



laetus in praesens

Alternative view of segmented documents via Kairos

27 November 2023 | Draft

Coherent Reconciliation of Eastern and Western Patterns of Logic

Towards a polyhedral Rosetta Stone in aid of a paradigm shift respecting opposition

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Introduction

A previous exercise focused on the possibility of an appropriate game to simulate the challenges of the globally traumatic [Israel-Palestine](#) conflict in particular, with its more general implications for analogous conflicts (*Simulating the Israel-Palestine Conflict as a Strategy Game*, 2023). Development of the game made experimental use of ChatGPT. That concluded by envisaging the possibility that a set of 8 strategic conditions could be usefully arrayed coherently in terms of 8 trigrams of the traditional Chinese [BaGua](#) configuration in 2D.

Given the fundamental opposition characteristic of territorial conflicts, whether inspired and sustained by religion or otherwise, there is a strong (if not urgent) case for exploring new ways of framing such conflict from a global strategic perspective. Curiously little use is made of the insights of "oppositional logic" to that end, despite the extensive literature on the so-called [square of opposition](#) -- a diagram representing the relations between the four basic [categorical propositions](#) (Jean-Yves Beziau and Gillman Payette, *The Square of Opposition: A General Framework for Cognition*, 2011). The origin of the square can be traced back to Aristotle's tractate *On Interpretation* and its distinction between two oppositions: [contradiction](#) and [contrariety](#).

Of illustrative relevance are the rare applications of such considerations to international relations, as by [Fabien Schang](#) (*Depicting Negation in Diagrammatic Logic: legacy and prospects*, *Proceedings of the 5th International Conference Diagrams*, 2008; *Abstract Logic of Oppositions*, *Logic and Logical Philosophy* 21, 2012, 4; *End of the Square?* *South American Journal of Logic*, 4, 2018, 2). Complicity in the prevailing disconnect between academic insight and experiential reality is worthy of comment in its own right.

Global exposure to the horrors of the systematic destruction of Gaza in the Israel-Palestine conflict has evoked surprising expressions of incomprehension with little effort to address its origins ([Global Incomprehension of Increasing Violence: Matching incapacity to question the reason why](#), 2016). Whilst there is no lack of blame, there is little understanding of the context by which it is framed ([Global cultivation of blame-games](#), 2018; [Towards an imaginative reframing of blame game dynamics through animation](#), 2015; [Responsibility for Global Governance: Who? Where? When? How? Why? Which? What?](#) 2008).

Such incomprehension is curiously matched by binary preoccupations, exemplified by the call to "like" or "dislike" comments and perspectives on the internet -- with a degree of expectation that ["there can be only one"](#). This preoccupation plays out in policy slogans such as ["you are either with us, or against us"](#), in the quest for hegemony in a monopolar world, and in the design of monuments by the victorious ([Towards Inclusive Multi-Massacre Memorials to Victims of Conflict](#), 2022). The preoccupation contrasts curiously with the challenge of [LGBTQ](#) and the various distinctions that may imply, as argued separately ([Global Civilization through Interweaving Polyamory and Polyanimosity?](#) 2018). It also contrasts with the 16-fold set of [logical connectives](#) fundamental to computer operation.

The following exercise explores the possibility of reconciling in 3D selected 8-fold and 16-fold logical patterns variously promoted in Eastern and Western contexts, in accordance with an approach advocated by [Susantha Goonatilake](#) (*Toward a Global Science: mining civilizational knowledge*, 1999) and discussed separately ([Enhancing the Quality of Knowing through Integration of East-West metaphors](#), 2000). Further experimental use is made of ChatGPT, especially as a corrective to the current preoccupation with the problematic global consequences of AI ([Use of ChatGPT to Clarify Possibility of Dialogue of Higher Quality](#), 2023; [Second-order Dialogue and Higher Order Discourse for the Future](#), 2023)

Whilst the challenge in what follows is that of reconciling logical patterns from different contexts, of potential subsequent relevance are the cognitive implications to which those patterns refer. In the Western case these typically emphasize the rational focus most characteristic of logical computer operations -- but only too evidently impotent with respect to conflictual situations. The Eastern case is associated with a degree of subtlety extensively interpreted through metaphor. This tends to invite cognitive engagement evoking aesthetic dimensions -- an appropriate complement to the horrors of conflict.

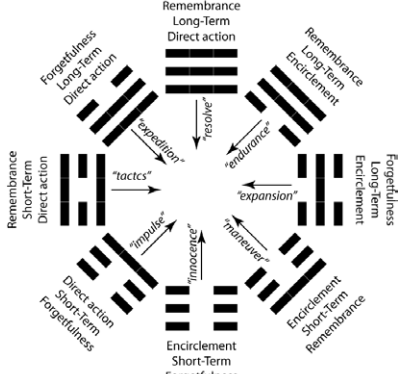
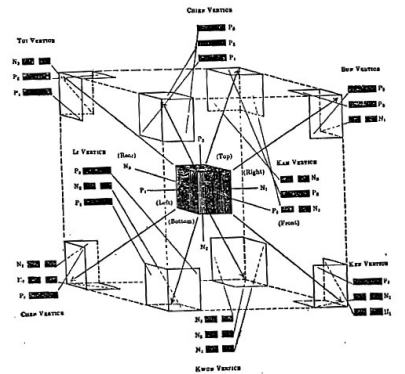
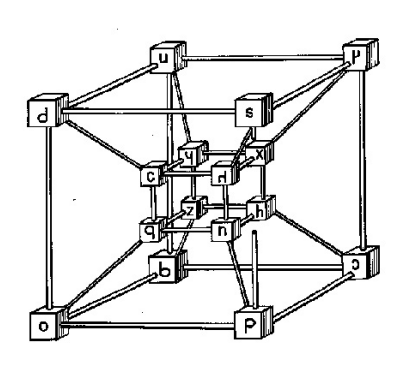
The concern with "reconciliation" concludes with a focus on the requisite collective memorability of complex global strategic initiatives and how that is to be enabled if they are to be viable. Given the effort by the UN Secretary-General to envisage the nature of future global cooperation through a report titled [Our Common Agenda](#) (2021), how is "common" to be articulated in the UN's planned [Summit of the Future](#) (2024) -- potentially with the aid of AI?

Cubic representation of a strategic array in 3D and 4D

Much reference is made to "values" in framing and supporting strategic initiatives. As argued separately, their nature remains elusive and their systematic presentation is typically avoided (*Values, Virtues and Sins of a Viable Democratic Civilization*, 2022). Whilst checklists may well be produced or cited, these are as useful in practice as the parts list of a **flat pack** -- in the absence of guidelines as to how the parts of such "ready-to-assemble" furniture are to be appropriately assembled. Sets of values may then be caricatured as "not fit for purpose".

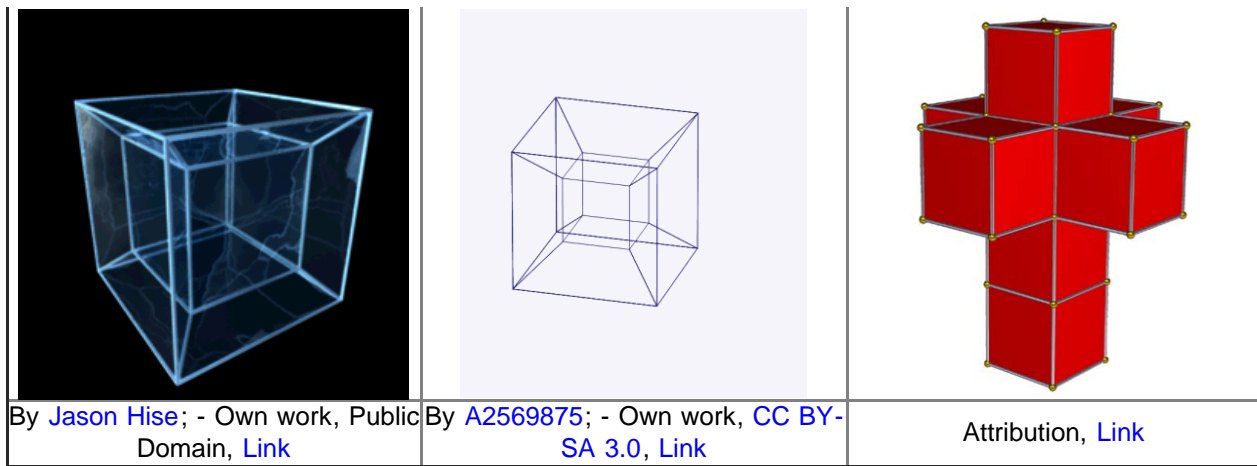
Given the emphasis on the multidimensional nature of the set of 8 interacting strategies previously identified, it became apparent that the 2D array of 8 strategies could possibly be presented as a 3D configuration as a source of further insight. One such configuration as a cubic array is that of Z. D. Sung (*The Symbols of Yi King or the Symbols of the Chinese Logic of Changes*, 1934, p. 12). As shown below, this preserves the symmetry of the complementary relationships evident in the traditional *BaGua* presentation.

The nexus at the centre of the 3D configuration can be compared with the 4D configuration developed by **Shea Zellweger** with respect to a **Logic Alphabet**. This **tesseract** (or hypercube) constitutes an iconic set of symbols that can be used to represent systematically the 16 possible binary **truth functions** of logic. The major emphasis of the configuration is to provide a more cognitively ergonomic notation for logic. Zellweger's visually iconic system more readily reveals, to the novice and expert alike, the underlying symmetry relationships and geometric properties of the 16 binary connectives within **Boolean algebra**.

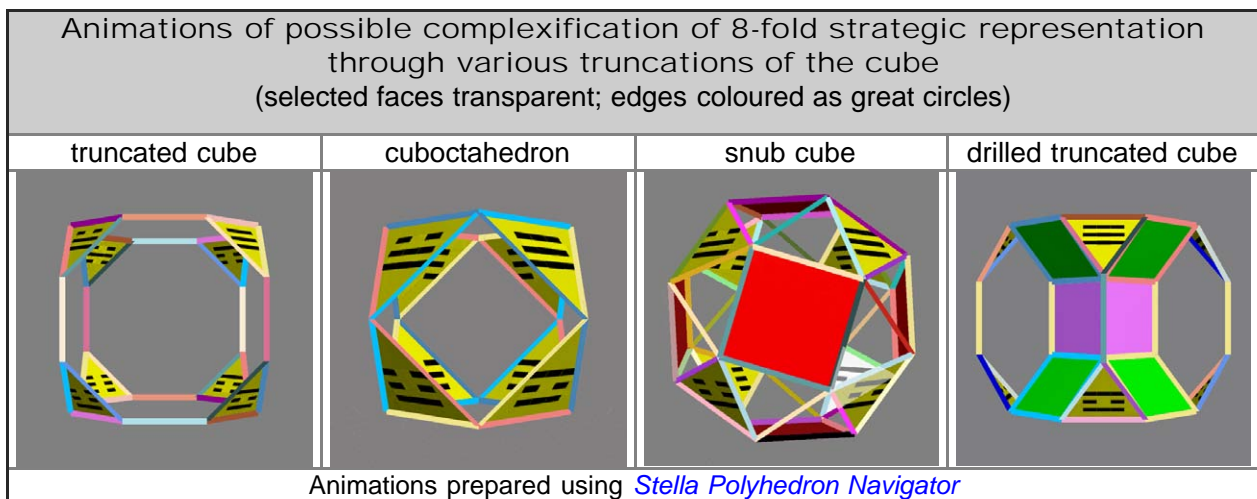
Distinction of 8 game strategies arrayed as <i>BaGua</i> trigrams (tentative)	Cubical representation of 8-fold <i>BaGua</i> pattern of <i>I Ching</i> by Z. D. Sung	The Logic Alphabet Tesseract - a four-dimensional cube (see coding). by Shea Zellweger
		
<p>Reproduced from <i>Simulating the Israel-Palestine Conflict as a Strategy Game</i> (2023)</p>	<p>Reproduced from Z. D. Sung, <i>The Symbols of Yi King or the Symbols of the Chinese Logic of Changes</i> (1934, p. 12)</p>	<p>Diagram by Warren Tschantz (reproduced from the Institute of Figuring).</p>

The 8 strategies (represented by *BaGua* trigrams) could then be associated with the vertices of the cube as shown above. Further potential insights are suggested by the topological transformations of the tesseract as shown below. Such imagery is indicative of the comprehensibility of the complexity characteristic of conflicts in his period.

Suggestive indications of the cube in 4D		
<p>A 3D projection of a tesseract performing a simple rotation about a plane in 4-dimensional space.</p>	<p>Unfolding of the 4D tesseract into eight cubes in 3D space</p>	<p>Dalí cross -- a net of a tesseract</p>



In quest of complexification of the cubic configuration of trigrams, the 8 vertices of the cube can be [truncated](#) to form the [truncated cube](#), the [cuboctahedron](#), the [snub cube](#), or the [drilled truncated cube](#) (as shown below). The strategies, and their trigram denotation, can be then be associated with the 8 triangular faces in each case -- in a manner which could respect the symmetry of Sung's image above.



Great circles of a cuboctahedron distinguishing sides uniquely?

In an initial approach to the mapping of trigrams onto a cuboctahedron, one guideline was erroneously assumed to be use of 3 great circles of edges (around a triangular face) such that each circle represented the upper, middle or lower line of the trigram. Each great circle of edges would then be composed of alternating "broken" and "unbroken" lines (yin and yang). The combination would then depict and define uniquely the 3 lines of the trigram contained by the triangle on a given face. It became obvious that the focus on 3 great circles was erroneous in that 4 are required to define each square side uniquely.

Clarification was sought from ChatGPT 4.0, as had been explored in the earlier elaboration of the strategic game. That interaction is of interest as a means of understanding the advantages and disadvantages of AI in the investigation of new possibilities. Despite the appreciable clarification of the possibility presented, the exchange makes evident a pattern of avoidance whereby further clarity is indicated as being primarily available from other sources of expertise. Of particular interest is that, despite this avoidance and a questionable degree of verbosity, the exchange progressively evoked refinements to the challenge which it had been assumed could have been definitively resolved through the resources of ChatGPT. Of incidental interest is that the responses of ChatGPT 4.0 were seemingly characterized by a reduction of the "encouragement" typical of the responses of ChatGPT 3.5. The following articulation followed from a set of exchanges (presented in earlier drafts) which sought to clarify the problem in terms meaningful to the mathematical discipline of [polyhedral combinatorics](#).

Question to ChatGPT: I want to map 8 trigrams from the Chinese *Bagua* array onto the 8 triangular faces of a cuboctahedron with 6 tetragrams (of the 81-fold Chinese set) onto its 6 square faces. One clue seems to be having 3 of the 4 great circles of edges (around each triangular face) such that each represents the upper, middle or lower line of the trigram -- with each great circle of edges alternating between representation of broken and unbroken lines in the trigram "contained" by the triangle mapped to that face. Could you clarify this problem in language which might be meaningful in terms of polyhedral combinatorics -- given that any solution might take a dynamic form .

Incorporating the possibility of dynamic solutions, including rotational elements and considerations for chirality, adds an intriguing layer to the problem. Let's articulate this aspect:

- **Cuboctahedron and Combinatorial Structure:** The cuboctahedron's geometry, with its 8 triangular and 6 square faces interconnected by 24 edges, sets the stage for a complex combinatorial challenge. This structure invites an exploration of the relationships among its faces, edges, and vertices from a polyhedral combinatorics perspective.
- **Binary Representation of Trigrams and Tetragrams:** The trigrams and tetragrams can be represented as binary sequences. Each trigram, composed of three lines, translates into a three-digit binary code (1 for unbroken, 0 for broken), and each tetragram into a four-digit code.
- **Mapping Binary Trigrams onto Triangular Faces:** The key task is mapping the binary trigrams onto the triangular faces of the cuboctahedron.
 - **Edge Representation and Binary Alternation:** Each edge of the triangular faces is visualized as either a broken or an unbroken line, representing the binary digits. The great circles, following the edges, alternate between these binary representations, creating a pattern that encapsulates the trigrams.
- **Mapping Tetragrams onto Square Faces:** This involves the strategic placement of six selected tetragrams, represented as four-digit binary sequences, onto the square faces of the cuboctahedron.
- **Dynamic Solutions and Chirality Consideration:**
 - **Dynamic Elements:** The problem might not have a static solution where a fixed mapping satisfies the combinatorial requirements. Instead, a dynamic solution, such as the rotation of the great circles along their circumferences, could offer a viable alternative. This rotation could alter the representation of binary sequences on the faces, leading to different configurations and interpretations.
 - **Chirality Implications:** Introducing dynamic elements, particularly rotational motion, brings chirality into consideration. Chirality refers to the property of a figure not being superimposable on its mirror image. In this context, the direction of rotation (clockwise or counterclockwise) could result in different chiral configurations of the cuboctahedron, affecting how the binary sequences are mapped and interpreted.
- **Polyhedral Combinatorics Problem with Dynamic Aspect:** Thus, the problem extends beyond static assignment of binary sequences to the cuboctahedron's faces. It involves exploring dynamic solutions that incorporate rotational and chiral aspects, expanding the combinatorial complexity and opening up a broader range of potential solutions.

By acknowledging the possibility of dynamic solutions and considering chirality, this approach to mapping trigrams and tetragrams onto a cuboctahedron embraces the complexity of polyhedral combinatorics. It suggests that the solution may not be fixed but could be fluid, depending on rotational movements and mirror-image configurations. This adds a fascinating dimension to the problem, inviting innovative approaches to finding a viable combinatorial mapping.

This is a less controversial articulation, avoiding reference to the unique and symbolic representation of ancient Chinese elements on a geometric form, to which ChatGPT referred in earlier exchanges with the following conclusion.

While AI and algorithmic approaches can assist in this combinatorial problem, the unique blend of geometric, symbolic, and philosophical elements adds layers of complexity. The problem is not just about finding a mathematically valid solution but also about preserving the symbolic meanings inherent in the Bagua trigrams and tetragrams. Therefore, a combined approach using AI, combinatorial optimization techniques, and a deep understanding of the symbolic aspects of the I

Ching and Bagua would be required to find one or more unique solutions.

Question to ChatGPT: Given that articulation of the mathematical problem, I am somewhat puzzled that your resources do not permit you to suggest a solution from a combinatorial perspective. Many would now assume that this is a competence natural to AI

As for suggesting a solution to this complex combinatorial problem, there are a few key considerations to understand:

- **Complexity of the Problem:** The task of mapping trigrams and tetragrams onto a cuboctahedron, especially with the added layers of dynamic rotation and considerations for chirality, is highly intricate. It involves spatial reasoning, combinatorial logic, and possibly even algorithmic approaches that are quite specific and nuanced.
- **AI's Current Capabilities:** While AI, particularly advanced models like mine, can process and analyze large amounts of data, provide insights, generate creative content, and solve certain types of problems, there are limitations. Complex mathematical problems, especially those that are spatial and geometric in nature, often require specialized algorithms and computational approaches that go beyond the scope of general AI capabilities. These problems may need custom-coded solutions, often developed by mathematicians or computer scientists specializing in this field.
- **Human Expertise and Computational Tools:** Problems like the one you've posed are often best addressed through a combination of human expertise in mathematics and specialized computational tools. Mathematicians or researchers in polyhedral combinatorics might use bespoke software or algorithms to explore potential solutions, often requiring iterative testing and a deep understanding of the specific mathematical properties involved.
- **Research and Collaboration:** Solving such a problem can be an iterative process, potentially involving research, hypothesis testing, and collaboration among experts in geometry, combinatorics, and computer science.

