), 2015). Discussion of the enneagram, as conventionally depicted in 2D, also makes use of the [wing metaphor](#).

The four cycles associated with the planar structures of the enneagram in 3D could then be understood as offering a sense of their operation as "wheels" of a kind -- or propellers distinctively oriented to enable 3D flight. It is perhaps appropriately amusing that the degrees of resemblance to the throne-like structure of the enneagram in 3D suggests that the configuration of propellers around it is reminiscent of the rapidly evolving design and operation of some forms of [ultra-light vehicle \(microlights\)](#) -- powered glider, [powered paraglider](#), [ultralight trike](#), or [backpack helicopter](#). Ezekiel's visions could then be understood as being of an "ultra-light throne".

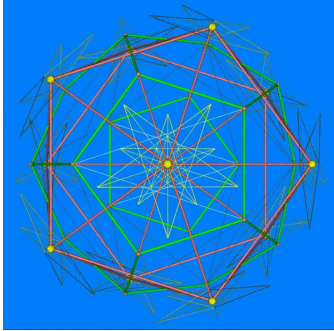
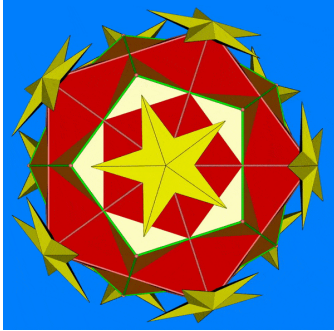
"Propellers": With respect to possible propeller design, considerations include how many blades and how they might be appropriately twisted along their length. A previous exercise considered aspects of this problem using a [Möbius strip \(Psychosocial Transformation by "Pill Pushing"? Model-making, strategic advocacy and the myth of the "red pill"](#), 2017) . The twist of that strip could be understood as a valuable indication of the cognitive challenge of empowering any strategic vehicle -- especially metaphorical recognition of some sense of "cutting edge" and "lift". That exercise focused on the problematic challenge of a trinity of associations (a [trilemma](#)) rather what could be more appropriate for a propeller blade linking two conditions (a [dilemma](#)). However the design elements are somewhat consistent with a possible design for a "propeller-driven ultra-light throne" as a vehicle.

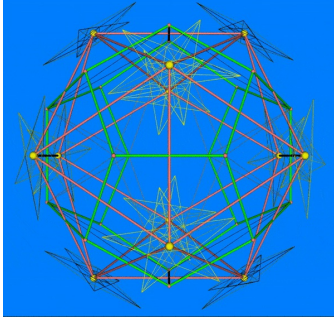
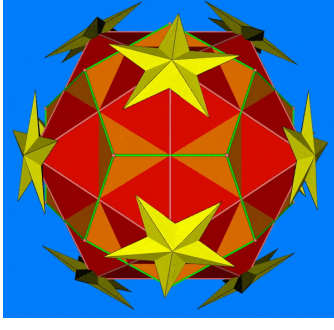
Animation extracts of movement of spheres through torus and over 3 Möbius strips (reproduced as variants of those from Visualization in 3D of a trinity of connotations as a cognitive pill)		
Circulation of spheres on Möbius strips		Slow rotation in "propeller" mode
	In this exercise, red and blue spheres circulate through the torus to echo the dilemmas associated with the iconic "red pill" and "blue pill".	
	3 smaller spheres travel around the Möbius strips in a "hesitant" zig-zag motion across each strip. This is usefully reminiscent of learning and decision-making under conditions of complexity.	

 <p>Video MP4. Interactive variants: X3D or WRL</p>	<p>With the "red pill" and the "blue pill" appropriately reminiscent of the conventional political extremes, inclusion of a third "green pill" is an appropriate indication of the environmental alternative variously promoted.</p> <p>Rotation on right can be made much faster, consistent with any function as a "propeller" ["very fast" video ***]</p>	 <p>Video MP4. Interactive variants: X3D or WRL</p>
---	--	---

Navigating Europe's 12 "dimensional space": 12 rotating stars on icosahedron as "propellers"?

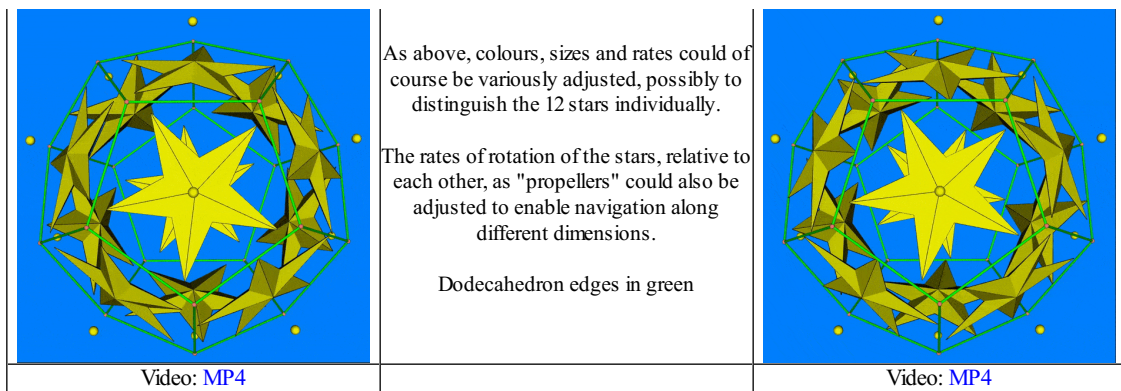
On the speculative assumption that the 12 stars of the Flag of Europe are somehow related to distinctive value dimensions, there would then be the question how these might be positioned around the icosahedral framework of the enneagram -- in order to provide propulsion along each dimension. Some idea of this possibility is offered by the following. The model was derived by importing a compound of the icosahedron (12 vertices) with its dual, the dodecahedron (12 faces), from [Stella Polyhedron Navigator](#) into an X3D format. The stars were similarly derived from the Stella application by combining pentagonal pyramids. For this exercise, the later were used because of their similarity to those on the Flag of Europe -- rather than a form of "propeller" based on the Möbius strip (as explored above with its distinctive advantages).

View of 12 stars rotating on 12 icosahedral vertices -- offering perspectives on dodecahedron		
Wireframe rendering	Options	Solid rendering
 <p>Video: MP4</p>	<p>Colours, sizes and rates could of course be variously adjusted, possibly to distinguish the 12 stars individually.</p> <p>The rates of rotation of the stars, relative to each other, as "propellers" could also be adjusted to enable navigation along different dimensions.</p> <p>The proximity of each star to the centre could also be adjusted, possibly sinking into the structure or emerging from it, or rendered transparent to some degree.</p> <p>This perspective is useful in highlighting the relation of each star to the icosahedral vertex, namely at the centre of a dodecahedral face (outlined in green on left and right)</p>	 <p>Video: MP4</p>

View of 12 stars rotating on 12 icosahedral vertices -- offering an alternative perspective on dodecahedral pattern		
Wireframe rendering	Options	Solid rendering
 <p>Video: MP4</p>	<p>As above, colours, sizes and rates could of course be variously adjusted, possibly to distinguish the 12 stars individually.</p> <p>The rates of rotation of the stars, relative to each other, as "propellers" could also be adjusted to enable navigation along different dimensions.</p> <p>The proximity of each star to the centre could also be adjusted, possibly sinking into the structure or emerging from it, or rendered transparent to some degree.</p> <p>This perspective is useful in offering a sense of the relation between the 12 dodecahedral faces, outlined in green (on left and right)</p>	 <p>Video: MP4</p>

In the variants below the height of the stars has been reduced from the level of vertices of the icosahedron (edges rendered invisible) down to the surface of the dodecahedron faces.

View of 12 stars rotating within 12 dodecahedral faces		
Slower	Options	Faster

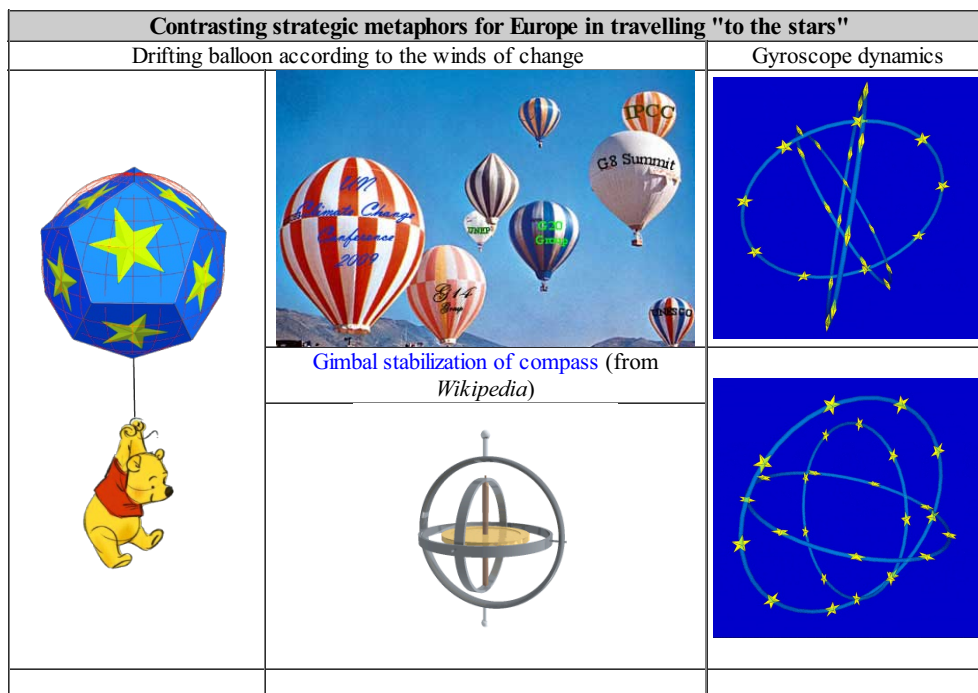


European futures: strategic drift versus multidimensional paradigm shift?