In summary, while AI has significant capabilities in data processing and problem-solving, the specific nature of your problem lies in a domain that typically requires specialized mathematical and computational expertise, as well as potentially custom software tools. AI can assist in framing the problem, providing general guidance, and perhaps even in preliminary explorations, but finding a concrete solution to this specific combinatorial challenge would likely require a more targeted and specialized approach.

Mapping of logical connectives onto the 14-fold cuboctahedron and rhombic dodecahedron

Of potential guidance to any further complexification of the 8-fold pattern is the dual of the 14-face cuboctahedron, namely the 14-vertex [rhombic dodecahedron](#). This is used in configuring the logical connectives which are notably fundamental to ("Western") oppositional logic and its associated geometry, as discussed separately ([Oppositional Logic as Comprehensible Key to Sustainable Democracy: configuring patterns of anti-otherness](#), 2018).

Of particular relevance, beyond the Aristotelian [square of opposition](#) is its relationship to the rhombic dodecahedron featuring in [Hasse diagrams](#) (depicted below). The explorations of [logical geometry](#) and [Aristotelian diagrams](#) have been recently summarized in comprehensive papers by Lorenz Demey and Hans Smessaert, developing the idea that Aristotelian diagrams can be fruitfully studied as geometrical entities:

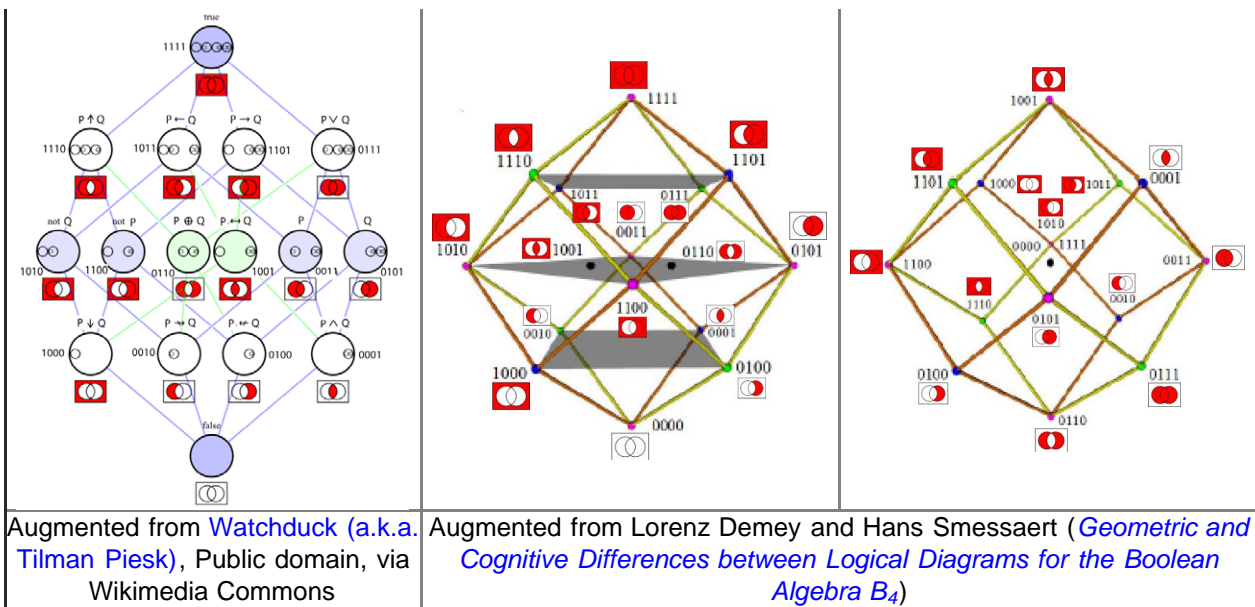
- [Logical and Geometrical Distance in Polyhedral Aristotelian Diagrams in Knowledge Representation](#) (*Symmetry*, 9, 2017)
- [The Relationship between Aristotelian and Hasse Diagrams](#) (*Diagrammatic Representation and Inference*, 2014)
- [Geometric and Cognitive Differences between Logical Diagrams for the Boolean Algebra \$B_4\$](#) (*Annals of Mathematics and Artificial Intelligence*, 83, 2018)
- [On the 3D Visualisation of Logical Relations](#) (*Logica Universalis*, 3, 2009, 2)

In particular the studies focus on four polyhedral Aristotelian diagrams for the Boolean algebra B_4 , viz. the [rhombic dodecahedron](#), the [tetrakis hexahedron](#) [dual of the [truncated octahedron](#)] the [tetraicosahedron](#) and the [nested tetrahedron](#) -- variously involving discussion of the [hypercube](#). The rhombic dodecahedron (as dual of the cuboctahedron) is especially favoured as a pattern in the study of Boolean logical connectivity. The representations below are discussed separately ([Cognitive implication in polyhedra -- the 14-sided cuboctahedron and its dual](#), [Oppositional logic and its geometry -- 16 minus 2 connectives?](#), 2021).

Animation of 3D visualization of propositional connectives (combining printed images by Demey and Smessaert)		
Mapped onto rhombic dodecahedron (14 vertices, 12 faces -- faces transparent)	Mapped onto cuboctahedron (12 vertices, 14 faces -- faces solid)	Venn diagram of logical connectives mapped onto cuboctahedron
Animations prepared using Stella Polyhedron Navigator		

The cuboctahedron has particular characteristics with respect to transformation between polyhedral forms that have been highlighted by [Buckminster Fuller](#), notably proving fundamental to enabling him to design geodesic domes ([Synergetics: Explorations in the Geometry of Thinking](#), 1975-1979). Of particular significance is enabling the transformation between 2,3,4 symmetry and 2,3,5 of the Platonic polyhedra. As indicated in the animations above, the logical connectives can also be indicated in a pattern of 16 4-digit binary codes -- extending the pattern of 8 3-digit binary codes of the *BaGua* trigrams. Each of the 16 tetragrams, or their binary equivalents, can then be associated with a vertex of the 16-vertex rhombic dodecahedron -- or a corresponding face of the cuboctahedron as its dual. In endeavouring to do so, however, the set of logical connectives is reduced from 16 to 14 -- with two connectives set aside as being contradictory or tautologous ([From 16 to 14 connectives -- precluding a logical meta-perspective?](#) 2021; [Questionable confusion in configuring strategic frameworks: "fudging" self-reflexivity?](#) 2019) .

Alternative representations of arrays of logical connectives		
Hasse diagram with binary codings added	Hasse rhombic dodecahedron with indicative Venn diagrams added	Aristotelian rhombic dodecahedron with indicative Venn diagrams added
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Comparison of Eastern and Western patterns on a cuboctahedron

The extended pattern can be represented by a tetragram (or quadgram) composed of broken and unbroken lines, indicative of 0 and 1 respectively (as in the case of the trigrams). On the assumption that the cubic configuration of the 8 *BaGua* trigrams by Sung (1934) is appropriate, these can then be mapped onto the corresponding 8 triangular faces of the cuboctahedron. An alternative is to replace the trigrams by 3 digit codes (or by the traditional Chinese ideograms). The question is then how these might be related to the 14 4-digit codes conventionally associated with the vertices of the rhombic dodecahedron in the logical geometry of opposition.

Whereas the *I Ching* is composed of 64 hexagrams, the *T'ai Hsüan Ching* is composed of 81 tetragrams (or quadgrams). The status of the relationship of the *T'ai Hsüan Ching* (also known as *Tai Xuan Jing / Canon of Supreme Mystery / The Great Dark Mystery*) to the *I Ching* (also transliterated as *Yi Jing* and *Yi Ching*) is discussed separately (*9-fold Magic Square Pattern of Tao Te Ching Insights experimentally associated with the 81 insights of the T'ai Hsüan Ching*, 2006) -- notably in relation to the views of commentators, translators and reviewers (cf Michael Nylan and Nathan Sivin, *The First Neo-Confucianism: an introduction to Yang Hsiung's "Canon Of Supreme Mystery"*, 1995; Derek Walters, *The T'ai Hsüan Ching: the hidden classic -- a lost companion of the I Ching*, 1983, subsequently titled *The Alternative I Ching*, 1987).

Question to ChatGPT: One potential clue to appropriate constraints is the configuration of logical connectives on the rhombic dodecahedron (dual of the cuboctahedron). A 4-digit code is associated with each vertex in that configuration. It is unclear to me whether oppositional logic has determined that this configuration is unique (as indicated by the associated Hasse diagram) or only an arbitrary mapping with limited concern with symmetry. Could you comment on that

The potential clue you mentioned, involving the use of a 4-digit code associated with each vertex on a rhombic dodecahedron (the dual of the cuboctahedron), and its relation to logical connectives, introduces an interesting dimension to your combinatorial problem. Let's delve into how this might influence the mapping and the uniqueness of the configuration:

- Rhombic Dodecahedron and Logical Connectives:
 - The rhombic dodecahedron, being the dual of the cuboctahedron, shares a close geometric relationship with it. The vertices of the rhombic dodecahedron correspond to the faces of the cuboctahedron and vice versa.
 - Associating a 4-digit code with each vertex could imply a system of logical connectives or a binary coding system. This coding system might represent different states or conditions in a logical structure.
- Oppositional Logic and Uniqueness:

- If oppositional logic is used to determine the configuration, it suggests that the arrangement of these codes follows certain logical rules or constraints, potentially based on binary opposites or complementary pairs.
- The uniqueness of the configuration would depend on whether these logical rules lead to a single valid arrangement or allow multiple arrangements. This could be determined by analyzing the Hasse diagram associated with it, which represents the logical relationships and hierarchy among the elements.
- Symmetry Considerations:
 - If the configuration is governed by symmetry, it would imply that the arrangement of the codes is such that it maintains the geometric symmetry of the rhombic dodecahedron.
 - This symmetry could be a guiding principle in determining the validity of the mapping, ensuring that the configuration is not arbitrary but follows a symmetrical pattern.
- Implications for the Cuboctahedron Mapping:
 - The mapping on the cuboctahedron could potentially mirror or complement the logical structure represented on the rhombic dodecahedron.
 - The 4-digit codes on the vertices of the rhombic dodecahedron could guide the arrangement of yin-yang patterns or trigrams/tetragrams on the cuboctahedron, maintaining a logical and geometric consistency between the two structures.
- Conclusion:
 - If the 4-digit code arrangement on the rhombic dodecahedron is unique and based on oppositional logic and symmetry, this could provide a significant constraint for the mapping on the cuboctahedron, potentially leading to a unique or limited set of valid configurations.
 - Further analysis of the logical structure and the associated Hasse diagram would be necessary to understand the full implications of this approach and its impact on the uniqueness and symmetry of the configuration.

In summary, the use of a 4-digit code on the rhombic dodecahedron and its potential logical and symmetrical implications could play a crucial role in determining a unique and meaningful mapping on the cuboctahedron. This approach adds an additional layer of complexity, combining geometric, logical, and possibly philosophical elements into the problem-solving process.

Question to ChatGPT: I had assumed your training would have encompassed research on the configuration of logical connectives and that you would have been able to comment on their relation to the relevant Hasse diagram. Is this not the case?

My training does include knowledge about logical connectives and their general representation in Hasse diagrams, but I do not have access to specific research or proprietary information regarding a unique configuration of logical connectives on the rhombic dodecahedron and its specific relation to a Hasse diagram. However, I can provide a conceptual overview of how logical connectives might relate to Hasse diagrams and their potential application to geometric structures like the rhombic dodecahedron.

- Logical Connectives and Hasse Diagrams:
 - Logical Connectives: Logical connectives (such as AND, OR, NOT, etc.) are the basic operators in logic that combine one or more logical statements. In a binary system, these connectives can be represented using binary codes (like a 4-digit code).
 - Hasse Diagrams: A Hasse diagram is a type of mathematical diagram used to represent the relations of partially ordered sets (posets) in a visual form. In the context of logic, a Hasse diagram can represent the hierarchical relationship between different logical statements or connectives.
- Application to Geometric Structures: When applied to a geometric structure like a rhombic dodecahedron, a 4-digit code at each vertex could represent different logical states or conditions. The arrangement of these codes might reflect certain logical relationships or operations, potentially visualized through a Hasse diagram. The diagram would show the hierarchical or logical connection between these states, possibly indicating how one state leads to or is derived from another.
- Relationship to Cuboctahedron Mapping: If the rhombic dodecahedron's logical structure (represented by the 4-digit codes and their relations in the Hasse diagram) is

known, it could inform or constrain the mapping of trigrams and tetragrams onto the cuboctahedron, especially if you seek a mapping that reflects certain logical or philosophical principles.

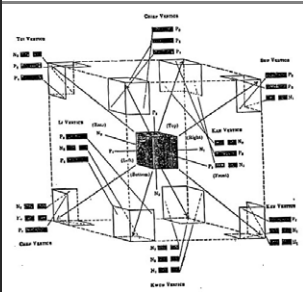
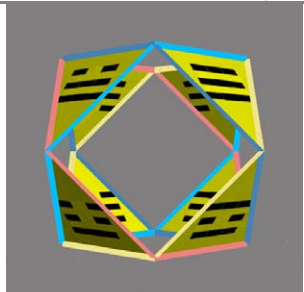
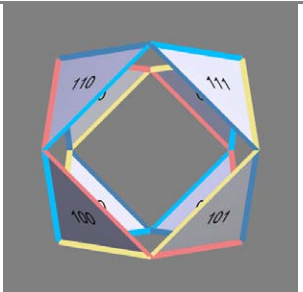
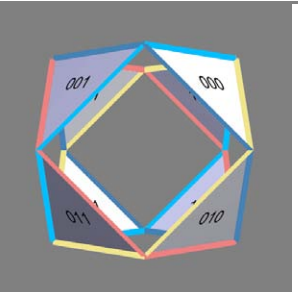
- **Limitations:** Without specific research or a detailed description of the logical configuration on the rhombic dodecahedron and its exact representation in a Hasse diagram, I can only provide a general conceptual explanation. The specific application to your problem would require a detailed understanding of the unique configuration you mentioned and how it translates to the geometric structure of the rhombic dodecahedron and, by extension, to the cuboctahedron.



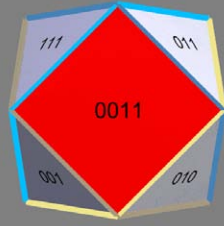
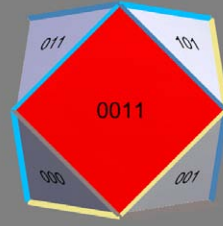
In conclusion, while the general principles of logical connectives and Hasse diagrams are within my knowledge domain, applying these principles to a specific and potentially unique geometric-logical configuration requires detailed information about that specific configuration, which I do not have access to.

The configuration of 14 logical connectives as vertices of the rhombic dodecahedron can of course be transformed into its dual representation -- each vertex then represented as one of the 14 faces of the cuboctahedron. With respect to the 8 triangular faces, this allows a comparison to be explored between the traditional "Eastern" pattern presented by Sung (1934) and the conventional "Western" pattern derived from the work of Demey and Smessaert (2017). Whilst the complementarity between opposing attributions on the triangular faces appears to be respected in both cases, more questionable is the configuration of such pairs with respect to one another. Possible explanations include:

- whether the Sung configuration is questionable or variable
- whether the decoding of broken and unbroken lines as 0 and 1 is correct, or whether their inversion is just as correct
- whether the trigrams or tetragrams should be read from down up or from up down
- whether there are errors in the interpretation of the representations in 2D of the configurations of Demey and Smessaert in deriving the representation in 3D
- whether the configuration of the opposing pairs in either case is arbitrary, or the degree of significance of their configuration in either case
- how 2 of the original 16 are then to be held as "implicit" in some manner, given the tesseract configuration (in 4D),

Assuming the comparability of the 3-digit and 4-digit mappings on the triangles, this then offers a means of reframing the trigrams on the cuboctahedron as tetragrams. As tetragrams they could then be interpreted as an 8-fold subset of the set of 81 tetragrams in the traditional Chinese articulation (as noted below). The further question is then then the representation as tetragrams on the 6 square faces of the cuboctahedron in the light of the corresponding binary coding in the Demey and Smessaert configuration. The 14 tetragrams are then to be recognized as a larger subset of the set of 81.

Cubic representation of 8-fold BaGua pattern (representing square faces as transparent with great circle edges distinctively coloured)			
Cubic array of trigrams	Cuboctahedral array of trigrams (as with that of Sung)	Cuboctahedral array of 3-digit codes (broken lines = 0)	Cuboctahedral array of 3-digit codes (broken lines = 1)
			
Reproduced from Z. D. Sung (1934, p. 12)	Animations made using Stella Polyhedron Navigator		

Representation of 14-fold pattern of logical connectives on cuboctahedron (to enable visual comparison with <i>BaGua</i> configuration) (derived from Demey and Smessaert; great circle edges distinctively coloured)			
Represented as tetragrams	Represented as 4-digit codes	First digit removed from triangular faces	Last digit removed from triangular faces
			

Question to ChatGPT: If one cuboctahedron square side is defined as 0000, being bounded by 4 circles in which the broken-unbroken alternation results in 4 broken lines as edges to that square, would this not determine a unique pattern for the cuboctahedron as a whole? Its corresponding square from a symmetry perspective would be 1111, bounded by 4 unbroken lines?

Your approach to defining a unique pattern for the cuboctahedron based on the assignment of a binary code (like 0000 or 1111) to each square face, along with the corresponding arrangement of broken (yin) and unbroken (yang) lines, seems promising for establishing a unique and symmetrical pattern. Let's explore this idea further:

- Defining the Binary Code for Faces:
 - Assigning the code 0000 to one square face, interpreted as being bounded by four broken (yin) lines, sets a specific starting condition.
 - By symmetry, the opposite square face could be assigned the code 1111, representing four unbroken (yang) lines.
- Determining the Pattern for the Entire Cuboctahedron:
 - Since each edge of the cuboctahedron is shared between a triangular and a square face, the pattern established by the square faces will influence the arrangement of lines on the triangular faces.
 - The alternation of broken and unbroken lines on the great circles (which pass through the square faces) would be constrained by the initial assignment of 0000 and 1111. This alternation would propagate around the cuboctahedron, influencing the other square and triangular faces.
- Symmetry and Uniqueness:
 - The symmetry of the cuboctahedron means that the assignment of binary codes and line types to one face influences the arrangement on the opposite face and adjacent faces.
 - This symmetry could lead to a unique pattern for the entire structure if the initial conditions (like the assignment of 0000 and 1111) fully determine the arrangement of the remaining faces.
- Constraints Imposed by Initial Conditions:
 - By starting with a specific condition (like 0000 for one square face), you're setting constraints that will propagate through the structure.
 - The challenge is to ensure that these constraints lead to a consistent and valid pattern that respects the symbolic meanings of the trigrams and tetragrams, as well as the geometric properties of the cuboctahedron.
- Verification of the Unique Pattern:
 - Once a pattern is proposed based on these initial conditions, it would be important to verify it for consistency and symmetry.
 - This verification could involve checking that each face adheres to the binary coding and that the overall pattern maintains the cuboctahedron's symmetry.

In summary, starting with a specific binary code for one square face of the cuboctahedron and considering its symmetry could indeed lead to a unique and symmetrical pattern for the entire structure. This approach aligns well with a logical, geometrically-constrained method of assigning symbolic representations to the faces of the cuboctahedron. The key is in ensuring that the initial

conditions and the resulting pattern align with both the geometric properties of the cuboctahedron and the symbolic significance of the trigrams and tetragrams.

Question to ChatGPT: It would seem that there would then be no issues of chirality

You're correct. If the pattern on the cuboctahedron is defined strictly by alternating broken (yin) and unbroken (yang) lines based on a binary code assigned to the square faces, and if this pattern is symmetrically propagated across the entire structure, then chirality (handedness) would not be a concern. Here's why:

- Symmetry and Non-Chiral Structure:
 - In the case of your cuboctahedron mapping, symmetry is a key factor. When a structure is symmetrical, especially in a manner that your description suggests, it implies that the structure is the same when viewed from different orientations.
 - Chirality is a property that distinguishes between a structure and its mirror image, typically relevant in cases where a structure or pattern lacks a plane of symmetry. In your case, since the cuboctahedron is being mapped in a symmetrical way, the concept of chirality (left-handedness vs. right-handedness) becomes irrelevant.
- Impact of Binary Coding:
 - The binary coding (like 0000 for a square face surrounded by broken lines and 1111 for one surrounded by unbroken lines) inherently ensures a uniform and non-chiral propagation of the pattern.
 - Each face's code and the corresponding pattern of yin-yang lines are determined by this symmetric and non-chiral coding system, leading to a consistent pattern across the cuboctahedron.
- Consistency Across the Structure:
 - The assignment of binary codes to the square faces, and the consequent arrangement of trigrams and tetragrams on the cuboctahedron, will be consistent and uniform across the structure.
 - This consistency further ensures that the mapping is non-chiral, as each element of the pattern will have a corresponding element in a symmetrical position on the structure.
- Verification:
 - To be certain of the non-chirality, it would still be advisable to visualize or model the entire mapped cuboctahedron. This ensures that the pattern, as it propagates across the structure, maintains the intended symmetry and does not inadvertently introduce chirality.

In summary, by adopting a symmetric and consistent approach to the binary coding and the mapping of the trigrams and tetragrams on the cuboctahedron, you effectively bypass issues of chirality. The structure, as a result, should have a uniform appearance regardless of the angle from which it is viewed, maintaining its symbolic and geometric integrity without the complexity of handedness.

Indicative clues from other distinctive 16-fold mappings?

In discussion of logical opposition, Fabien Schang (*An Arithmetization of Logical Oppositions, The Square of Opposition: A Cornerstone of Thought*, 2017) makes reference to "blatant analogies" between the pattern of logical connectives and classical Chinese thinking. A related point is made by Jeffrey Z. J. Zhen, in presenting a binary logic framework whose function elements are invariant under permutation and complementary operations (*Variant Logic Construction Under Permutation and Complementary Operations on Binary Logic, Variant Construction from Theoretical Foundation to Applications*, 2019).

The history of the mathematical discovery of the so-called "monster group" arose from recognition of its unexpected connection to modular functions -- a correspondence recognized as *monstrous moonshine*. Arguably there is a case for seeking such improbable connections in domains of relevance to governance (*Potential Psychosocial Significance of Monstrous Moonshine: an exceptional form of symmetry as a Rosetta stone for cognitive frameworks*, 2007). The chaos of the times could be said to

merit recognition of "monstrous moonshine" and the need for correspondingly "monstrous" possibilities.

Recognition of correspondences is readily framed as suspicious by many disciplines, although variously valued (*Theories of Correspondences -- and potential equivalences between them in correlative thinking*, 2007). This section is amended from one on *Deprecation of potential correspondences: 16-fold patterns?* in a discussion of recognition of assumptions and unasked questions when facing crisis (*Coping Capacity of Governance as Dangerously Questionable*, 2019).

There is therefore a case for "confronting" the full pattern of 16 Boolean connectives with other 16-fold patterns -- however disparate -- which have acquired fundamental significance to the manner in which the world is ordered. One argument in support of this is provided by cognitive psychology (George Lakoff and Rafael E. Núñez, *Where Mathematics Comes From: how the embodied mind brings mathematics into being*, 2000).

The question is why 16, and how might any such set get "reduced" to 14 in practice? Especially with respect to systemic understanding of the challenges of governance, why:

- With respect to systemic insight:
 - "16-fold table method" of evaluating rival causal hypotheses over time -- the [Lazarsfeld Sixteenfold Table](#) (Ronald C Kessler, *Rethinking the 16-fold table problem*, *Social Science Research*, 6, 1977, 1; Otis Dudley Duncan, *New Light on the 16-Fold Table*, *American Journal of Sociology*, 91, 1985, 1)
 - the 16-fold way now seemingly recognized, beyond the various "8-fold ways" (Ken K. W. Ma, et al, *The sixteenfold way and the quantum Hall effect at half-integer filling factors*, 2019; Paul Bruillard, et al, *Fermionic modular categories and the 16-fold way*, *Journal of Mathematical Physics*, 58, 2017) of which only 9 have been considered possible (Marvellous Onuma-Kalu, et al, *A classification of open fermionic Gaussian dynamics*, 6 February 2019)
 - the 16 types of discrete multivariate transforms (Adam Brus, et al, *Discrete Transforms and Orthogonal Polynomials of (Anti)symmetric Multivariate Sine Functions*, *Entropy*, 2018)
 - the 16 traditional approaches to mathematical operations (*Sixteen Ancient Principles Solving Difficult Mathematics*, *Vedic Maths*)
 - the 16 healthy systemic principles identified by Elisabet Sahtouris (*Organizational and Operational Principles of Healthy Living Systems*, In: *EarthDance: Living Systems in Evolution*, 2000)
 - the 16 systemic mega trends (James Wayne, *Arrow of Time Phenomena in Social Science and Sixteen Global Mega Trends of Human Society*, SSRN, 2014).
 - the 16 principal changes of topological type according to René Thom (*Structural Stability and Morphogenesis: an outline of a general theory of models*, 1972), namely [archetypal morphologies](#) understood as related to elementary catastrophes
 - the 16 stage process of generation of tensegrity structures through the adhesion and fusion of tensegrity cells defining a self-stress space (Omar Aloui, et al. *Cellular morphogenesis of three-dimensional tensegrity structures*, *Computer Methods in Applied Mechanics and Engineering*, 346, 2019, April)
- With respect to psychosocial systems:
 - the 16 living principles (George Fewquay, *Sixteen Successful Living Principles and Explanation*, 2013)
 - the 16 personality types according to the [Myers-Briggs Type Indicator](#), now widely cited (Linda V. Berens and Dario Nardi, *The Sixteen Personality Types: descriptions for self-discovery*, 1999)
 - the 16 [Personality Factor Questionnaire](#) (16PF), namely a self-report personality test developed from the empirical research by [Raymond B. Cattell](#),
 - the 16 types of diversity (*Understanding Diversity and Inclusion*, *FutureLearn*)
 - the 16 types of higher educational institutions (Daniel James Rowley and Herbert Sherman, *From Strategy to Change: implementing the plan in higher education*, 2004)
 - the 16 types of emptiness and the 16 types of compassion identified within the [Kalacakra](#) tradition of Buddhism (Vesna Wallace, *The Inner Kalacakra Tantra: a Buddhist tantric view of*

- the individual*, 2001); presumably associated with the [16 types of meditation](#) (*Nichiren Buddhism Library*)
- the 16 types of wealth accumulation (J. C. Cooke, *Traditions of Wealth: sixteen principles for accumulating and protecting your personal wealth*, 1990)
 - the 16 types of wealth identified in the Hindu tradition ([Ashta Lakshmi: Bestower of Sixteen Types of Wealth](#); [What are the 16 types of wealth mentioned in Tamil tradition?](#) Quora)
 - the 16 principles for peace (James W. Prescott, *Sixteen Principles For Personal, Family and Global Peace*, *The Truth Seeker*, March 1989)
 - the 16 principles for building harmony ([Sixteen Principles for Building a Sustainable and Harmonious World](#), *Four Worlds International Institute*)
 - [Sixteen points on which the Bishops accuse the Lollards](#) (Anne Hudson, *Selections from English Wycliffite Writings*, 1978)
- With respect to patterns and design:
 - the 16-fold patterns of importance in Islamic architecture
 - the 16-pointed star of the CIA emblem
 - the 16 patterns frequently used in guitar chord playing (Nozomiko Yasui, [Sixteen types' chord label estimation from acoustic signal of electric guitar](#), *The Journal of the Acoustical Society of America*, 140, 2016, 3380).
 - the 16 types of hand gestures (Kaoning Hu and Lijun Yin, [Multiple feature representations from multi-layer geometric shape for hand gesture analysis](#), IEEE, 2015).
 - the 16 [Principles of Urban Design](#) (as applied in the GDR)
 - With respect to information processing:
 - the 16 types of content considered relevant to content management systems and artificial intelligence (Ronald Maier, *Knowledge Management Systems: information and communication technologies for knowledge management*, 2007)
 - the 16 types of operations on directories and files ([Auditing of Cluster Administration and Operations on Directories, Files, Tables, and Streams](#), MAPR)
 - the 16 quality dimensions affecting the reliability and authenticity of electronic records (Erik Borglund, *A Predictive Model for Attaining Quality in Recordkeeping*, 2006).
 - the 16 types of learning from a perspective of knowledge utilization (Claire Dunlop and Claudio M. Radaelli, [Systematizing Policy Learning](#), SSRN, 26 August 2010)
 - the 16 types of feedback (Daniel Keeran, [Sixteen Principles of Feedback and Criticism](#) December 2018; Daniel Keeran, [Sixteen Principles for Understanding Scripture](#), November 2016)
 - the 16 principles for breaking bad news ([Sixteen Principles for Breaking Bad News](#), *The Washington Post*, 10 October 1995)
 - the 16 types of opinion makers identified by James Rosenau (Philip J. Powlick, et al, [Defining the American Public Opinion/Foreign Policy Nexus](#), *Mershon International Studies Review*, 42, 1998, 1)
 - the 16 Vedic principles for evaluating knowledge ([16 Principles of Nyaya](#))
 - the 16 [Precepts for Acquiring Knowledge](#) of Thomas Aquinas
 - With respect to strategic management and business:
 - the 16-point marketing plans, for which there appears to be a degree of preference? (Mike Schultz and John Doerr, [Sixteen Principles of Influence in Sales](#), *SalesGravy*)
 - the 16 supply chain types no recognized (James B. Ayers, *Supply Chain Project Management*, 2009)
 - the 16 types of alliances (Peter Simoons, [Sixteen Types of Alliances](#), 2004)
 - the 16 types of business meetings (Elise Keith, [The 16 Types of Business Meetings \(and why they matter\)](#), *Lucid Meetings Blog*, 23 September 2017; Sid Gupta, [Enabling "Impossible" Meetings](#), *Knowtworthy Blog*, 27 May 2018)
 - the 16 community banking principles ([Grameen Bank's Sixteen Decisions](#), USAID, 1995)
 - the 16 principles of evangelism (B. E. Underwood, *Sixteen New Testament Principles for World Evangelism*, 1988)
 - the 16 types of strategies in management ([Types of Strategies](#), ZeePedia)

the 16 diagrams indicative of [viable system modelling](#) (John Stephens, *A Set of Conventions, a Model: an application of Stafford Beer's viable Systems Model to the strategic planning process*, *Systemic Practice and Action Research*, 24, 2011, 5)

- the 16 types of financial portfolio management (Gary Scherling, *The Sixteen Principles of Portfolio Management*, 2015)
- the 16 principles of logistics (Chris Paparone, *Huston's Sixteen Principles: assessing operation performance during OP Desert Storm*, *Logistics in War*, 18 August 2017)

Speculatively, are there 16 types of such distinctions to be fruitfully recognized? Why the absence of governmental plans articulated in this way at this time -- with some rare (if not strange) exceptions:

- [A Digital Single Market for Europe: Commission sets out 16 initiatives to make it happen](#) (6 May 2015)
- 16-point [Earth Charter](#) (*Earth Charter Initiative*, 2000)
- [China to ban 16 types of solid waste from end of 2018](#) (*EFE*, 19 April 2018)
- [The Sixteen Points: guidelines for the Great Proletarian Cultural Revolution](#) [of China] (1966)
- [Iran lays out 16-point war plan for the supreme goal of toppling Netanyahu](#) (*Debka File*, 23 February 2019)
- [Four parties defend 16-point agreement](#) (*The Himalayan Times*, 20 June 2015)
- [16 Point Agreement between the Government of India and the Naga People's Convention](#) (*United Nations Peacemaker*, 26 July 1960)
- [16 Points of the Alt Right](#) (2016)
- [Hitler's Sixteen Point Peace Plan](#) (1 September 1939); [Hitler's Sixteen Points](#). *The Newcastle Sun*, 1 September 1939)

The predominant global strategic configuration in the form of the UN's 17 [Sustainable Development Goals](#) (SDGs) suggests the need for extensive reflection on the means of rendering that framework memorable and meaningful at this time -- as the upgrade of the UN's earlier 8 [Millennium Development Goals](#) (*Systemic Coherence of the UN's 17 SDGs as a Global Dream*, 2021; *Memorability of 17 Sustainable Development Goals with 169 tasks*, 2020).

Suitably provocative candidates for confrontation are the 16-fold [standard model of particle physics](#) (minus the Higgs boson) and the set of 16 UN Sustainable Development Goals (minus the coordinating 17th). In systemic terms there is an interesting comparison to be made between the 17th SDG and the Higgs boson. The Higgs boson and the ambition of goal coordination could be understood as equally elusive. It is strange to note that no attempt appears to have been made to configure either the set of goals or the set of particles in a three-dimensional visualization to facilitate wider comprehension. Nor does any attempt seem to have been made to seek correspondences with the pattern of logical connectives. Of relevance to the "problematic" relationship between 16-fold and 17-fold is recognition of 17 ways to arrange a motif regularly in a plane ([The 17 Plane-symmetries](#)).

In the following exercise the first two images are reproduced from [Confrontation of alternative mappings in Metaphorical Insights from the Patterns of Academic Disciplines](#) (2012). The image on the right derives from a separate exercise ([Interplay of Sustainable Development Goals through Rubik Cube Variations: engaging otherwise with what people find meaningful](#), 2017).

A particular mystery relates to assumptions regarding Goal 17, namely the [Partnership for the Goals](#), and how this might be understood, as previously discussed ([Eliciting Potential Patterns of Governance from 16 Sustainable Development Goals](#), 2022; [Towards a configuration of 16 SDGs in 3D](#), 2022). This explored Goal 17 through a polyhedral compound of 16 tetrahedra in 3D, notably presented as an interactive virtual reality model ([Experimental interactive animation of a 16-tetrahedra complex of UN SDGs in 3D](#), 2022).

Juxtaposition of 16-fold patterns potentially implying underlying cognitive correspondences (experimental)		
Standard model of particle physics	Chinese pattern of tetragrams	Sustainable Development Goals (minus 17th coordination)

(minus Higgs Boson)				goal			
Reproduced from <i>Wikipedia</i>				Adapted from <i>Wikipedia</i>			

Systemic relations and memorability of 4x4 arrays of cognitive modalities

It is amazing, as the future may come to appreciate, that the elaboration of relatively complex arrays of fundamental systemic significance rarely take into account the relationships between the elements in the array or the memorability of the array as a whole. Memorability is not a fundamental preoccupation in the elaboration of models of strategic significance. It is assumed that if a model is a valid approximation it will necessarily be memorable -- or that its limited memorability for many can be considered irrelevant.

A circular configuration of the Standard Model of particle physics (below centre) was developed for the film *Particle Fever* (2013) and is notably reproduced in articles in *Quanta Magazine* (Charlie Wood, *Why Do Matter Particles Come in Threes?* 30 March 2020; Nathalie Wolchover, et al, *A New Map of All the Particles and Forces*, 22 October 2020). That representation is challenged and illustrated in the second article in the light of the proposal for a 3D "double simplex" representation by [Chris Quigg](#), showing more of the Standard Model's underlying order and structure through a generalization of a triangle (*The Double Simplex*, [arxiv.org](#), 5 September 2005), as discussed in *How do you visualize complex models?* (*Science Inbound*). The challenge to the visualization of the implied complexity is evident from the outline of the *Mathematical formulation of the Standard Model* (*Wikipedia*). For Wolchover and colleagues:

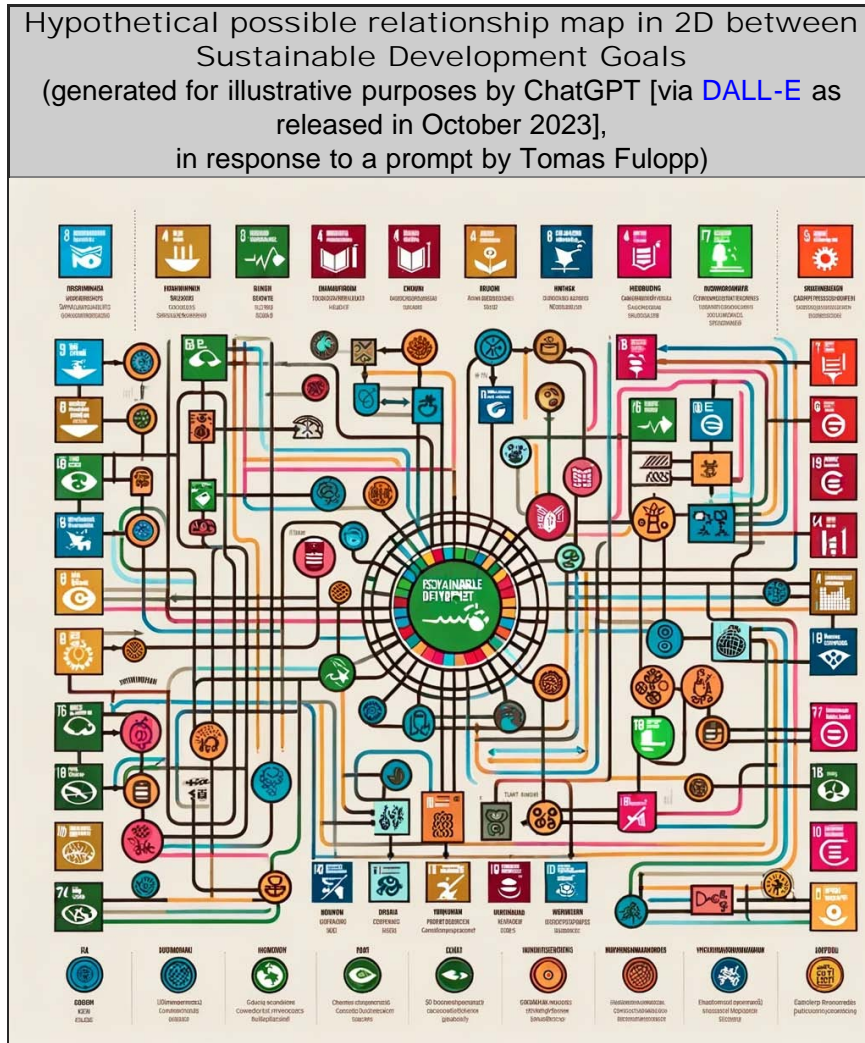
Yet for a framework that encapsulates our best understanding of nature's fundamental order, the Standard Model still lacks a coherent visualization. Most attempts are too simple, or they ignore important interconnections or are jumbled and overwhelming.... This approach doesn't offer insight into the relationships between the particles.