Balloons versus Gyroscopes? The dodecahedral configuration of the 12 stars of the Flag of Europe could be understood as taking the form of a balloon. Europe could understand its future -- going to the stars -- as ensured by a rising balloon, appropriately illustrated by the classic image of the complacently optimistic Winnie-the-Pooh. Such a balloon could drift according the winds of change as with other strategic balloons, as previously argued (*Globallooning -- Strategic Inflation of Expectations and Inconsequential Drift Global*, 2009).

The implicit challenge of the Pooh Bear image is of course the vulnerability of a balloon, as can be otherwise argued (*Pricking the Bubble of Global Complacent Complicity: hyperdimensional insights from the physics of bubble blowing, bursting and collapse?* 2017). The iconic bear can however be engaged otherwise (*Enrolling Winnie-the-Pooh's Companions in Climate Change Discourse*, 2009).

The balloon metaphor can be contrasted with that of the gyroscope, as indicative of complex dynamics through which stability is achieved under unstable conditions -- using a gimbal configuration, as shown below and discussed separately (*Gyroscopes for balance in higher dimensional navigation*, 2018). The quest for sustainability could be usefully explored through the design of strategic gyroscopes and gimbals (*Gyroscopes for balance in higher dimensional navigation*, 2018).



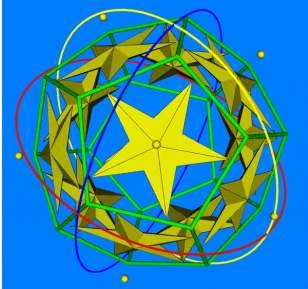


Imagining navigation portals -- as strategic windows of opportunity: In the effort to enhance the "optics" of the European Parliament (at least in the eyes of Europeans), a case can be made for exploring the strategic implications of *Portals for intercourse with an imagined reality* (2016). There it was noted that through science fiction and fantasy the collective imagination has cultivated the sense of a *portal* -- now variously rendered ever more fascinatingly attractive (if not hypnotic) through special effects. This is understood to be a technological or magical doorway that connects two distant locations separated by spacetime. It usually consists of two or more gateways, with an object entering one gateway leaving via the other instantaneously.

Such a framing engages the sense of humanity travelling "to the stars" and "between the stars" -- a dynamic completely absent from the imaginative associations to the stars of the Flag of Europe. Unfortunately it could be said that the popular imagination has already travelled "light years" beyond that of conventional institutional thinking -- despite the purported official importance attached to the future governance of artificial intelligence (a theme of the [2019 G20 gathering in Osaka](#)). Governance has yet to "catch up" with imagination.

One example is the *stargate* of the TV series (the theme of the *Stargate Wiki*; notably evoking the creativity of artists such as Silvia Hartmann, *Stargate Symbols*). Another is that of the imaginative mechanism presented in the iconic movie *Contact* (1997), as shown below -- imagined in the light of a science fiction novel by astrophysicist [Carl Sagan](#) (*Contact*, 1985). A suggestive animation of 3

mutually rotating circles, within which the icosahedron/dodecahedron is embedded, is presented for comparison (below right). The icosahedron is rendered transparent except for the vertices.

Contact movie (1997): associated imagery		European "Contact" analogue?
"The Machine" (animation)	Shoulder patch (distributed by SciFi Geeks)	Animation of gimbal/gyroscope dynamics around 12 stars in dodecahedral configuration
		

As described by John DeNardo ([Portals in Science Fiction and Fantasy](#), *Kirkus Reviews*, 20 November 2013):

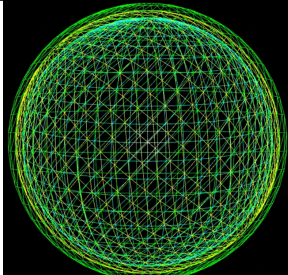
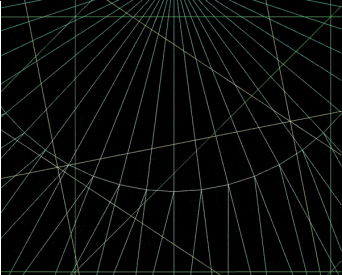
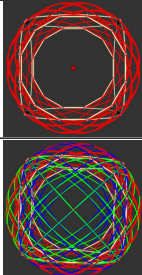
The most obvious definition of portals -- doorways to other places -- is too simplistic to convey the true nature of them. Sometimes those places are real, but far away. Sometimes they are fantasy worlds that shouldn't exist but do. Sometimes they are physical, sometimes metaphorical, mere plot devices to advance the story. They could take many forms, from holes in the ground, to mirrors, to large constructs big enough to fly a starship through. Sometimes they aren't about traveling distance at all, but instead are about traveling through time.