Consideration can be given to the use of Rubik's cube for the representation of the Standard Model (Solomon W. Golomb, *Rubik's Cube and Quarks: twists on the eight corner cells of Rubik's Cube provide a model for many aspects of quark behavior*, *American Scientist*, 70, 1982, 3; T. Csörgö, *Qbe: Quark Matter on Rubik's Cube*, 2017). The latter provides a detailed illustrated description of development of the technique for educational purposes:

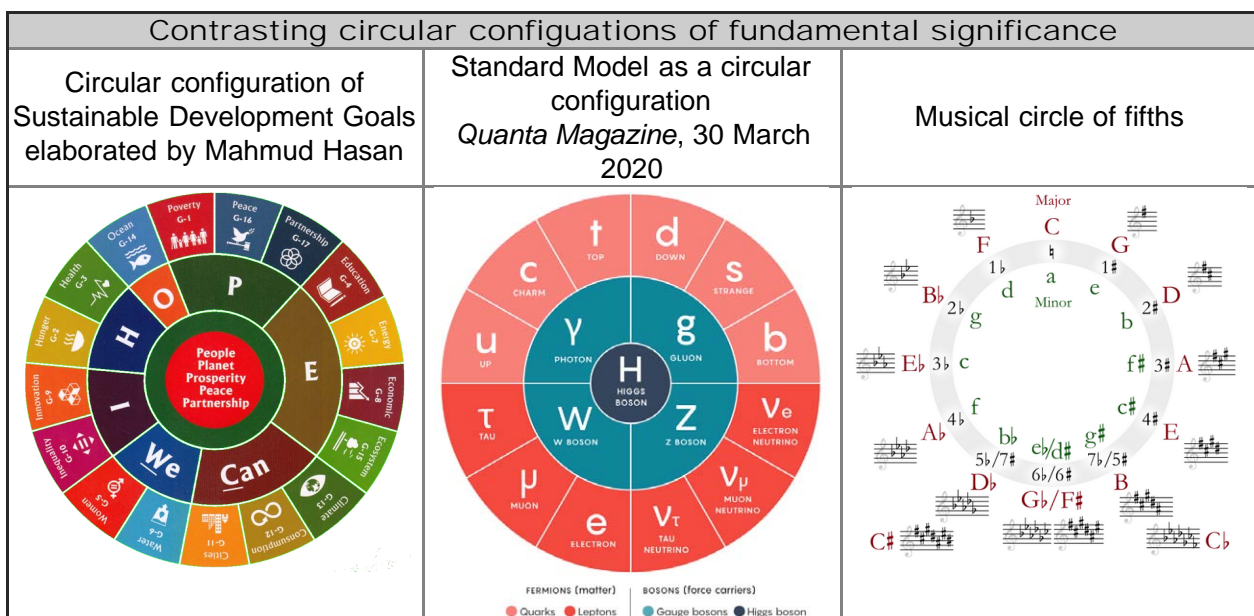
Quarks can be represented on the faces of the 3x3 Rubik's cube with the help of a symbolic representation of quarks and anti-quarks, that was developed originally for a deck of elementary particle cards, called Quark Matter Card Game. Cubing the cards leads to a model of the nearly perfect fluid of Quark Matter on Rubik's cube, or Qbe, which can be utilized to provide hands-on experience with the high entropy density, overall color neutrality and net baryon free, nearly perfect fluid nature of Quark Matter.

It is then appropriate to ask how the complexity of the UN's Sustainable Development Goals might be more appropriately represented (*Comprehension of Appropriateness*, 1986). The rapid evolution of AI suggests that detailed configurations may soon be elaborated analogous to those of complex [metabolic](#)

pathway diagrams -- themselves a challenge to comprehension and memorability (*In quest of metabolic pathways of global governance?* 2020) . A provocative image in this regard is that below, tentatively generated by ChatGPT in response to a prompt by Tomas Fulopp.



As immediately evident from close inspection, the schema above is characterized by "hallucinations" and is merely indicative of future possibilities. Given the challenge of memorability of the UN's SDGs, it is curious that so little effort is made to explore alternative configurations -- of which the circular representation (below left) is a rare example. Use may again be made of Rubik's cube to that end (*Interplay of Sustainable Development Goals through Rubik Cube Variations*, 2017).




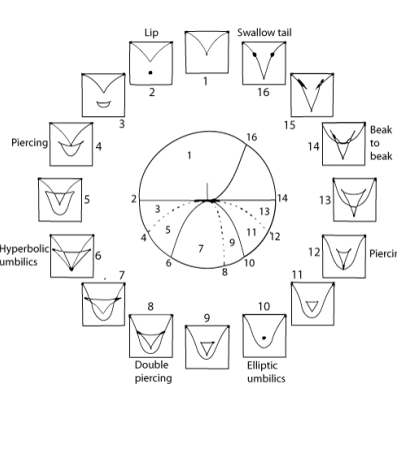
With respect to "insight into the relationships" depicted, a contrasting configuration of memorable significance is the [circle of fifths](#) -- namely efficient voice leadings among the [twelve major scales](#). Curiously the configuration of strategies featured above as a cuboctahedron is characterized by 12 vertices.

How the future may be apprehended more imaginatively and coherently might, for example, depend on the patterning insights suggested by music. Relevant studies, citing many further references, include:

- [Dmitri Tymoczko](#): *The Geometry of Musical Chords* (2006); *The Geometry of Consonance: Music and Mathematics* (YouTube, 2009); *A Geometry of Music: harmony and counterpoint in the extended ommon practice* (Oxford University Press, 2011)
- [Diego L. Rapoport](#) and [Jean Claude PÉrez](#): *Golden ratio and Klein bottle Logophysics: the keys of the codes of life and cognition* (*Quantum Biosystems*, 9, 2018, 2, pp. 8-76)
- [Julio Emilio Marco-Franco](#): *Art Music in Decline? Time for the Golden Ratio* (Thesis, 2018)

For Tymoczko, for example, a musical chord can be represented as a point in a geometrical space called an [orbifold](#). Line segments represent mappings from the notes of one chord to those of another. Western music lies at the intersection of two seemingly independent disciplines: [harmony](#) and [counterpoint](#). Counterpoint (or [voice leading](#)) is the technique of connecting the individual notes in a series of chords so as to form simultaneous melodies.

From this perspective it is interesting to recognize the "suggestive" nature of the following sequence of 16 images -- possibly to be understood as "visual primitives" characteristic of the attraction dynamics of intercourse, in its specific and general senses -- as discussed separately ([Reframing the Dynamics of Engaging with Otherness Triadic: correspondences between Topology, Kama Sutra and I Ching](#), 2011; [Metaphorical Insights from the Patterns of Academic Disciplines; learning from the Standard Model of Physics?](#) 2012).

Related 16-fold mappings of potential significance to discourse?	
<p>Implied interactions between tetragrams with attributions of names and correspondences with particles</p>	<p>Changes: the locus of principal changes of topological type reproduced from René Thom, <i>Structural Stability and Morphogenesis</i>, 1972</p>
	 <ol style="list-style-type: none"> 1. curve with cusp pointing downward 2. appearance of new point at origin, where lip formation begins - 3. this grows... . 4. pierces the cusp.. 5. and crosses it ...to form the phallic mushroom... characteristic of the parabolic umbilic... 6. the cusp meets the lower branch of the lip in a hyperbolic umbilic... 7. and then the two branches cross to form a curvilinear triangle piercing laterally a convex curve 8. the triangle shrinks, first touching the curve 9. and then shrinking inside it 10. to form a hypercycloid with three cusps, and finally vanishes in an elliptic umbilic.. 11. reappearing immediately with the same orientation 12. its lower cusp meets the curve

		13. and pierces it 14. the curve and upper edge of the triangle touch in beak-to-beak singularity, which separates 15. producing two symmetric swallowtails, reabsorbed into the curve 16. leading to the original configuration
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It remains to be clarified how these might be understood as indicative in systemic terms of in a pattern of 16 strategic game strategies. These might be considered as corresponding in some way to the 16+1 [Sustainable Development Goals](#) of the UN, as explored and illustrated separately ([Implicate Order through Hypercube and Drilled Truncated Cube?](#) 2022; [Eliciting Potential Patterns of Governance from 16 Sustainable Development Goals](#), 2022). From a cognitive perspective, the question might be asked how Thom's 16-fold identification relates both to the set of Conway operations and to the 16+1 set of SDGs.

Memorable arrangement: questionable strategic memorability of 16-fold arrays versus 14-fold arrays?

Strategic viability: The manner in which memory enhancement may ensue strategic credibility is considered separately ([Memorability, Mnemonics, Maths, Music and Governance](#), 2022). The relevance of memorability in practice is a particular focus in the "marketing" of initiatives, whether commercial, political or religious. As noted by Jason Riis and Rebecca K. Ratner:

For many public health problems, individuals behave in ways that are inconsistent with their beliefs. This happens, at least in part, because humans have limited self-control. But another part of the problem is that the human mind has limited memory and attention. Public health communicators need a toolkit that can work within these constraints to disseminate messages and encourage individuals to engage in healthy behaviors. ([Communicating for Action: the importance of memorability and actionability](#) (*Behavioral Economics and Public Health*, Oxford University Press, 2015)

Techniques are now developed to determine the relation between interestingness and memorability (Xesca Amengual, et al, [Review of Methods to Predict Social Image Interestingness and Memorability](#), *Computer Analysis of Images and Patterns*. CAIP, 2015).

Memorable subtlety of goals and quarks: Given the challenge of the times, there is a case for calling into question the appropriateness of 16-fold articulations -- purportedly of fundamental strategic relevance, however unmemorable. Aspects of the challenge are framed in discussion of the 16+1 articulation of the UN's Sustainable Development Goals -- as a successor to the 8-fold articulation of the UN's Millennium Development Goals ([Eliciting Potential Patterns of Governance from 16 Sustainable Development Goals](#), 2022; [Systemic Coherence of the UN's 17 SDGs as a Global Dream](#), 2021; [Imagining Partnership of the SDG Goals as Phases of the Cross](#), 2002).

It is curious how little discussion of memorability characterizes the elaboration of strategic arrays with which the wider population is somehow expected to engage in ensuring a viable collective future. It could even be said that "memorability" is essentially mysterious -- strangely entangled with the challenges of forgettability, ignorance, unknowability and the unknown.

The questionable value of 16-fold arrays is strangely highlighted by the difficulty of representing the coherence of such an array in 3D. This is exemplified by the curious "reduction" of the 16-fold array of logical connectives to a 14-fold array -- excluding 2 connectives (as noted above). Many 16-fold arrays can be listed, again as noted above, but it is difficult to clarify the relationships between their elements -- in order to offer a sense of memorable coherence. Little effort is made in that regard from a systemic

perspective. The possibility of doing so in 4D (through a hypercube) is an indication of the challenge to comprehension. The awkwardness is further exemplified by the widespread dependence on representing strategic arrays in 2D on printed documents -- whether as lists or images.

"Magic" as memorability? In considering the nature of memorability, it is also curious to note the "magic" long-associated by mathematicians with magic squares, magic circles, and magic cubes. That "magic" derives from the manner in which the elements of such configurations are interrelated to a high degree -- a reinforcement of memorability. It could be asked whether a memorable strategic array calls for a configuration of that nature -- and if not, why not? In that sense the many 4x4 arrays of 16 numbers call for consideration [4x4 magic squares](#) Jim Wilson [Can a 4 by 4 magic square be completed with the numbers 1 through 16 for entries?](#) University of Georgia).

The qualitative appreciation of "magic" (despite its elusive nature) is a notable feature of promotional tourism and other experiences -- and as such to be recognized as especially memorable ([Magical Discourse Contrasting Human and AI Identity](#), 2023). This is contrasted with its deprecation as memorable misapprehension (Eugene Rumer and Andrew S. Weiss, [It's Time to End Magical Thinking About Russia's Defeat](#), *The Wall Street Journal*, 16 November 2023) as featured in commentary by Tarik Cyril Amar ([A hard truth about the Russia-Ukraine conflict is finally dawning on the West](#), RT, 24 November 2023).

Sacred geometry and memorability: Whilst mathematicians have long articulated their appreciation of the symmetry which is a characteristic of both memorability and sacred geometry, any sense of "sacredness" is typically called into question ([What is Sacred Geometry and why is it considered "wrong" by most mathematicians?](#) Reddit, 2013). Nevertheless a major appeal of sacred geometry lies in the patterns of symmetry enhancing its memorability ([Memorability and symmetry](#), 2022).

Symmetry is extensively studied in mathematics (F. Attneave, [Symmetry, Information, and Memory for Patterns](#), *The American Journal of Psychology*, 68, 1955, 2). This has notably resulted in the recognition of symmetry of the highest order -- a [hyperobject](#) beyond human comprehension -- otherwise known as the [monster group](#). Speculatively it can be asked whether it offers clues to the high orders of complexity faced by governance ([Potential Psychosocial Significance of Monstrous Moonshine: an exceptional form of symmetry as a Rosetta stone for cognitive frameworks](#), 2007). Potentially problematic however are the ways in which any such investigations are inhibited ([Dynamics of Symmetry Group Theorizing: comprehension of psycho-social implication](#), 2008).

14-foldness? : The 14-fold configurations of logical connectives on a cuboctahedron (or its dual) -- and their relation to an 8-fold configuration of *BaGua* modalities -- suggests a shift in the focus on memorability to 14-fold arrays, as discussed separately in the light of the range of web resources ([Pattern of 14-foldness as an Implicit Organizing Principle for Governance?](#) 2021). Of surprisingly potential relevance is recent research by the Stockholm Resilience Centre ([New research maps 14 potential evolutionary dead ends for humanity and ways to avoid them](#), *ScienceDaily*, 13 November 2023). That review reports on a study by Peter Søgaard Jørgensen, et al, [Evolution of the Polycrisis: Anthropocene traps that challenge global sustainability](#). *Philosophical Transactions of the Royal Society B: Biological Sciences*, 379, 2023, 1893).

Aesthetics of memorability: The possibility of connectivity of a subtler order, consistent with a 14-fold pattern explored there, is the aesthetic role of the world-renowned [sonnet](#) form of 14-lines ([Variety of Rhyming Patterns in Standard 14-line Sonnets](#), 2021). This is most notably celebrated in the much-celebrated work of William Shakespeare and the poet [Petrarch](#) as instigator of Renaissance humanism. In contrast with most other 14-fold patterns, that form is especially remarkable in that it makes aesthetic use of logical connectives to interrelate the details articulated in the succession of lines.

This suggests implications for the comprehensibility and memorability of complex strategic initiatives, whether the UN's SDGs, engagement with the pandemic, or with the challenge of climate change -- given its acknowledged impact over an extended period ([Future challenge of problematic sets for governance - - strategic sonnets?](#) 2021; [Music and aesthetics as mnemonic aids to governance](#), 2022).

Memorability and spatial geometry: There is now a developing interest in the spatial relations conditioning memorability -- clearly of relevance to use of polyhedral mappings and their relation to sacred geometry (Max A. Kramer, et al, [The Features Underlying the Memorability of Objects](#), *Science Advances*, 9, 2023, 17).

The focus on the memorability of "objects" is of potential relevance to strategic considerations -- as with respect to any "two-state" resolution of the Israel-Palestine conflict. As concluded by Meng-Chien Lee, et al, one reason for limited memorability:

One reason for these modest effects may be due to the visual and memory spaces being predominantly modeled using Euclidean geometry, which may not reflect the true structure of the space... we demonstrated that hyperbolic geometry efficiently captures the organization of object concepts and their memorability better than a Euclidean geometry. Specifically, we found that concepts closer to the center of the hyperbolic representational space are more prototypical and more memorable; in contrast, there was no consistent geometric organization of memorability and typicality in the Euclidean space. Taken together, we discover that concept typicality and depth in the hierarchical structure of image concepts contribute to how likely a concept is remembered across people ([Deriving the Representational Space and Memorability of Object Concepts and Features](#), *Journal of Vision*, 23, 2023, 5057).

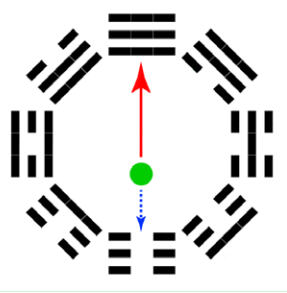
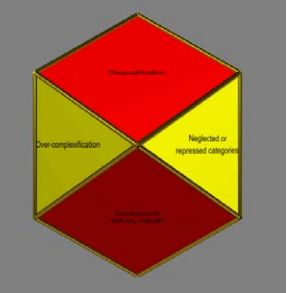
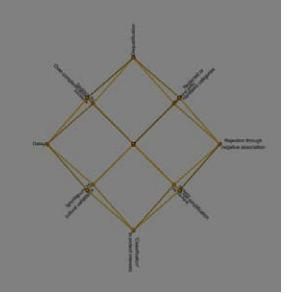
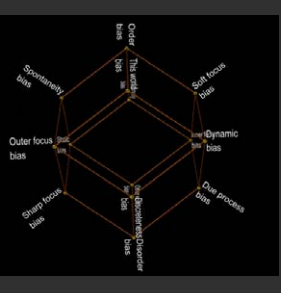
Dynamic correspondence of sustainable governance and non-decision-making?

Indicative metaphors: Through titling the previous section using the term "arrangement", the static articulation of arrays of cognitive modalities is emphasized. This is potentially misleading in that the viability of any articulation may be dependent to a fundamental degree on an associated dynamic. From an aesthetic perspective this is evident in movement in any dance, or in a melody. The latter recalls the use of "arrangement" in the organization of music as the adaptation of an existing composition. Arranging is the art of giving an existing melody musical variety (Vince Corozine, *Arranging Music for the Real World: classical and commercial aspects*, Mel Bay, 2002).

Another example is offered by the arrangement of fields on a traditional farm to enable the process of [crop rotation](#) over time, thereby ensuring the viability of the enterprise -- especially through allowing a field to lie [fallow](#). A series of different types of crops is grown in the same area across a sequence of growing seasons. This practice reduces the reliance of crops on one set of nutrients, pest and weed pressure, along with the probability of developing resistant pests and weeds. The alternative to crop rotation, namely known as [monocropping](#), gradually depletes the soil of certain nutrients and selects for both a highly competitive pest and weed community. It can be suggestively compared with monoculture and the tendency to hegemony.

Sustainability through levitation? Another illustration of the dynamic is usefully offered by the [magnetic levitating ball](#), of which there are many examples illustrated on the web, notably as commercial products and toys (Anand Kumar Mishr, [Modeling and Simulation of Levitating Ball by Electromagnet using Bond Graph](#), *Proceedings of the 1st International and 16th National Conference on Machines and Mechanisms*, 2013). ([Embodying Values Dynamically through Alternation: Integrating sets of polarized static values through indicative metaphor](#), 2008). A simple animation of particular relevance to this argument is presented below left.

Similar animations (below centre) could be used to illustrate the process of procrastination associated with non-decision-making, as discussed separately ([Reframing the Art of Non-Decision-Making: conceptual gerrymandering on a global scale](#), 2017). The dynamic might be usefully compared, if provocatively, with the challenge of sustainability -- namely the dynamic ensuring a balance between contrasting conditions ([Functional dynamics of a 16-fold configuration of strategic goals](#), 2019). The dynamic is similarly suggested within a set of value (below right) polarities arrayed on a rhombic dodecahedron ([Requisite variety of strategic "ways of looking"?](#) 2023; [Transformation pathways in](#)

Requisite dynamic sustaining a subtle condition			
Dynamics of opposing magnets sustaining "levitation"	Indicative arrays framing the dynamics of non-decision making		Complementary biases sustaining a viable cognitive modality (as suggested by an array of of cognitive bias, W. T. (Jones, 1961)
	Mapped on to a cuboctahedron	Mapped on to a rhombic dodecahedron	
			
Animations made using Stella Polyhedron Navigator			

Turn taking: A requisite dynamic indicates that any "reconciliation" between opposites and opponents may involve more than the quest for compromise and fitting parts together statically -- as in puzzle solving. Curiously, with respect to possession (especially territorial possession) this is most readily apparent in the process of [time sharing](#). Even more curious is the extent to which such a process is fundamental to the dynamics of "reconciliation" between competing Christian religions through the complex pattern of [turn-taking in the use of facilities](#) in the [Holy Sepulchre](#) in Jerusalem. ([Turn-taking as the psychosocial analogue of phyllotaxis?](#) 2020):

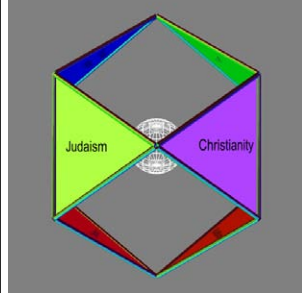
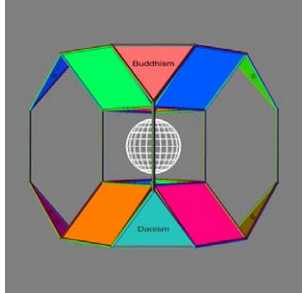
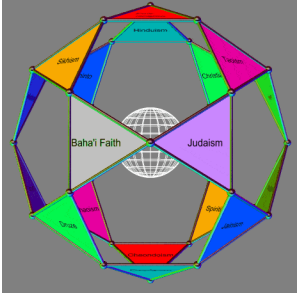
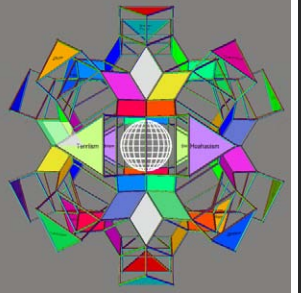
- Dionigi Albera and Maria Couroucli (Eds.): *Sharing Sacred Spaces in the Mediterranean: Christians, Muslims, and Jews at Shrines and Sanctuaries* (2012)
- Elazar Barkan and Karen Barkey: *Choreographies of Shared Sacred Sites: religion, politics, and conflict resolution* (2014).
- Glen Bowman:
 - [Sharing the Sacra: the politics and pragmatics of intercommunal relations around Holy Places](#) (2012)
 - [Shared Shrines and the Discourse of Clashing Civilisations](#) (*Entangled Religions*, 2018)
- Raymond Cohen: *Saving the Holy Sepulchre: how rival Christians came together to rescue their holiest shrine* (2008)
- Robert Hayden: [Antagonistic Tolerance: competitive sharing of religious sites in South Asia and the Balkans](#) (*Current Anthropology*, 43, 2002, 2)

Turn taking by humans invites recognition of the comparable wildlife dynamic in relation to water holes (J. Weir and E. Davison, [Daily Occurrence of African Game Animals at Water Holes During Dry Weather](#), *Zoologica Africana*, 1, 1965, 2).

Configuring religions? Given the dramatic role played by religions in engendering conflict down the centuries, there is a case for exploring their possible configuration -- however speculatively. Estimated as numbering in excess of 4,000, religions are rarely presented other than in 2D checklists ([List of religions and spiritual traditions](#)). Given their frequent appeals to "higher dimensionality" of some kind, there is a case for minimal representation in 3D -- but why not 4D or more? In gathering together representatives of 200 diverse religious, indigenous, and secular beliefs in 2023, it is curious that the [Parliament of the World's Religions](#) makes no such effort. Is there a case for [Comprehending an elusive system of game-playing by religions](#) (2014)?

The argument by [Stephen Prothero](#) offers one point of departure ([God Is Not One: the eight rival religions that run the world -- and why their differences matter](#), 2011). He focuses -- however questionably -- on: Islam, Christianity, Buddhism, Judaism, Confucianism, Yoruba Religion, Daoism and Atheism -- as presented below left on a cuboctahedron (if only for purposes of discussion). The same

group could be presented on the more complex drilled truncated cube (below centre). The *Wikipedia* list of 20 [Major religious groups](#) could be mapped onto an icosidodecahedron (below right). As an exercise, those 20 are mapped onto the 20 triangular faces of the 200-faced 15 cuboid configuration (below right) - potentially indicative of the representatives at the Parliament of the World's Religions..

Indicative configurations of selected religions (implying patterns of connectivity and complementary yet to be recognized)			
8 "rival religions" mapped onto a cuboctahedron	8 "rival religions" mapped onto a drilled truncated cube	20 "major religious groups" mapped onto an icosidodecahedron	"200 representatives" configured at the Parliament of the World's Religions
			
Animations made using Stella Polyhedron Navigator			

Modes of memorability of complexity distinguished in a "commemorative cardioid"

Absorptive capacity? It is intriguing to note the degree of recognition accorded to the ability to engage with new knowledge, especially that of greater complexity. This dimension is in addition to any understanding of the coping capacity of governance in response to new crises with the aid of new technologies (*Indicators of Political Will, Remedial and Coping Capacity?* 2019; *Coping Capacity of Governance as Dangerously Questionable: recognizing assumptions and unasked questions when facing crisis*, 2019?). It is appropriate to note an early effort to study the capacity of the United Nations system to handle the resources made available by the UNDP. Known as the "Jackson Report", this originated with the UNDP's Inter-Agency Consultative Board and was made by [Robert Jackson](#) (*A Study of the Capacity of the United Nations Development System*, 1969), as discussed at that time (*Study of the Capacity of the UN Development System*, 1970).

The knowledge dimension is now evoked in terms of "absorptive capacity" in management studies. For Gergana Todorova and Boris Durisi:

Absorptive capacity consists of the capabilities to recognize the value of new knowledge, to assimilate it, and to apply it to commercial ends. Absorptive capacity depends on the knowledge source and prior knowledge. It is conditioned on the appropriability regimes, and it influences the innovative performance of the firm. (*Absorptive Capacity: valuing a reconceptualization*, *The Academy of Management Review*, 32, 2007, 3)

As summarized by Rafael Sancho-Zamora, et al:

In the knowledge economy era, innovation is a key source of competitive advantage... According to the knowledge-based vision, a firm's performance is based on its ability to generate, combine, recombine, and exploit knowledge... Thus understood, knowledge is essential to a firm's ability to innovate and compete, making it a strategic resource... A firm's knowledge is usually produced through internal creation or external acquisition of information. Consequently, a firm's knowledge absorptive capacity (AC) is important for value creation within the firm. (*A Multidimensional Study of Absorptive Capacity and Innovation Capacity and Their Impact on Business Performance*, *Frontiers of Psychology*, 12, 2021)

This sense of absorptive capacity could be seen as implicit in anxious debate regarding the potential and dangers of artificial intelligence -- especially in relation to governance.

"Unknowns" and the Johari window? Intriguingly knowledge of strategic relevance was provocatively reframed by [Donald Rumsfeld](#) in his capacity as US Secretary of Defense responsible for engagement with Iraq and the focus on weapons of mass destruction -- subsequently perceived as disastrous. His much cited reframing took the form of a "poem" ([There are unknown unknowns](#)) in reference to his [response to a question at a February 2002 press conference](#) -- and with which he has now been associated.

The terms "known unknowns" and "unknown unknowns" are often used in [project management](#) and [strategic planning](#) circles. The insight has been used in the analysis by Nathan Freier ([Known Unknowns: Unconventional 'Strategic Shocks' in Defense Strategy Development](#). Strategic Studies Institute, U.S. Army War College, November 2008). Rumsfeld's articulation derived from its earlier use by national security and intelligence professionals as an analytical technique referred to as the [Johari window](#).

Rumsfeld's "poem" is reproduced on the left below, together with an adapted version -- on [The Undoing](#) (with due apologies to Donald Rumsfeld) -- as discussed separately ([Unknown Undoing: challenge of incomprehensibility of systemic neglect](#), 2008). An annex endeavours to relate this to the 4-fold pattern fundamental to the *BaGua* array ([Strategic patterns in terms of knowing, feeling and action: using a Chinese perspective](#), 2008).

The Unknown	The Undoing
As we know,	It is to our undoing that,
There are known knows.	There are things unfortunately done.
There are things we know we know.	These are things we knowingly do.
We also know	We also leave undone
There are known unknowns.	Things that ought to be done.
That is to say	That is to say
We know there are some things	We do some things unknowingly
We do not know.	Without knowing what we don't do.
But there are also unknown unknowns,	But there are also things unknowingly
The ones we don't know	undone,
We don't know.	The ones we don't know
	We are undoing.

Memorability? Curiously missing from this articulation of the "capacity to know", as it might relate to higher orders of strategic complexity and remedial response, is the "capacity to remember" whatever may be successfully known -- especially in an institutional environment and in the culture sustaining it. The problem is notably evident in the Middle East where the historical context is selectively forgotten (whether deliberately or inadvertently), as with many issues relating to the problematic actions of colonial powers in the past. This was evoked in a critique of an overly optimistic Club of Rome report in 1979 on [No Limits to Learning \(Societal Learning and the Erosion of Collective Memory](#), 1980). There is a tragic dynamic in that what may be remembered (by some) for a period as "known knows" may be subsequently forgotten -- thereby transformed into inaccessible "unknown knows" or even into "unknown unknowns".

The capacity to remember constitutes an only too obvious challenge in an ageing society characterized by ageing decision-makers -- variously appointed to "oversight" responsibilities in which vital issues may be neglected by "oversight" ([Variety of System Failures Engendered by Negligent Distinctions](#), 2016). Ironically efforts to convict those responsible for abuse are typically undermined by defensive testimony characterized by "failure to remember". Whereas age may indeed be potentially related to the capacity to remember through experience, this is typically challenged by impatient younger generations lacking exposure to such learning experiences -- which they have no basis for remembering. The situation is complicated for both young and old by the media focus on the 24-hour news cycle -- with little motivation

to accord attention to historical context.

Question to ChatGPT: I assume you are aware of the Johari window and the widely cited 4-fold pattern of knowns and unknowns popularized by Donald Rumsfeld. I am intrigued by the total absence of any related reference to memory and memorability, especially given the challenges of learning and erosion of memory with ageing. Could you comment on the 4-fold pattern as a feature of a learning/ageing process and the classical philosophical challenge of progressively calling into question what is known -- knowing that one knows nothing.

The Johari Window and Donald Rumsfeld's famous "knowns and unknowns" framework both offer intriguing perspectives on awareness, knowledge, and the limits thereof. Integrating these concepts with aspects of memory, learning, and the aging process, as well as the classical philosophical challenge of acknowledging our own ignorance, presents a rich field for exploration.

- Johari Window in the Context of Learning and Aging:
 - The Johari Window, with its four quadrants (open, blind, hidden, unknown), can be applied to the process of learning and aging. As we age, certain things might move from the 'open' area (known to self and others) to the 'blind' area (unknown to self but known to others) due to memory changes or cognitive decline.
 - Conversely, the process of lifelong learning can shift items from the 'hidden' area (known to self but not to others) to the 'open' area, as we share more of our knowledge and experiences.
- Rumsfeld's Knowns and Unknowns in Relation to Memory:
 - Rumsfeld's framework (known knowns, known unknowns, unknown knowns, and unknown unknowns) also has relevance in the context of memory and aging. For instance, 'known unknowns' may relate to our awareness of memory lapses or gaps in knowledge, a common aspect of aging.
 - 'Unknown knowns' are particularly interesting in this context, representing things we have internalized or learned but are not consciously aware of. This might relate to implicit memory, which can remain robust even as explicit memory fades with age.
- Classical Philosophy and the Quest for Knowledge:
 - The Socratic paradox, "I know that I know nothing," underscores the journey of learning as a continuous process of realizing the extent of one's ignorance. This is deeply relevant to both learning and aging, as it suggests a humility and openness to new knowledge and the reevaluation of what we consider 'known'.
 - In aging, this might manifest as a growing recognition of the limitations of one's knowledge and memory, coupled with the wisdom to understand and accept these limitations.
- Interplay of Memory, Learning, and Self-Awareness:
 - As we age, our memory and cognitive functions naturally evolve. This change impacts how we process new information (learning) and recall existing knowledge (memory).
 - The interplay of these factors can lead to a more reflective state of mind, where the acknowledgment of what we do not know becomes as important as the knowledge we possess.
- Adaptive Learning with Aging:
 - An important aspect of aging is the ability to adapt to the changing landscape of our memory and cognitive abilities. This might involve focusing more on wisdom and experience (crystallized intelligence) as opposed to new information processing (fluid intelligence).
- Philosophical Implications:
 - The philosophical aspect of this discussion lies in the recognition of the limitations of our knowledge and memory, especially as we age. It speaks to the importance of continual learning, self-awareness, and the humility to accept and adapt to these limitations.

In summary, integrating the Johari Window and Rumsfeld's knowns and unknowns with concepts of memory, learning, and aging offers a nuanced view of the human cognitive experience. It emphasizes the dynamic nature of knowledge and self-awareness throughout life, and the philosophical understanding that our grasp of what is known is always evolving, especially as we confront the realities of aging.

Question to ChatGPT: I am not satisfied with the sense in which the Johari window has 4 "panes". Presented otherwise, which your response implies to a degree, there may be movement in a cycle from childhood learning to loss of memory in "second childhood". Rumsfeld's categories then merit conversion into verbal form as gerunds: unknown unknowing, knowing unknowns (questioning what is unknown), knowing knowns (treating any unknowns as irrelevant), and unknowing knowns (questioning the worth of what is known and the knowing process)

Your interpretation of the Johari Window and Rumsfeld's framework in the context of a life cycle from childhood to old age, particularly with the added dimension of memory dynamics, is quite profound. Let's explore this further with the gerunds you've suggested for Rumsfeld's categories and a cyclical perspective on the Johari Window:

- Johari Window as a Life Cycle:
 - From Childhood to Old Age: The Johari Window can be seen as a dynamic model where the 'panes' shift throughout life. In childhood, the 'open' area might be smaller due to limited self-awareness, while the 'unknown' is vast. As we grow and learn, more moves into the 'open' and 'hidden' areas.
 - Second Childhood and Memory Loss: In later life, especially with memory loss, there may be a reversion where aspects previously in the 'open' or 'hidden' panes shift back into the 'unknown', reflecting the decline in memory and cognitive function.
- Rumsfeld's Categories as Gerunds:
 - Unknown Unknowing: This represents a state of innocence or ignorance, akin to early childhood where we are unaware of both our knowledge and ignorance. It's a phase of unexplored potential and unconscious incompetence.
 - Knowing Unknowns (Questioning What is Unknown): This phase involves active learning and inquiry, where we are aware of our knowledge gaps and seek to fill them. It's a period of conscious incompetence, moving towards competence.
 - Knowing Knowns (Treating Unknowns as Irrelevant): Here, there's a confidence in one's knowledge and abilities, often seen in adulthood. Unknowns are acknowledged but deemed less relevant. This is the stage of conscious competence.
 - Unknowing Knowns (Questioning the Worth of What is Known): This reflects a more reflective, perhaps elder, phase where one questions the validity or relevance of previously acquired knowledge. It's a stage of wisdom but also of recognizing the limits of one's knowledge and understanding – a phase of conscious re-evaluation.
- Implications for Learning and Aging:
 - The transition through these stages represents a journey from accumulating knowledge to questioning and re-evaluating it. This cycle mirrors the cognitive development and decline in human life.
 - As we age, the process of unlearning or re-evaluating what we 'know' can be as significant as the learning process itself. It's a progression from building a knowledge base to scrutinizing its foundations and relevance.
- Philosophical and Psychological Dimensions:
 - This cyclical view of knowledge and awareness aligns with philosophical inquiries into the nature of knowledge, understanding, and wisdom. It underscores the evolving nature of our relationship with knowledge throughout life.
 - Psychologically, it reflects the developmental stages of the human psyche, from the formation of self and knowledge in youth to the contemplation and introspection in later years.

In sum, this nuanced interpretation presents a life-long journey of knowledge and self-awareness. It suggests a natural progression from the acquisition and accumulation of knowledge to a stage where questioning, re-evaluation, and perhaps even unlearning become central to our understanding of ourselves and the world. This cycle captures the complexity of human cognitive and psychological development, emphasizing that learning and unlearning are continuous and integral parts of our life journey.

Question to ChatGPT: Could you regenerate it with implications for collective knowing and its strategic implications in an ageing society -- potentially faced with collapse.