Although the gimbal-based structure achieved renown in a science fiction movie in 1997, it has continued to be developed for astronaut training ([Aerotrim](#); [Orbotron](#), *YouTube*; [Orbotron](#)) and recreation ([Astro Orbitron](#); [Human gyroscope](#), *YouTube*; [Guide to human gyroscope rides](#)). It offers a means of challenging the sense of coordination in unusually disorienting circumstances. This suggests the value of a cognitive analogue for strategic decision-makers in institutions faced with a turbulent future.

Imagining a perspectival framework in multidimensional space: With respect to the speculative references above suggesting that the enneagram in 3D bore some resemblance to an "ultra-light throne", the seated versions of those gimbal-based structures are indicative of the variety of positions of the enneagram within an icosahedral framework -- imagined in terms of resonance by Stafford Beer, and as they might relate to the golden rectangle element of that figure. Whether for an astronaut or a "noonaut", the changing windows on externality from within the gimbal framework are a fundamental challenge to the "governor" of the vehicle -- as for the president of the European Parliament.

There are several approaches to imagining this. As an alternative to 2-dimensionality of the financial spreadsheet through which governance is most typically managed, there is a case for exploring a possibility more relevant to a global environment ([Spherical Accounting: using geometry to embody developmental integrity](#), 2004). Another approach is to generalize the movement of the 3 mutually orthogonal great circles (shown above) into nested spheres in mutually orthogonal rotation (as illustrated in the left hand image below). The question would then be how the dynamics of the spherical gridwork would then reframe the perception of a governor seated within. This is suggested by the central animation below.

A third option follows from the continuing enthusiasm for 12-fold configurations of "round tables" -- currently evident in jury size, gatherings of experts, or in "round tables of the wise", recognized as indicative of requisite variety, most notably inspired by the legend Arthurian [Knights of the Round Table](#) and by the [Last Supper](#). The possibility indicated below right derive from a separate argument ([Embedding twelve-fold in appropriately encircled polyhedra](#), 2017).

Comprehension of strategic options in multidimensional space		
Animation of 3 concentrically nested spheres, rotating orthogonally in 3D	Dodecagonal round table in 3D	
External view (animation)	View from origin	Indication of great circles between seats
		

Of relevance to comprehension of the "simplest" case, namely the mutual rotation of 3 great circles, of particular interest is the remarkable articulation by [Dante Alighieri](#) with respect to the three rings (*tre giri*) of the Holy Trinity in *Paradiso* 33 of the *Divine*

Comedy (Arielle Saiber and Aba Mbirika, *The Three Girs of Paradiso XXXIII*, *Dante Studies*, 131, 2013, pp. 237-272). The rings are discussed separately in terms of interlocking **Borromean rings** (*Borromean challenge to comprehension of any trinity?*, 2018; *Comprehension of Unity as a Paradoxical Dynamic: metaphors reframing problematic engagement with otherness*, 2019; *Imagining a mnemonic device of requisite higher dimensionality*, 2019).

Dysfunctionally divisive political discourse and tendency to demonisation

Strategic preoccupation with "evil"? The future may well consider remarkable the extent of divisive political discourse, notably between the political groupings within institutions such as the European Parliament -- readily recognized as detesting each other, often to an incredible degree. More problematic is the manner in which those in opposition and disagreement become qualified as enemies, if not traitors, as in the authoritative statement: *You're either with us, or against us*. So framed, this may then be considered appropriate justification for their elimination (*Eradication as the Strategic Final Solution of the 21st Century?* 2014). The dynamics in relation to populism and the far-right in Europe offer extensive examples of this, each endeavouring to marginalize the other.

Even more remarkable is the extent to which leaders repeatedly claim their opponents to be "evil" (*Existence of evil as authoritatively claimed to be an overriding strategic concern*, 2016). Seen as a means of framing the special bond between the USA and the UK, most recently opposition to "evil" featured in the historic formal address by Donald Trump to the Queen at a state banquet: *Our fight is against evil and for a world in which goodness and honour may be the foundation of the life of men in every land* (*Trump state banquet: The Queen and Donald Trump's speeches*, *Express*, 3 June 2019).