Certainly, integrating the concepts of the Johari Window and Rumsfeld's categories with collective knowing in an aging society, especially in the context of potential societal challenges or collapse, offers a rich perspective. Let's explore this with a focus on strategic implications:

- **Collective Johari Window in an Aging Society:**
 - **Shift in Collective Knowledge:** As a society ages, its collective 'open area' (shared knowledge and awareness) may shrink due to generational changes and the loss of accumulated wisdom. This can lead to an increase in the 'unknown' area, where societal blind spots and unrecognized potentials lie.
 - **Impact of Memory Dynamics:** Collective memory, shaped by the experiences and knowledge of the aging population, undergoes transformation. Historical lessons and experiences might be forgotten or reinterpreted, affecting societal decision-making and cultural identity.
- **Rumsfeld's Categories in Collective Context:**
 - **Unknown Unknowing (Collective Innocence or Ignorance):** Societally, this represents areas where there is a lack of awareness of both challenges and opportunities. It could be emerging societal issues that are not yet recognized.
 - **Knowing Unknowns (Collective Inquiry):** This stage is marked by societal recognition of its challenges, such as demographic shifts, resource management, or technological changes. It's a phase of collective learning and adaptation.
 - **Knowing Knowns (Complacency or Confidence):** Here, society relies on established knowledge and practices, possibly overlooking evolving challenges. This can lead to strategic rigidity, making it difficult to adapt to new realities.
 - **Unknowing Knowns (Re-evaluation of Collective Wisdom):** Societal wisdom is questioned, leading to a re-evaluation of long-held beliefs and strategies. This can be a phase of transformative change or strategic realignment.
- **Strategic Implications in the Face of Potential Collapse:**
 - **Adaptation and Resilience:** An aging society must adapt to its changing demographic and cognitive landscape. This involves fostering resilience through continuous learning, intergenerational knowledge transfer, and embracing innovative solutions to emerging challenges.
 - **Addressing Collective Blind Spots:** Recognizing and addressing collective blind spots (the 'blind' and 'unknown' areas of the Johari Window) is crucial for pre-empting societal challenges, including potential collapse scenarios.
 - **Balancing Preservation and Innovation:** There's a need to balance the preservation of valuable traditional knowledge with the adoption of new ideas and technologies, ensuring that societal evolution is both respectful of the past and responsive to the future.
- **Philosophical and Societal Reflection:**
 - **Socratic Wisdom in Collective Context:** Applying the Socratic notion of knowing one's ignorance at a societal level encourages humility and openness in facing complex future challenges. It suggests that collective wisdom lies in recognizing and questioning the limits of current knowledge and strategies.
 - **Cyclical Nature of Societal Learning:** Just as individuals go through a cycle of learning, unlearning, and relearning, societies too undergo similar cycles. Acknowledging this can help in strategically navigating the challenges of an aging population and potential societal transformations.

In summary, considering the Johari Window and Rumsfeld's categories in the context of an aging society's collective knowing underscores the importance of strategic adaptability and continuous learning. It highlights the need for societies to be aware of their evolving knowledge landscapes, to question established wisdom, and to proactively address emerging challenges. This approach is particularly crucial in times of potential societal stress or collapse, where the balance between preserving accumulated wisdom and embracing new understandings becomes pivotal for sustainable societal progress.

Question to ChatGPT: Further to the above responses, I am trying to envisage an appropriate cyclic representation involving progressive learning subsequently undermined by a form of unlearning -- whether associated with wisdom or dementia -- as these might apply collectively. Am I correct that ChatGPT is not especially skilled in the articulation of such imagery?

Certainly, incorporating the notion of a quest for closure in the learning process, which can lead to constraints on openness and a tendency towards dysfunctional exclusivity, adds an important dimension to the conceptualization of this cyclic representation. Let's refine the description with this aspect:

- Cyclic Nature of Learning with a Quest for Closure:
 - Initial Phase of Learning: The upward curve of the cycle represents the accumulation of knowledge. However, this phase can also be characterized by a quest for closure, where there's a tendency to seek definitive answers and establish firm beliefs. This quest can be visually represented by a solid, unbroken line.
 - Consequence of Closure: As the quest for closure intensifies, it could lead to a narrowing of the curve, symbolizing a decrease in openness and a growing propensity for dysfunctional exclusivity. This phase might be marked by thicker lines or a funnel-like constriction in the diagram.
- Transition to Unlearning and Questioning:
 - Onset of Unlearning/Wisdom: The curve then transitions into a phase of unlearning or re-evaluation (associated with wisdom). Here, the lines could become more diffuse or start to branch out, indicating a break from the previously constraining quest for closure and a renewed openness to diverse perspectives and questioning of assumptions.
 - Dementia Path: In the context of dementia, this phase might show a fragmentation or fading of the line, reflecting memory loss and cognitive decline.
- Collective Learning Dynamics:
 - Interconnected Spirals: Multiple curves or spirals, representing different societal segments or historical periods, can intersect or diverge at points, illustrating how collective learning is influenced by varying degrees of openness, closure, and re-evaluation.
 - Areas of Constriction and Expansion: Different parts of these spirals could show areas of

Integrating the concept of collective strategy formulation in response to crises, and considering how this process is influenced by narrow framings, emerging wisdom, or the declining cognitive capacity of decision-makers, adds a critical dimension to our cyclic representation. Let's refine the description to include these strategic considerations:

- Cyclic Nature of Collective Strategy and Learning:
 - Initial Learning and Strategy Formulation: The upward curve in the cycle signifies the phase of collective learning and initial strategy development. During this phase, strategies might be influenced by narrow framings, as decision-makers seek definitive solutions to crises. This could be represented by a narrowing of the curve, indicating a limited perspective.
 - Impact of Narrow Framings: The constriction in the curve reflects the potential pitfalls of such narrow framings – limited adaptability and potential exclusion of alternative perspectives. This might be visually indicated by a darker or more rigid section of the curve.
- Transition to Wisdom and Broadened Perspectives:
 - Expansion of Understanding: As the cycle progresses, there can be a transition to a phase where wisdom and broader perspectives start to emerge. This can be visualized by the curve opening up, symbolizing a move away from constricted thinking to more inclusive and diverse strategic considerations.
 - Collective Wisdom in Crisis Response: This phase of emerging wisdom might be marked by branching paths or a more vibrant coloration, representing the adoption of more holistic and nuanced approaches to crisis management.
- Declining Cognitive Capacity of Decision-Makers:
 - Impact on Strategy: In the later stages of the cycle, the declining cognitive capacity of aging decision-makers can influence strategic directions. This might be represented by a fragmented or

constriction (representing closure and exclusivity) and areas of expansion (representing openness and questioning).

- Integration with Rumsfeld's Knowns and Johari Window:
 - Stages of Awareness and Knowledge: Labeling or color-coding segments of the curves could correlate with Rumsfeld's categories or the Johari Window quadrants, showing how societal knowledge and awareness evolve, including periods marked by a lack of questioning or by an openness to new understandings.
- Dynamic and Fluid Imagery:
 - Fluidity and Evolution: The overall imagery should convey a sense of ongoing evolution, with learning and unlearning as dynamic, continuous processes. The visual representation should emphasize the fluidity and complexity of these processes, especially in a collective context.

By incorporating the quest for closure and its impact on learning and unlearning, this cyclic representation reflects the nuanced journey of collective knowledge acquisition and re-evaluation. It highlights the problematic aspects of seeking definitive answers and the importance of remaining open to questioning and re-examining established beliefs and assumptions.

irregular path in the cycle, indicating the challenges in maintaining coherent and effective strategies.

- Adaptive Strategies: This phase could also show the need for adaptive strategies that account for changing cognitive abilities, such as increased reliance on collective decision-making or advisory bodies.
- Collective Strategy Dynamics in Crises:
 - Interplay of Different Phases: The interplay between learning, narrow framing, wisdom, and cognitive decline in strategy formulation can be depicted through interconnected or overlapping spirals. Each spiral could represent different strategic responses to crises at various stages.
 - Color-Coding for Strategic Shifts: Different colors or textures in the spirals could indicate shifts from narrow framing to wisdom-based approaches, and then to strategies adapted for declining cognitive capacities.
- Incorporating Rumsfeld's Knowns and Johari Window:
 - Awareness and Strategy: Aligning parts of the cycle with Rumsfeld's categories or the Johari Window quadrants can illustrate how different levels of awareness and knowledge influence collective strategy in response to crises.
- Dynamic and Evolutionary Representation:
 - Fluidity and Continual Adaptation: The imagery should emphasize the fluid and adaptive nature of collective strategy, especially in the face of crises. It should convey the idea that strategic thinking evolves through various stages, influenced by learning, wisdom, and the cognitive capacities of decision-makers.

This refined representation underscores the dynamic and complex nature of collective strategy formulation in response to crises. It highlights how strategies are shaped by various factors, including the need for definitive answers, the emergence of wisdom, and the cognitive abilities of those in leadership roles. This approach offers a nuanced view of the strategic challenges and adaptations that societies undergo, particularly in times of crisis.

Question to ChatGPT: Considering other design options, reverting to use of the 4 great circles along the edges of a cuboctahedron, could you comment on how the dynamics associated with the Johari/Rumsfeld distinctions might interweave around the polyhedron if each was represented by one such circle -- thereby giving unique expression to each side, whether triangle or square. One possibility is

to see any specific combination of 3 circles as dominant, intermediary and subordinate

The idea of using the four great circles along the edges of a cuboctahedron to represent the dynamics of the Johari Window and Rumsfeld's distinctions offers a fascinating geometric interpretation of these psychological and epistemological concepts. Let's explore how this can be conceptualized:

- Great Circles as Representation of Johari/Rumsfeld Dynamics:
 - Each of the four great circles on the cuboctahedron could represent a different aspect of the Johari Window (open, blind, hidden, unknown) or Rumsfeld's categories (known knowns, known unknowns, unknown knowns, unknown unknowns).
 - The intersection and interplay of these circles on the polyhedron's surface could symbolize the dynamic and often complex nature of personal and collective understanding and awareness.
- Dominant, Intermediary, and Subordinate Circles:
 - On each face of the cuboctahedron, the three intersecting great circles could be seen as having roles of dominance, intermediation, and subordination. This hierarchy could represent the varying influence or prominence of different aspects of knowledge and awareness in specific situations or contexts.
 - For example, on a triangular face, the dominant circle might represent the most apparent or currently relevant aspect (e.g., 'known knowns'), the intermediary could symbolize a transitional or less apparent aspect (e.g., 'known unknowns'), and the subordinate could reflect an underlying or latent aspect (e.g., 'unknown unknowns').
- Unique Expression on Each Face:
 - Since each face of the cuboctahedron is bounded by a unique combination of three great circles, this creates a distinctive pattern or representation of knowledge and awareness on each face. This reflects the idea that our understanding and perspective can change depending on the context or viewpoint.
 - The square faces, intersected by four circles, can offer even more complex interplays, perhaps representing more intricate or multi-layered aspects of knowledge and awareness.
- Dynamic and Evolving Understanding:
 - As one moves around the cuboctahedron, the changing intersections of the circles can symbolize the fluid and evolving nature of our understanding and awareness. This dynamic representation aligns with the idea that our perception of what we know and don't know is continually shifting.
- Geometric Visualization of Psychological and Epistemological Concepts:
 - This approach provides a geometric visualization of complex psychological and epistemological concepts, using the cuboctahedron as a metaphor for the multifaceted nature of knowledge, awareness, and understanding.
 - It also suggests that our comprehension of various situations is not static but involves a continuous interplay of different elements of knowledge and awareness.

In summary, using the great circles of a cuboctahedron to represent the Johari Window and Rumsfeld's distinctions provides a unique and visually engaging way to contemplate the intricacies of knowledge, awareness, and understanding. It highlights the complexity and fluidity of these concepts, as well as the idea that our perspective can change significantly depending on how we approach and interpret different situations

Question to ChatGPT: If each great circle is distinctively coloured, its circulation could be understood as a standing sinusoidal wave -- bulging out (unbroken line) and in (broken line). To be clarified is the cognitive dynamic associated with the Johari/Rumsfeld distinctions: engaging "deterministically" with the unknown (?), engaging "tentatively" with the unknown (?), and corresponding modalities with respect to the known. More meaningful language for each is required -- the contrast is reminiscent of that between the traditional cognitive metaphors of earth, air, fire and water. However the interweaving of the circles requires that one modality would be absent for each triangle, although all are present for each square. Can you improve this articulation in combination with the previous response

Let's further elaborate on this concept:

- Great Circles as Colored Sinusoidal Waves:
 - Color and Waveform Representation: Each of the four great circles is given a unique color and represented as a standing sinusoidal wave, with the wave bulging out (unbroken line) and in (broken line) along its path. This visual representation can symbolize the dynamic nature of knowledge and awareness.
 - Symbolism of Wave Dynamics: The bulging in and out of the waves can represent the oscillation between different states of knowing and unknowing, akin to the shifting boundaries of awareness in the Johari Window and the various knowns and unknowns in Rumsfeld's framework.
- Cognitive Dynamics in Johari/Rumsfeld Context:
 - Engaging with the Unknown:
 - Deterministic Engagement (e.g., Earth Modality): This could be symbolized by a great circle where the wave is more pronounced or rigid, representing a firm stance or a more confident approach to navigating the unknown. It reflects a solid, grounded way of dealing with unknowns.
 - Tentative Engagement (e.g., Air Modality): Here, the wave might be softer or more fluid, symbolizing a cautious or flexible approach to the unknown, akin to exploring or feeling out unseen possibilities.
 - Engaging with the Known:
 - Assertive Engagement (e.g., Fire Modality): This could be visualized by a wave that is intense or sharply defined, representing an active and energetic engagement with what is known.
 - Reflective Engagement (e.g., Water Modality): A wave that is gentle or undulating could represent a reflective or introspective approach to the known, suggesting a deeper contemplation or absorption of knowledge.
- Interweaving of Circles and Modalities:
 - Triangular Faces: Each triangle on the cuboctahedron is bounded by segments of three great circles, each representing different modalities of engaging with the known and unknown. The absence of one modality on each triangle suggests a specific focus or limitation in the approach to knowledge and awareness in that context.
 - Square Faces: The square faces, intersected by all four great circles, represent a more comprehensive interplay of modalities. This suggests a multifaceted and holistic approach, where all aspects of engaging with the known and unknown are present and interwoven.
- Dynamic and Evolving Understanding:
 - Movement Around the Polyhedron: As one moves around the cuboctahedron, the changing intersections and overlaps of the colored waves symbolize the dynamic and evolving nature of understanding and awareness. It highlights the fluid interplay of different cognitive approaches and perspectives.
- Symbolism and Cognitive Metaphors:
 - Elemental Symbolism: The use of elemental metaphors (earth, air, fire, water) for each modality adds depth to the representation, drawing on traditional symbolism to convey different ways of knowing and perceiving.

By combining these elements, this conceptual model offers a visually and symbolically rich representation of the cognitive dynamics associated with knowledge and awareness. It underscores the complexity and fluidity of our understanding and the various ways we engage with the known and unknown, reminiscent of elemental interplays in nature.

Question to ChatGPT: Missing however are the consequences of ageing (learning/remembering and decline/unlearning/forgetting). How could this be incorporated into the representation. One additional technique is to allow spheres to travel through the circles designed as tori

Incorporating the aspects of aging, particularly the processes of learning, remembering, and the decline associated with unlearning and forgetting, into the representation of the great circles on a cuboctahedron adds another layer of meaning. Let's explore how this could be visualized, including the innovative idea of spheres traveling through these circles designed as tori (ring-shaped structures):

- Great Circles as Tori with Traveling Spheres:

Tori Representation: Transforming the great circles into tori can symbolize pathways or channels of cognitive processes. The torus shape, with its continuous surface, is an apt metaphor for the cyclic nature of learning and unlearning.

- Spheres as Cognitive Entities: Small spheres traveling through these tori can represent cognitive entities — thoughts, memories, ideas. Their movement through the tori symbolizes the journey of these entities through different stages of learning and aging.
- Visualizing Learning and Aging Process:
 - Color and Movement of Spheres: The color and speed of the spheres could vary to represent different stages of life and cognition. Brightly colored, fast-moving spheres could symbolize the vibrancy of learning and forming new memories in youth and adulthood.
 - Altered Movement for Aging: As the spheres approach sections of the tori representing later stages of life, their movement might slow down, change color, or become less stable, symbolizing the decline in memory formation, cognitive slowing, and the process of unlearning or forgetting.
- Interplay of Tori and Cognitive Dynamics:
 - Intersecting Pathways: The intersections of the tori, where spheres can transfer from one path to another, represent the complex interplay of different cognitive modalities (e.g., deterministic, tentative, assertive, reflective) throughout life.
 - Absence of a Sphere: In some sections of the tori, especially in those representing later life stages, the absence of a sphere (or its disappearance) could symbolize forgetting or the loss of certain cognitive abilities.
- Incorporating Johari/Rumsfeld Distinctions:
 - Modality Dominance in Life Stages: Different sections of the tori could emphasize different Johari/Rumsfeld modalities. For instance, the 'known knows' might be more prominent in sections representing mid-life, while 'unknown unknowns' could be more significant in sections symbolizing older age.
- Dynamic and Continuous Cycle:
 - Cyclic Nature of Cognitive Journey: The continuous loop of the tori reinforces the concept of life as a cyclic journey, with learning and unlearning as ongoing processes.
 - Interaction of Spheres and Tori: The dynamic interaction between the spheres and the tori visually represents the constant flux in cognitive states and processes throughout a person's life.

This conceptual model, with its tori and traveling spheres, offers a rich visual metaphor for the cognitive journey through different stages of life. It combines the complexity of cognitive modalities with the natural progression of aging, highlighting the intricate interplay of learning, memory, and cognitive decline. This representation can provide a deeper understanding of the cognitive changes associated with aging, framed within the broader context of knowledge and awareness.

Imagining the design of a mnemonic aid: Following some of the indications above, the 4 great circles of edges of a 3D cuboctahedral model can be distinctively coloured, as shown below -- each is then understood to correspond to one of the Johari/Rumsfeld cognitive modalities -- as a cyclic process. In colouring each great circle, lighter and darker colours are used alternatively as an indication of unbroken lines (darker) and broken lines (lighter). The triangular and square faces are then distinctively framed.

In principle a unique trigram could then be associated with each of the 8 triangles, and a unique tetragram with each of the 6 squares -- in each case with an appropriate correspondence with the framing edges (of broken and unbroken lines). Unambiguous cases in this respect are evident where a triangle or square is framed by either broken lines or unbroken lines. For the other 12 cases, further insight is required from polyhedral combinatorics with regard to the relation between the different lines in a trigram and the lines framing a triangular space (or a square space). The attribution of trigrams and tetragrams in the model below is therefore provisional.

Following clarification, instead of black, the individual lines might then be coloured to reflect this correspondence. Less evident at this stage is whether there is an unambiguous combinatorial solution --

or whether a meaningful solution, if possible, is only feasible through allowing for a dynamic of some kind. Also to be clarified is how any such solution might relate to the complementary correspondence between opposite faces -- as indicated by the *BaGua* arrangement in 2D and by the requirements of logical geometry of opposition. The latter requires that the connectives otherwise mapped onto the vertices of the rhombic dodecahedron correspond to those on the faces of the cuboctahedron (as its dual).

In the tentative configuration below, a degree of success appears to have been achieved in associating trigrams and tetragrams with triangles and squares according to the particular pattern of edge lines (with "broken" or "unbroken", as lighter or darker). However with 111 as point of departure, it is evident that some pairs of opposite trigrams are switched in relation to the *BaGua* configuration above -- reinforcing the argument for a dynamic solution. Further thought could be given to the orientation of trigrams and tetragrams in relation to the edge configurations with which they are associated -- whether from an aesthetic perspective (given any choice of rotation) or otherwise.