The British Empire has been variously accused of being evil (Steven A. Grasse, *The Evil Empire: 101 Ways that England ruined the world*, 2007; *Was the British empire evil?* *Quora*, 2017). Given the continuing violence between Hindus and Muslims in India and Pakistan, and the **current deprecation of Gandhi within India** by its ruling party, how are Gandhi's remarks on "evil" with regard to British authorities to be interpreted now:

In my opinion, non-co-operation with evil is as much a duty as is co-operation with good. But in the past, non-co-operation has been deliberately expressed in violence to the evil-doer....The only course open to you, the Judge and the assessors, is either to resign your posts and thus dissociate yourselves from evil, if you feel that the law you are called upon to administer is an evil, and that in reality I am innocent, or to inflict on me the severest penalty, if you believe that the system and the law you are assisting to administer are good for the people of this country, and that my activity is, therefore, injurious to the common weal (*Statement In The Great Trial of 1922, Some Famous Speeches: Selected Works of Mahatma Gandhi, The Voice of Truth*, Vol. VI, Part-I, p.14-24)

Given the leadership that the USA and the UK seek to offer to the world, most notably via the sciences, it is curious that no effort whatsoever is made to process discord otherwise -- in the celebration of their bond. Is the only recourse to a nebulous notion which has been the problematic preoccupation of religions over centuries in their quest to eliminate the various manifestations of witchcraft and the manifestations of the works of Satan? Can the thinking and discourse deployed in the global **War on Terror** be only too readily recognized as the 21st Century variant of the "War on Witchcraft" -- with its enthusiasm for various forms of Inquisition, guided by the *Malleus Malificarum* (1487)?

Positive vs Negative? An even more evident variant of this trend is through the distinction widely made between the "positive" and the "negative" -- otherwise understood as being between "us" (emblematic of "goodness and honour", as declared by Donald Trump) and "them" (*Us and Them: relating to challenging others patterns in the shadow dance between "good" and "evil"*, 2009). This unquestionable framing of "positive" is a feature of the analysis of **Barbara Ehrenreich** (*Smile Or Die: how positive thinking fooled America and the world*, 2010). As yet to be addressed in these strange times are the fruitful possibilities of interrelating positive and negative (*Being Positive Avoiding Negativity: management challenge of positive vs negative*, 2005).

Curiously the visit of Donald Trump to Europe, on the occasion of the 75th D-Day celebrations, helps to emphasize the sense in which even then there was a high degree of antipathy and disagreement between those acting together against the Nazi regime -- echoed on this occasion by the absence of a representative of Russia and significant cooling of relations between Trump and Macron (having previously celebrated their friendship only months ago), recalling that between Dwight Eisenhower and Charles de Gaulle. The nastiness which characterize this politics of divisiveness was rendered explicit in the assertion by Trump that the leader of the UK opposition, Jeremy Corbyn, was a "negative force" (*Donald Trump refused to meet 'negative' Jeremy Corbyn*, *POLITICO*, 4 June 2019; *Trump is spreading hate and division, Corbyn tells protesters*, *The Guardian*, 4 June 2019). More than ironic, the US interference in UK politics -- to the point of endorsing a candidate for Prime Minister -- cannot be compared to the evil intervention of Russia in US politics.

Strangely neither science, nor religion nor philosophy offers any way of thinking otherwise about such primitive naivety -- so potentially unfruitful in a time of global crisis. The challenge can be discussed as one of *Reconciling "positive" and "negative" operational insights* (2018)

Dynamic reframing of discourse polarization: clues from generation and use of electricity?

Having indulged so widely in the metaphorical distinction between positive and negative, there is a strong case for exploring that framework for clues as to how their relationship could be employed more fruitfully. Guidance in this respect is to be found in the thinking and inventions of a person instrumental in the development of electrical technology, namely **Nikola Tesla** (1856-1943). His renowned ability to handle very high voltages safely is an indication of the quality of thinking required to handle the strong positive and negative "charges" which characterize political discourse at the present time -- especially given the apparently total absence of insights in

that regard. This contrasts with the typical current response, best framed metaphorically in terms of "neutralization" and "insulation" -- as evident in the political approach to those at the opposite end of the political spectrum.

Over a period in which the development of flight has been inspired by biomimicry, as noted above, there is a case for exploring the manner in which developing more creative means to handle divisive discourse could be inspired by technomimicry. Rather than the argument above with respect to helicopter development, the question is whether there are patterns to the thinking in the handling of positive and negative electrical charges which are suggestive of ways of developing cognitive and behavioural "technologies" to handle manifestations of "positive" and "negative" in discourse (*Electrical Systems as a Guiding Metaphor for Stages of Group Dialogue*, 2001; *Modulating Cognitive transformations: electrical metaphors and semiconduction*, 2012).

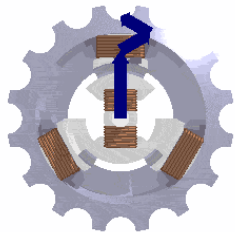
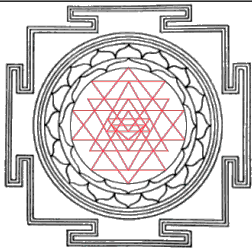
This argument has been developed separately (*Reimagining Tesla's Creativity through Technomimicry: psychosocial empowerment by imagining charged conditions otherwise*, 2014). This considers the following:

<p>Fulsome appreciation of the problem-filled life of an eccentric genius</p> <p>Creative insight into handling duality</p> <p>Progressive engagement of the gifted with reality</p> <p>Visual thinking as indicated by Tesla and by consideration thereof</p> <p>Psychosocial relevance of Tesla's creative process</p> <p>Imagining a method for adapting Tesla's insights to a psychosocial context</p> <p>Detecting a meta-pattern of connectivity amongst Tesla's insights</p>	<p>Patterns of patterns: towards dynamic integrative mapping of inventions</p> <p>Potential implications of alternation and rotation in psychosocial fields</p> <p>Insight into global dynamics through Tesla's focus on the sphere</p> <p>Psychosocial insights from the electrical War of Currents -- AC versus DC</p> <p>Tesla as an extraordinarily instructive experimental failure</p> <p>Encycling positive and negative for future sustainability</p>
---	---

Especially relevant there is the section on *Potential implications of alternation and rotation in psychosocial fields*, from which the following animations are reproduced. That on the left illustrates the operation of a **polyphase system** is a means of **distributing alternating-current electrical power**. Polyphase systems have three or more energized electrical conductors carrying alternating currents with a definite time offset between the voltage waves in each conductor. Such systems are considered particularly useful for transmitting power to **electric motors**. **Three-phase electric power**, as illustrated, is a common method of alternating-current electric power generation, transmission, and distribution.

The rotations of the stellated octahedron (above) within the dodecahedron and icosahedron are suggestive of how connectivity is established and broken.

The animation on the right below is an adaptation of the **Sri Yantra** of the Shri Vidya school of Hindu tantra. The central part is formed of nine interlocking triangles that surround and radiate out from the central point. As being suggestive of cognitive "wiring", the set of triangles is rotated through three positions at the same rate as that of the animation on the left.

Potential correspondences between electrical and cognitive cycles?	
<p>Magnetic field and vectors from 3-phase coils (animation reproduced from <i>Wikipedia</i>)</p>	<p>Experimental 3-phase animation of classic Sri Yantra (core "wiring" configuration passes through 3 phases)</p>
	

Circulation and recycling: The argument was further developed in *Representation of Creative Processes through Dynamics in Three Dimensions: global insight from spherical reframing of mandalas, the zodiac and the enneagram* (2014). The question is how a variety of widely familiar clues can be "mined" for relevance to reframing the psychosocial processes of global governance -- readily characterized as a vehicle endeavouring desperately to operate on "square wheels" (*Reframing the Square Wheels of Global Governance: transcending vain hopes of squaring the circle in global decision-making*, 2017). Missing is adaptation of insights from electrical metaphors into generation and empowerment, as suggested there (*Central pattern generators and higher order values?* 2017).

Whereas there is a degree of clarity on circulation of water, air, money and electricity -- and knowledge to some extent -- somehow the adaptation of that thinking to the circulation of values has not been developed. The collapse of discourse into simplistic charges of reprehensible "negativity" (to be rejected at all costs), in comparison with the "positive" (to be cultivated at all costs), is a consequence. This is usefully compared to the destructive discharges characteristic of accumulation of **static electricity**. The question to be asked is "what needs to circulate" and how is that to be comprehended and enabled (*Circulation of the Light: essential metaphor of global sustainability?* 2010). The failure in that regard is central to the environmental crisis -- the massive accumulation of waste and the desperate efforts at recycling. Missing are the insights into what might be termed "encycling" (*Encycling Problematic Wickedness for Potential Humanity*, 2014).

Connectivity, relevance -- disagreement and irrelevance: There is fairly precise recognition of connectivity, associated with a sense

of coherence and relevance. Difficulties clearly emerge through recognition of difference, especially when it implies disagreement with an alternative perspective. This may be framed as incompatibility, notably when it constitutes a challenge and cannot be ignored. Future strategic viability may however be threatened if the alternative perspective is treated as irrelevant, whether or not it can be effectively isolated (if not eliminated).

Curiously these degrees of connectivity and isolation are readily understood as vital to the operation of an electrical system in which they are characteristic of the design of specialized elements. Arguably the viability of an ecosystem involving a multiplicity of species can also be understood as implying different degrees of connectivity and separation (proximity -- phased over time, as with the dynamics of an electrical system).

Framed in this way, the question can then be asked how this could be understood to apply to a psychosocial system. Rather than focusing on the problematic nature of difference, disagreement and irrelevance, the issue is then "where" any other is located and "when" contact may be systemically feasible and appropriate. In order that all can be recognized as "singing from the same hymn sheet" (as suggested by the Anthem of Europe?). To that end, there is currently an increasingly desperate quest for "consensus", and appeals for "tolerance" of alternative perspectives (*The Consensus Delusion: mysterious attractor undermining global civilization as currently imagined*, 2011).