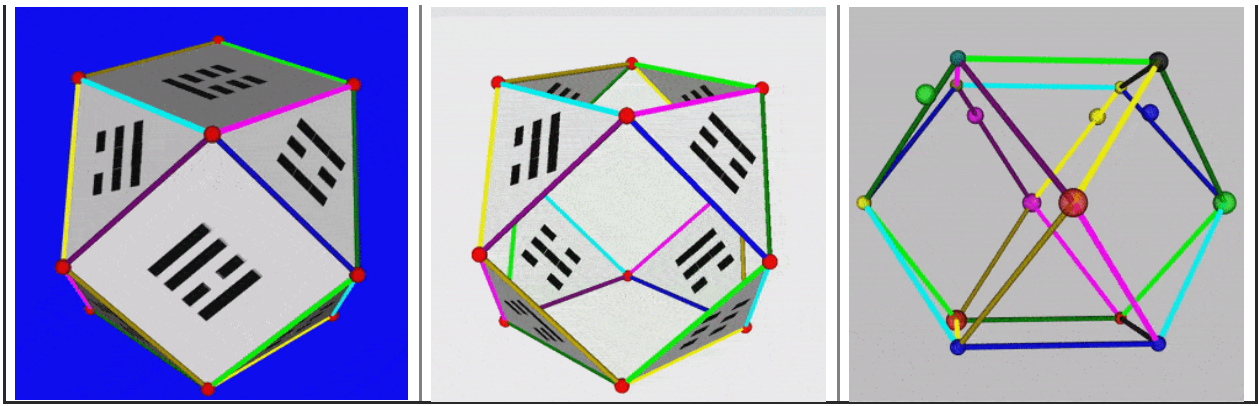
From a mnemonic perspective, of interest is the cognitive and semantic significance that might then be associated with the 12 vertices of the cuboctahedron, each being the confluence of two great circles -- with the associated pattern of 2 broken and 2 unbroken lines. Due to the symmetry of the configuration, the opposite vertex is then a reflection of this pattern. The complementarities and patterns of opposition then invite recognition of "positive" and "negative" connotations. Any dynamic might then suggest that these connotations be subject to alternation -- exemplified by the positive symbolism of "Earth" and any questionable negative connotation (as misplaced concreteness). The absence of a unique solution can be usefully understood as indicative of the necessity of avoiding attribution of simplistic connotations of "positive" and "negative".

Also of interest is the contrast between the 8 triangular faces and the 6 square faces in the light of the pattern of 14 logical connectives conventionally mapped onto the rhombic dodecahedron (as dual of the cuboctahedron). Given the abstruse nature of many of these connectives, "reduction" of the pattern of 14 to 8 -- avoiding consideration of 6 -- might be understood as highlighting a more comprehensible configuration for mnemonic purposes.

A second variant of the configuration (below centre) renders the 6 square faces transparent periodically. This suggests a way of considering the transition from the UN's earlier 8 Millennium Development Goals to a 14-fold set of Sustainable Development Goals -- assuming that 2 of the 16 could be considered "contradictory" or "tautologous" (as with the 16 logical connectives), and the 17th understood as the configuration as a whole. 8 of the 17 could then be understood as primary in some way, with 6 as secondary or of subtler systemic or cognitive significance.

A third variant (below right) uses the movement of spheres along the four great circle pathways to suggest one aspect of system dynamics. In seeking ways to represent increasing complexity comprehensible and memorable, further modifications might be made -- changing the dimensions of the spheres or stages along each pathway..

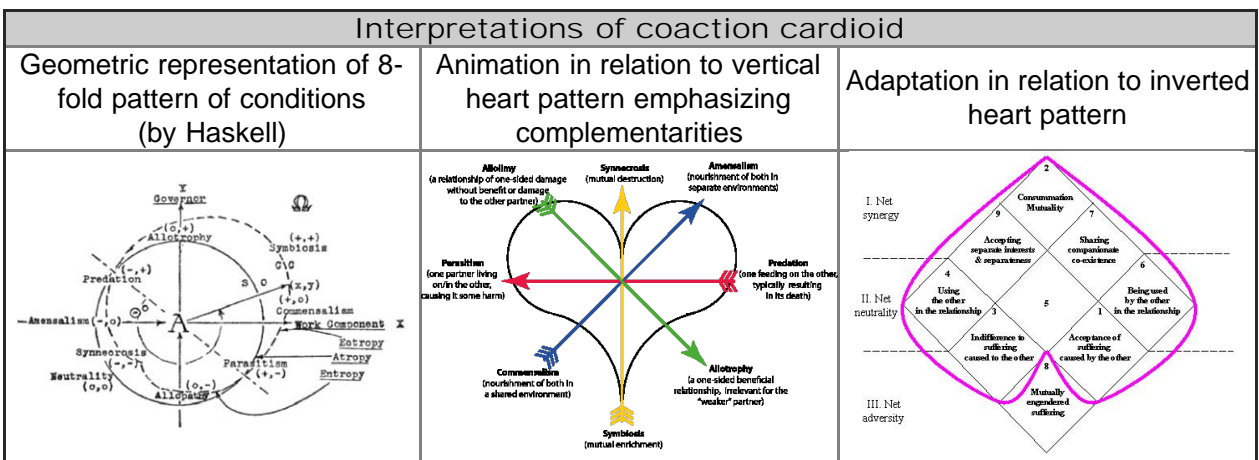
Tentative attribution of trigrams and tetragrams according to four distinctively coloured great circles of cuboctahedron (lighter line variant= "broken" lines; darker line variant="unbroken" lines)		
Animation with opposing squares visible	Animation with periodic transparency of coloured opposing squares	Animation of movement of coloured spheres along 4 great circle pathways



Commemorative cardioid? The question is then how the four categories of "knowns" might be fruitfully related to what is remembered or forgotten. A suggestive indication is offered by the systemic generalization of Edward Haskell in the light of ecosystemic relations between species in nature, presented schematically as a coaction cardioid below left and centre (*Full Circle: the moral force of unified science*, 1972). This can be variously explored with respect to governance implications, most notably in the light of commentary by Timothy Wilken (*The Relationship Continuum*, 2002):

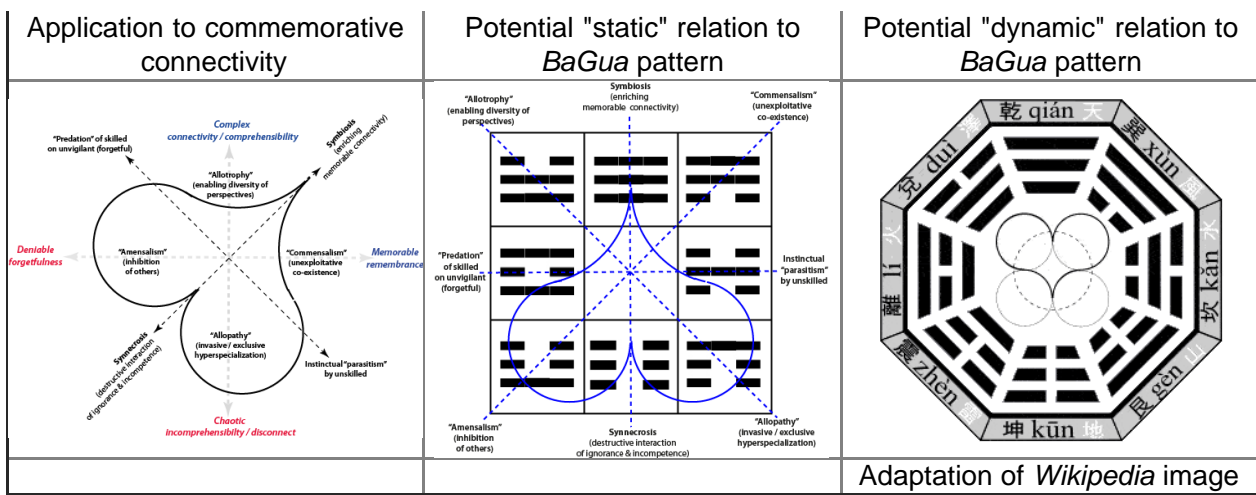
- *Cardioid Attractor Fundamental to Sustainability: 8 transactional games forming the heart of sustainable relationship* (2005)
- *Framing the Interplay of Leadership and Misleadership -- in the light of the coaction cardioid and the Mandelbrot set* (2007)

The vulnerability of collective memory also invites exploration through reframing the entangled relationship between the "heartless heads" (with a purportedly longer-term focus) and the "headless hearts" (with a focus on immediacy), as discussed separately using the images below (*Symbolizing Collective Remembering Otherwise*, 2018.)



Tentatively adapting Haskell's coaction cardioid from a systemic perspective suggests the schema on the left below, with axes of "complexity/connectivity" and "memorability". Following the association to the 4-fold pattern of "knowns / unknowns", this suggests a possible relation to the 8-fold *BaGua*, as indicated below centre. This immediately highlights the questionable assumption of associating a symbiotic relationship uniquely between connectivity and memorability with the "111" pattern deemed as essentially "positive" (metaphorical "heaven") -- in contrast to associating a chaotically destructive relation with the "000" pattern (metaphorical "earth"). This assumption is potentially corrected in the animation below right in which the orientation of the cardioid alternates to suggest the symbiotic association with "earth" -- consistent with the integrative symbolism of Earth..

Exploratory association of a commemorative cardioid with the dynamics of the *BaGua* pattern



Dynamic reframing of the cognitive challenge of memorable configuration

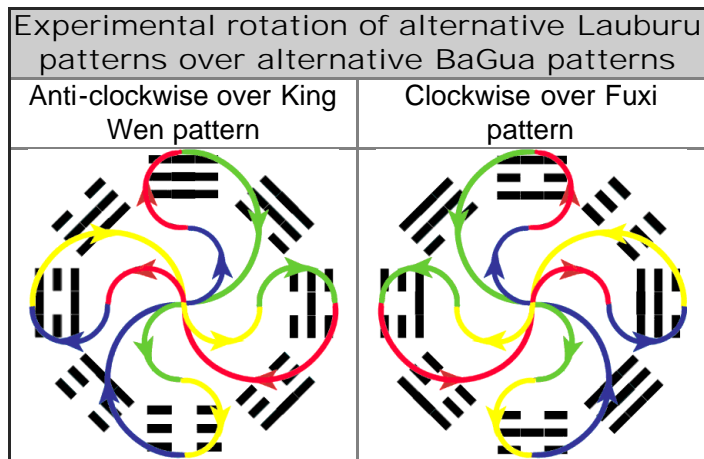
There is indeed the possibility that the "Eastern" and "Western" configurations can be memorably reconciled in the light of insights from [polyhedral combinatorics](#). Rather than a focus on correspondences between invariant configurations, another approach merits consideration in the light of the cognitive challenge and that of sustainable governance.

Dynamic relationships: Whether arrayed in 2D, 3D or more, the challenge can be understood metaphorically as one of dynamic adjustment of the forces associated with the configuration of polarities to ensure that a central focus is maintained "sustainably" (on average) -- however much there is momentary deviation from it in a variety of directions. In a sense it is that dynamic displacement which reflects "desirable" diversity around the central focus (in 2D, 3D, or more).

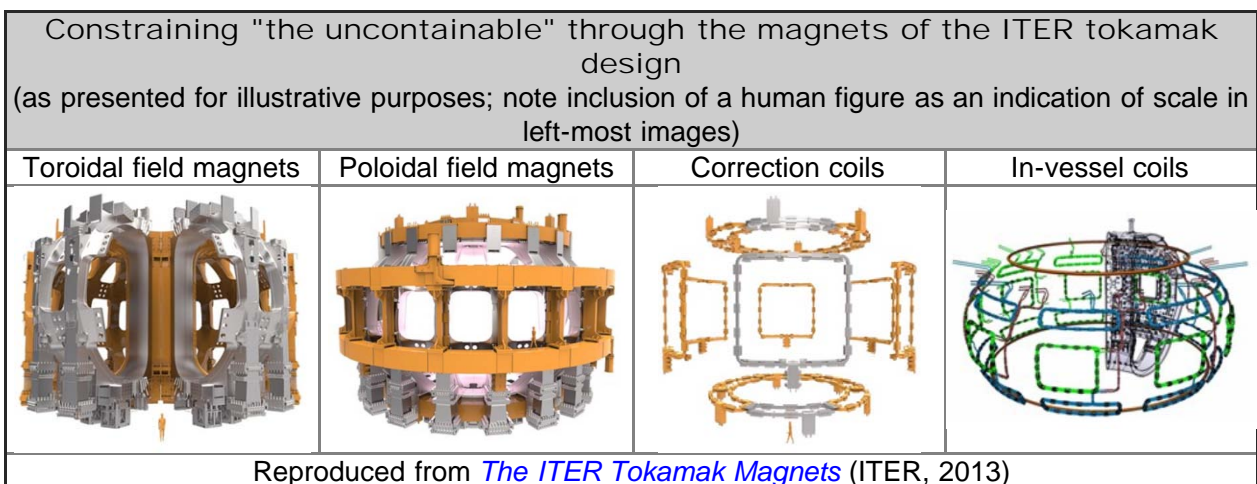
The possibility can be understood as featuring in various studies (T. Kunii, et al, *Visualizing Highly Abstract Mathematical Concepts: a case study in animation of homology groups*, [Multimedia Modeling](#), 1993; Vassil Sgurev and Vladimir Jotsov, [Method for Interpretation of Functions of Propositional Logic by Specific Binary Markov Processes](#), *Recent Contributions in Intelligent Systems*, 2016). One indication to that effect is the work of Jeffrey Z. J. Zhen (mentioned above):

The entire framework is described using 4 levels of hierarchy: n variables, 2^n states, 2^{2^n} functions, and $2^n!2^{2^n}$ logic functionals. Under the proposed framework, it is possible to determine higher level function complexity by analysing lower levels of organisation characteristics. These characteristics can be determined quite accurately because the symmetry conditions of variable and state organisations have invariant logic functions and a corresponding logic functional organisation. More symmetrical arrangement at state level creates more symmetrical permutations within the function space. Lower level properties are highly influential on the higher level properties of function components within a logic functional space. The proposed framework provides a logic foundation to describe complex binary systems using lower level properties, making analysis of systems more efficient and less calculation intensive. Different global coding schemes are discussed and typical two-variable cases of logic functionals are illustrated ([Variant Logic Construction Under Permutation and Complementary Operations on Binary Logic](#), *Variant Construction from Theoretical Foundation to Applications*, 2019)

Design metaphors: Various metaphors can be used to illustrate the dynamic. A melody or a sonnet can frame a memorable pattern of connectivity between associations. This could be achieved through a configuration of colours in a [colour wheel](#), understood dynamically as a colour cycle. The following speculative animations use the [lauburu](#) symbol of Basque culture in relation to variants of the *BaGua* pattern, as discussed separately ([Improvisation in Multivocal Poetic Discourse: Basque lauburu and bertsolaritza as catalysts of global significance](#), 2016).



A related design challenge is the magnetic containment within a toroidal fusion reactor of nuclear plasma to ensure that it does not come into destructive contact with the walls of the container -- an archetypal "container for what cannot be contained". The ITER nuclear fusion reactor uses 18 "D"-shaped toroidal field magnets placed around the vacuum vessel to produce a magnetic field whose primary function is dynamically to confine the plasma particles. 6 ring-shaped poloidal field coils are situated outside of the toroidal field magnet structure to shape the plasma and contribute to its stability by dynamically "pinching" it away from the walls. 18 superconducting correction coils are inserted between the toroidal and poloidal field coils to compensate for field errors caused by geometrical deviations due to manufacturing and assembly tolerances. Two non-superconducting coil systems inside of the ITER vacuum vessel provide additional plasma control capabilities.

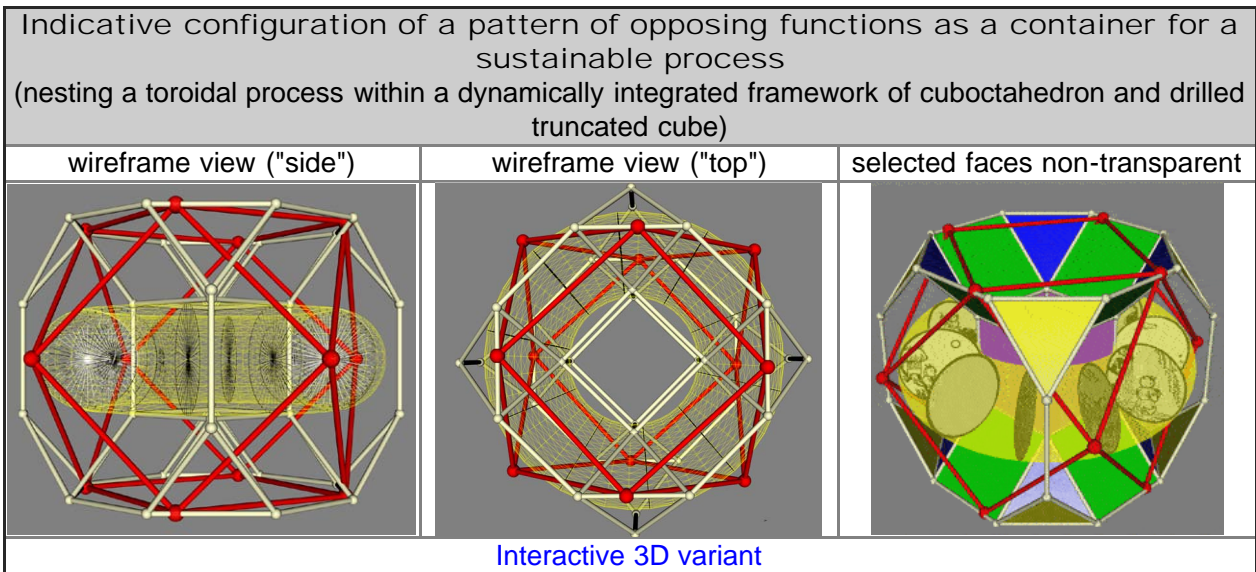


Thirty-five nations are collaborating to build ITER -- the European Union (plus Switzerland and the UK) is contributing almost half of the cost of its construction, while the other six members (China, India, Japan, South Korea, Russia and the USA) are contributing equally to the rest. Construction began in 2010 and the original 2018 first plasma target date was put back to 2025 by the ITER council in 2016. ([ITER delays revision of project's timeline](#), *World Nuclear News*, 27 June 2023).