There is however a strong a case for "getting real" and focusing on the significance of disagreement and the valuable systemic role it may play -- the requisite variety enabling a viable system to function, as variously articulated in the following:

- *Insights into Dynamics of any Psychosocial Rosetta Stone: standing wave understood dynamically rather than statically* (2018)
- *Triangulation of Incommensurable Concepts for Global Configuration* (2011)
- *Warp and Weft of Future Governance: ninefold interweaving of incommensurable threads of discourse* (2010)
- *Framework for interrelating incompatible perspectives* (1995)
- *Containing the Incommensurable* (1995)
- *Social Organization Determined by Incommunicability of Insights* (1995)
- *Using Disagreements for Superordinate Frame Configuration* (1992)

Archetypal irony of the relationship between competing strategic advocates

The European Parliament, framed by symbolic 12-foldness, offers the remarkable irony of a 9-fold set of groups with contrasting aspirations -- whose incompatibilities are only too evident. It invites reframing through the insight of anthropologist [Gregory Bateson](#) in concluding a conference on the effects of conscious purpose on human adaptation: *We are our own metaphor* (Mary Catherine Bateson, *Our Own Metaphor*, 1972). In this respect the insight of [Kenneth Boulding](#) (*The Image: knowledge in life and society*, 1956), as an early contributor to general systems thinking, is relevant:

Our consciousness of the unity of the self in the middle of a vast complexity of images or material structures is at least a suitable metaphor for the unity of a group, organization, department, discipline, or science. If personification is only a metaphor, let us not despise metaphors - we might be one ourselves. (*Ecodynamics: a new theory of societal evolution*, 1978 p. 345)

How might such insights apply to the political groups constituting the European Parliament -- expected to engender an integrative understanding and claiming to do so, were it not for the obstacles constituted by the advocacy of competing strategies, readily to blamed, if not demonised? How is that pattern to be understood as its own metaphor in this integrative failure?

The archetypal irony is however equally evident in the conceptual elaboration of relevant systemic insights. Those offering insight together then constitute their own metaphor of integrative failure with respect to global governance. Rather than focusing on the iconic figures who have contributed to such understanding, it is then systemically of far greater significance (or at least potentially so) how they have deprecated or ineffectively ignored each others contribution. Why their tendency to treat each others insights as effectively irrelevant -- as with the political groups of the European Parliament?

A systemic exploration of the disconnectivity of archetypal systems thinkers might consider the lack of viable systemic connectivity between authors variously cited above -- potentially 12 perspectives represented at the "table" of a "Last Supper" of a "global" civilization in crisis. Might they be understood in terms of one or more implicit enneagrams within an icosahedral framework -- in 3D as befits a "global" perspective?

- Stafford Beer: given the insights noted above (*Beyond Dispute: the invention of team synte-grity*, 1994) and the manner in which their development has been inhibited, as variously framed (Andrew Pickering, *The Cybernetic Brain: sketches of another future*, 2010; Eden Medina, *Designing Freedom, Regulating a Nation: socialist cybernetics in Allende's Chile*, *Journal of Latin American Studies*, 38 , 2006)
- Edward de Bono: given his lifelong articulation of a 6-fold framework, potentially to be understood as the closed 6-path portion of the enneagram (*Six Frames: For Thinking About Information*, 2008)
- Terrence Deacon: given the relevance of his insights to the function of a "hole", implied by references above to toroidal topology and the sense in which perspectives are interrelated "around" the torus, via intermediaries, rather than "directly" (*What's Missing from Theories of Information?* 2010). The implication of that hole, to which Stafford Beer refers, merits far greater consideration (*Cognitive mystery of holes, lacunae and incompleteness; Vital hole dynamic: embracing error, otherness and neglect*, 2014)
- Buckminster Fuller: given his insights into the geometry of polyhedra (*Synergetics: explorations in the geometry of thinking*, 1975/1979) -- despite his apparent failure to apply it as claimed by the subtitle of that magnum opus (*Geometry of Thinking for Sustainable Global Governance: cognitive implication of synergetics*, 2009)

- Arthur Young: given his adaptation of his insights to navigation of any "vehicle", as it might be relevant to global governance (*The Geometry of Meaning*, 1976). Suggestively, such insights can be further adapted to the 12-fold challenge of discourse and strategic articulation (*Typology of 12 complementary dialogue modes essential to sustainable dialogue*, 1998; *Typology of 12 complementary strategies essential to sustainable development*, and on *Characteristics of phases in 12-phase learning / action cycles*, 1998).
- Anthony Blake: given his insights into the enneagram and dialogue (*The Intelligent Enneagram*, 1996; *The Supreme Art of Dialogue*, 2009)
- Christopher Alexander: given his remarkable investigation of pattern language, the nature of order, and its implications for transformation (*A Pattern Language*, 1977; *The Nature of Order*, 2003-4), offering the possibility of their adaptation to psychosocial order (*5-fold Pattern Language*, 1984; *Geometrical configuration of Alexander's 15 transformations*, 2010).
- Maurice Yolles: given his adaptation of cybernetics to the management of knowledge in social organization (*Knowledge Cybernetics: a new metaphor for social collectives. Organisational Transformation and Social Change*, 2006; *Exploring Cultures Through Knowledge Cybernetics. Journal of Cross-Cultural Competence and Management*, 2007)
- Gregory Bateson: given his articulation into the implications of self-reference (*Mind and Nature: a necessary unity*, 1979; *Angels Fear: towards an epistemology of the sacred*, 1988)
- Alexander Wendt: given his insights into the reframing of conventional social science thinking in terms of quantum relativity (*Quantum Mind and Social Science: unifying physical and social ontology*, 2015), potentially of great relevance to comprehension of the implications of reverberation and resonance in contexts of collective dialogue.
- Other perspectives, necessarily omitted: ?

With respect to each, understood as distributed as vertices of an icosahedron, the insight with respect to their mutually perceived "irrelevance" and "disagreement" is that their relationship is better understood in terms of the internal links across the icosahedron. These are described in terms of synte-grity as "critic lines". With each perspective understood as a distinctive orientation -- held to be unconstrained by its proponents -- it is the critic lines between them that constrains their otherwise inordinate projection beyond the bounds of the viability of the 12-fold systemic framework.

References

Christopher Alexander:

- A Pattern Language. Oxford University Press, 1977
- 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 [\[text\]](#)

Gregory Bateson:

- Mind and Nature: a necessary unity. Hampton Press, 1979
- Angels Fear: towards an epistemology of the sacred. University of Chicago Press, 1988

Stafford Beer:

- Beyond Dispute: the invention of team synte-grity. Wiley, 1994
- Diagnosing the System for Organizations. Wiley, 1985
- Platform for Change. Wiley, 1975
- Brain of the Firm. Allen Lane, 1972.
- Fanfare for Effective Freedom: cybernetic praxis in government. Richard Goodman Memorial Lecture, 1973 [\[text\]](#)

A. G. E. Blake:

- The Intelligent Enneagram. Shambhala, 1996
- The Supreme Art of Dialogue. Duversity Publications, 2009

Terrence W. Deacon:

- Incomplete Nature: how mind emerged from matter. W. W. Norton, 2011
- What's Missing from Theories of Information? In: Paul Davies and Niels Henrik Gregersen (Eds.), Information and the Nature of Reality: From Physics to Metaphysics. Cambridge University Press, 2010, pp. 146-169 [\[text\]](#)

Edward de Bono:

- Six Thinking Hats. Back Bay Books, 1985
- Six Action Shoes. Longman Higher Education, 1991
- Six Value Medals: the essential tool for success in the 21st Century. Ebury Press, 2005
- Six Frames: For Thinking About Information. Vermilion, 2008

Barbara Ehrenreich:

- Bright-sided: how the relentless promotion of positive thinking has undermined America. Metropolitan Books, 2009
- Smile Or Die: how positive thinking fooled America and the world. Granta Books, 2010 [[summary](#)]

Angela Espinosa and Jon Walker. *A Complexity Approach to Sustainability: theory and application*. World Scientific, 2011

R. Buckminster Fuller:

- Operating Manual for Spaceship Earth. Lars Müller Publishers 2008 [[summary](#)]

R. Buckminster Fuller with E. J. Applewhite:

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

Michael C. Jackson. *Critical Systems Thinking and the Management of Complexity*. Wiley, 2019

Andrew Pickering. *The Cybernetic Brain: sketches of another future*. University of Chicago Press, 2010

John Ralston Saul. *The Unconscious Civilization*. Knopf, 1995

Alexander Wendt. *Quantum Mind and Social Science: unifying physical and social ontology*. Cambridge University Press, 2015

Maurice Yolles:

- Knowledge Cybernetics: a new metaphor for social collectives. *Organisational Transformation and Social Change*, 3, 1, October 2006, pp. 19-49 [[abstract](#)]
- Exploring Cultures Through Knowledge Cybernetics. *Journal of Cross-Cultural Competence and Management*, 2007, 5, pp. 19-74 [[abstract](#)]

Arthur M. Young:

- The Geometry of Meaning. Delacorte Press, 1976
- The Reflexive Universe: evolution of consciousness. Anodos Foundation, 1976 [[excerpt](#)]
- The Bell Notes: a journey from physics to metaphysics. Delacorte Press / Seymour Lawrence, 1979



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

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