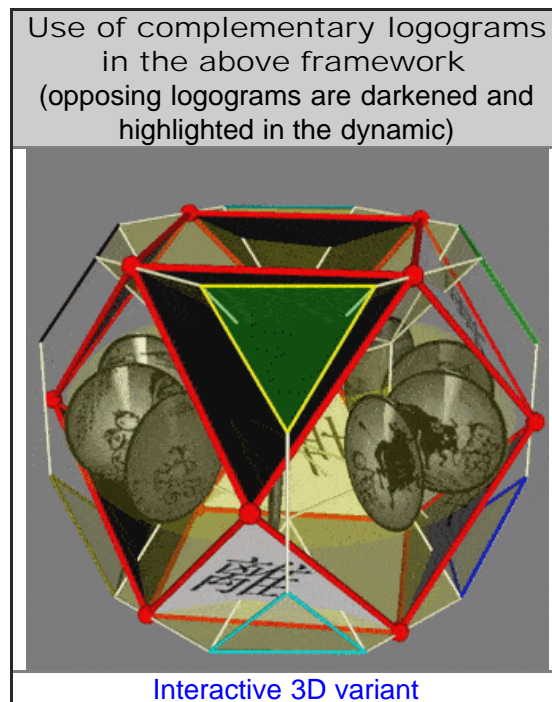
Speculative design: Given the potential of technomimicry, and as an indication of the challenges of attention control and focus, the ITER system of plasma control can be explored as a metaphor for the dynamics of sustainable governance ([Enactivating a Cognitive Fusion Reactor: Imaginal Transformation of Energy Resourcing \(ITER-8\)](#), 2006). A case can be made for shifting from global geometry to that of a torus ([Imagining Toroidal Life as a Sustainable Alternative: from globalization to toroidization or back to flatland?](#) 2019).

As a speculative design exercise, the cuboctahedron and drilled truncated cube (discussed above) can be combined dynamically (below) to create a form of toroidal "container" inspired by the ITER design (above). Within that framework a torus of associations -- corresponding to that of nuclear plasma -- can be set to rotate. The pattern of images is derived from the much-cited set of [10 Zen bulls](#) (or 10 ox-

herding images) -- with its cognitive significance discussed separately ([Circular configuration of cognitive phases framing toroidal experience?](#) 2017). Consistent with the magnetic containment of the ITER design, the animation could be further developed by animating a counter-balancing dynamic between opposing triangular elements of the configuration.



Following the dynamic design constraints illustrated by ITER, a further possibility is to build into the configuration a dynamic corresponding to that of the controlling role of counteracting "magnets" -- in this case the 8 *BaGua* elements, discussed previously and configured on opposing triangular faces of the cuboctahedron. Their complementarity offers an indication of the counterbalancing role of complementary cognitive functions with which those elements are associated. This is suggested by a typical array of alternative metaphors, indicated in the following table. Usefully to be emphasized is the elusive cognitive modality implied by the various metaphors associated with each element -- perhaps to be best understood as an aesthetic synthesis. The Chinese [logograms](#) are used in the following example



Technical note: Whilst there is considerable flexibility in modifying the above model in the [X3D-Edit software](#) used, a major challenge (for novices) is the counter-intuitive association of rectangular logogram images with the triangular sides. This involves iterative adjustment of the 4 parameters of the [TextureTransform](#) node, about which the application notes: *The visible effects of these transformations*

might appear reversed because the image changes occur before mapping to the geometry. This can make the process seem counter-intuitive. As remarked by ChatGPT from which guidance was sought:

The process can indeed be more of an art than a science, especially when dealing with complex shapes like a cuboctahedron. Each software has its quirks and ways of handling transformations, and what works in one scenario may not apply universally. This "artistic" aspect of 3D modeling often requires a lot of experimentation, intuition, and patience. Successful texturing is frequently achieved through trial and error, and understanding the peculiarities of the software you're working with.

Strategic implications of interwoven cognitive modalities

Cognitive possibilities: Features of the above configuration, and the approach to its construction, recall the processes and implications of production and inspiration associated with the design of [mandalas](#) and [yantras](#) of Eastern traditions -- although in this case the various possibilities of information technology enable dynamic features with potential cognitive implications to be embodied in the design. Aesthetic possibilities can also be imagined in order to enhance memorability. The challenge has been otherwise explored in terms of designing a "concordian" mandala in contrast with a "discordian" variant ([Con-quest Aesthetically Reframed via the Concordian Mandala](#), 2016; [Concordian Mandala as a Symbolic Nexus](#), 2016).

Specifically with regard to the above configuration, exploratory design enhancements might include:

- modifying the colour of various elements to achieve distinctive contrasts, possibly rendering some (relatively) transparent
- modifying the size of various features (radius of struts, radius of spheres)
- modifying the rate of movement, notably the rotating cuboctahedral framework or that of the ox-herding disks.
- modifying the images (or text) displayed on each face, possibly alternating between elements in the following table

Table of BaGua trigram correspondences (reproduced from [Wikipedia](#))

#	Trigram figure	Possible binary value ^[1]	Possible decimal sequential number ^[1]	Name	Translation: Wilhelm ^[2]	Image in nature (pp. I-II)	Phase ^[3]	Later Heaven's Direction (p. 269) ^[3]	Later Heaven's Equinox or Solstice ^[3]	Earlier Heaven's Direction ^[3]	Earlier Heaven's Equinox or Solstice ^[3]	Family relationship (p. 274)	Body part (p. 274)	Attribute (p. 273)	Stage/ state (pp. I-II)	Animal (p. 273)	Obtained Images ^[13]
1	☰	111	7	乾 <i>qián</i>	<i>the Creative, '(natural) force'</i>	heaven, sky 天	metal	northwest		south	Summer Solstice	father	head	strong, persisting	creative	馬 horse	三連 three lines
2	☱	110	6	兌 <i>duì</i>	<i>the Joyous, 'open (reflection)'</i>	lake, marsh 澤	metal	west	Fall Equinox	southeast		third daughter	mouth	pleasure	tranquil (complete devotion)	羊 sheep, goat	上缺 flawed above
3	☲	101	5	離 <i>lí</i>	<i>the Clinging, 'radiance'</i>	fire, glow 火	fire	south	Summer Solstice	east	Spring Equinox	second daughter	eye	light-giving, humane "dependence"	clinging, clarity, adaptable	雉 pheasant	中虛 hollow middle
4	☳	100	4	震 <i>zhèn</i>	<i>the Arousing, 'shake'</i>	thunder 雷	wood	east	Spring Equinox	northeast		first son	foot	inciting movement	initiative	龍 dragon	仰盃 face-up jar
5	☴	011	3	巽 <i>xùn</i>	<i>the Gentle, 'ground'</i>	wind, air 風	wood	southeast		southwest		first daughter	thigh	penetrating	gentle entrance	雞 fowl	下斷 broken below
6	☵	010	2	坎 <i>kǎn</i>	<i>the Abysmal, 'gorge'</i>	water 水	water	north	Winter Solstice	west	Fall Equinox	second son	ear	dangerous	in-motion	豕 pig	中滿 full middle
7	☶	001	1	艮 <i>gèn</i>	<i>Keeping Still, bound</i>	mountain 山	earth	northeast		northwest		third son	hand	resting, stand-still	completion	狗 dog	覆碗 face-down bowl
8	☷	000	0	坤 <i>kūn</i>	<i>the Receptive, field</i>	ground, earth 地	earth	southwest		north	Winter Solstice	mother	belly	devoted, yielding	receptive	牛 cow	六斷 six fragments

Rather than focusing on the seemingly questionable relation between the elements in any row, there is a case for exploring how these might be fruitfully understood as [figures of speech](#) calling for aesthetic insight, as potentially fundamental to the need for powerful rhetoric in governance ([Questionable Classification of Figures of Speech](#), 2016; [Being Spoken to Meaningfully by Constructs](#), 2023).

Corresponding strategic dynamics: The categories distinguished in the above table, especially as metaphors, can be (mis)understood as primarily static in emphasis. Of particular interest is the less

than obvious maner in which their dynamic implications are specifically evoked in a 5-fold pattern by the martial arts, most notably in a classic text on kenjutsu and the martial arts in general, written by the Japanese swordsman Miyamoto Musashi *The Book of Five Rings*. This is a text whose relevance to strategic management is now widely cited (David Guenni, *Strategy as a Way of Life: Universality in the "Book of Five Rings"*, *Classics of Strategy and Diplomacy*, 19 May 2022; Luis E. Romero, *Become A Business Samurai With Musashi's Five Powerful Lessons*, *Forbes*, 11 December 2020; Donald G. Krause, *The Book of Five Rings for Executives: Musashi's classic book of competitive tactics*, 1998). It is held to be one of the most insightful texts on the subtle arts of confrontation and victory to emerge from Asian culture. The book analyzes the process of struggle and mastery over conflict that underlies every level of human interaction.

The 5-fold interpretation is strongly associated with the Chinese *Wu Xing* philosophy, as presented schematically on the right below.

Eastern recognition of 5-fold patterning		5-phase <i>Wu Xing</i> cycle
<p>Alternative schematic indications of the relation between the 8-fold and 5-fold patterns</p>		
<p>Reproduced from <i>Bagua (Taoism)</i>, <i>Modern-Wushu-Fandom</i></p>	<p>Adapted from <i>Wu Xing</i> entry in <i>Wikipedia</i> Interaction arrows: black=generating; white=overcoming</p>	

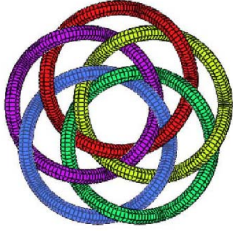
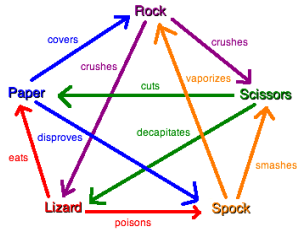
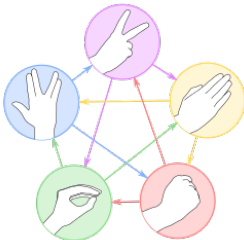

Curiously the "Eastern" *Wu Xing* pattern is comparable with the "Western" *Hygieia* pattern of the *Pythagoreans* -- as being of potential relevance with respect to any broader understanding of "health" as potentially understood as the underlying goal of any strategy, especially when recognized in "global" terms, as discussed separately (*Memorable dynamics of living and dying: Hygeia and Wu Xing*, 2014).

Borromean discourse? The allusive Eastern martial arts reference to "five rings" invites commentary in relation to the subtle connectivity of *Borromean rings* -- most typically explored and represented in their 3-fold variant with respect to their logical implications. Seldom mentioned is the 5-fold variant, as depicted below left.

Seemingly quite distinct is the complexification of the widely recognized hand game of *rock-paper-scissors* -- now extended to a "5-weapon" version *rock-paper-scissors-spock-lizard*. In such games, each weapon is (fatally) vulnerable to another. Ironically this recalls the influential strategic philosophy of *Mutually Assured Destruction (MAD)*. In that sense the distinctive hypotheses associated with each, calls another into question -- even to the point of being perceived as mutually incommensurable. This frames the possibility in terms of the paradoxical configuration of Borromean rings of which there are 3-fold, 5-fold, 7-fold, and more variants (Marc Chamberland and Eugene A. Herman, *Rock-paper-scissors meets Borromean rings*, *The Mathematical Intelligencer*, 37, 2015, 2; Chengzhi Liang and Kurt Mislow, *On Borromean links*, *Journal of Mathematical Chemistry*, 16, 1994).

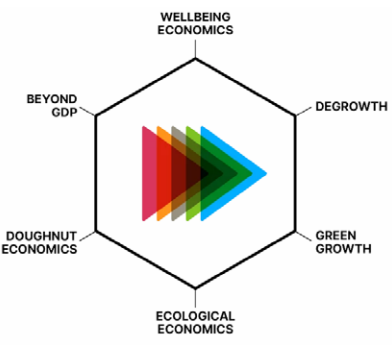
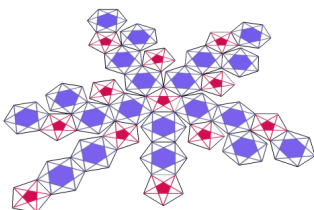
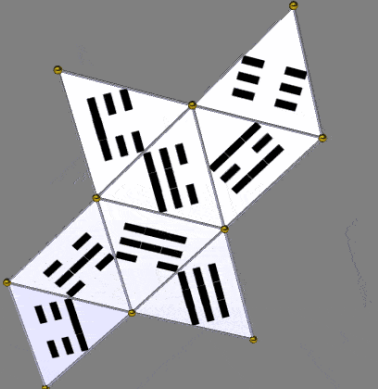
It can be argued that the dynamics of this elusive 5-fold pattern then merit comparison with the quest for the credibility and viability of the strategic challenge of the "5-turnarounds" currently promoted by the *Earth4All* initiative of the Club of Rome, as discussed separately (*Beyond binary dialogue -- the subtle possibility of "Borromean intercourse"?* 2023). Is there a necessary aesthetic and qualitative complement to the Western logical articulation of the 5-fold strategic challenge articulated by the experts of the Club of Rome -- one which remains to be explored and expressed if that challenge is to be rendered

comprehensible in practical terms?

Comparable 5-fold patterns of strategic relevance			
5-fold Borromean rings	5-fold game of Rock-Scissors-Paper-Lizard-Spock oriented graph		"5-turnarounds" of Earth4All initiative of Club of Rome
		hand gestures	
			
Reproduced from Chamberland and Herman (2015)	Geysirhead, CC BY-SA 4.0 , via Wikimedia Commons	DMacks, CC BY-SA 3.0 , via Wikimedia Commons	Reproduced from Earth4All

The Earth4All initiative, as the intellectual inheritor of the global modelling articulations of *The Limits to Growth* (1972), frames a 6-fold set of new economic paradigms through its Transformational Economics Commission, as variously articulated as a means of achieving the "5-turnarounds by Chandran Nair (*Tracking the transformations needed for a more equitable world*, Earth4All, 27 October 2022; *Transformation for a disparate and more equitable world*, Earth4All, 2022).

Curiously no effort would seem to have been made to reconcile the 5-fold and 6-fold strategic articulations. Such a challenge is far from trivial as is only too tragically illustrated by the analogous challenge evident in the long-standing crisis of the Middle East. One exercise in that regard explored the insights from spherical geometry (*Middle East Peace Potential through Dynamics in Spherical Geometry*, 2012). This focused on the possibility of engendering connectivity from incommensurable 5-fold and 6-fold conceptual frameworks. Of potential relevance to reconciliation of the 5- an 6-fold frameworks of the Club of Rome is the geometry of the 6-vertex octahedron -- offering 8-sides with which the *BaGua* strategic encoding could be associated. The octahedron is of course the geometric dual of the 6-sided cube, whose truncations are variously illustrated above -- including the cuboctahedron.

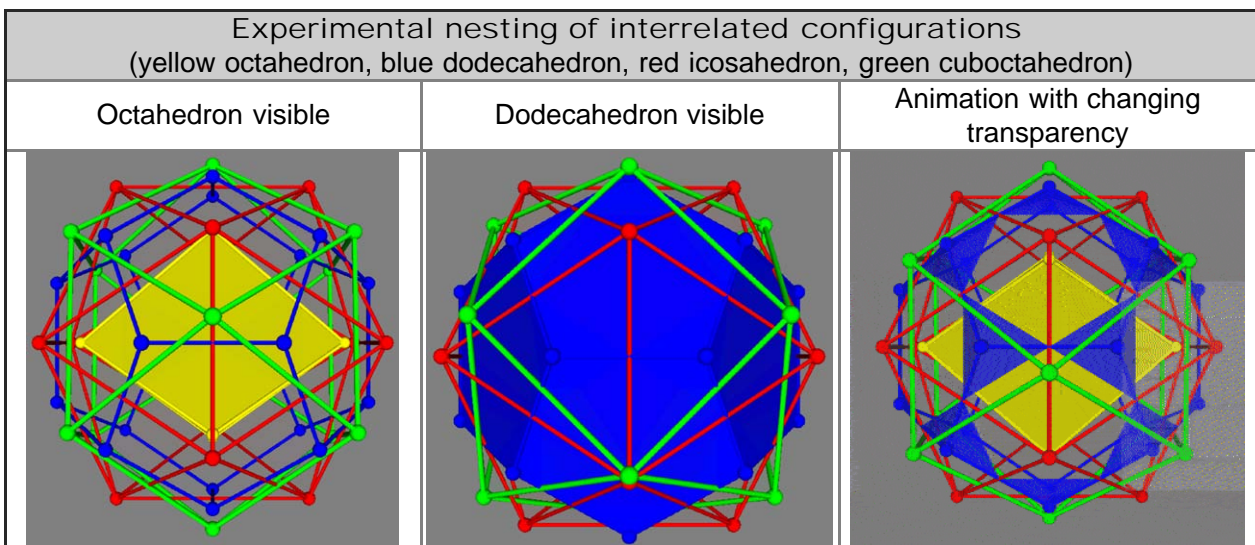
Framing the challenge of interrelating 5-fold, 6-fold and 8-fold strategic patterns		
6-fold pattern of new economic paradigms (according to the Club of Rome)	Interrelating 5-fold and 6-fold patterns active in the Middle East	Animation of (un)folding of 6-vertex 8-sided octahedron with <i>BaGua</i> trigram encoding
		
Reproduced from Earth4All	Animations generated using Stella Polyhedron Navigator	

Dynamically interweaving 8-fold, 5-fold, 12-fold, 14-fold and 20-fold strategic patterns?

The argument above emphasizes the insights to be derived from an 8-fold pattern. Somewhat inexplicably, the Eastern martial arts derive 5-fold implementations of that pattern -- widely held to be of strategic significance. Curiously, and with relatively little explanation, a Western strategic emphasis is

given to 12-fold, 14-fold and 20-fold patterns (*Checklist of 12-fold Principles, Plans, Symbols and Concepts: web resources*, 2011; *Pattern of 14-foldness as an Implicit Organizing Principle for Governance? Web resources* 2021; *Requisite 20-fold Articulation of Operative Insights? Checklist of web resources on 20 strategies, rules, methods and insights*, 2018). This absence of systemic explanation is consistent with that associated with the elaboration of the 16+1 Sustainable Development Goals of the UN, as previously argued -- and experimentally mapped onto the drilled truncated cube (*Polyhedral representation of Sustainable Development Goals including "Own Goals"?* 2022).

Nesting configurations: One approach to indication of the potential complex of semantic and cognitive relationships between such patterns is through nesting an icosahedron (with its dodecahedral dual) within a cuboctahedron. To that configuration may be added an octahedron such that its vertices are centered on the square faces of the cuboctahedron (recalling the geometrical relation of the octahedron to the truncation of the cube by which the cuboctahedron is formed). The relationships are then partially evident through the dynamic of the following in which the octahedron only becomes visible periodically when the cuboctahedron, icosahedron and dodecahedron are rendered transparent. By rotating the octahedron and cuboctahedron together particular vertices of the latter pass through particular vertices of the icosahedron (centered on the faces of the dodecahedron).



More complex nested configurations (and animations) could be explored with the addition of the rhombic dodecahedron (of significance to oppositional geometry) and the drilled truncated cube. Appropriate images could be added to the faces in each case.

Potential relevance to the UN's Sustainable Development Goals

Question to ChatGPT: In using the cuboctahedron for strategic mapping purposes, I have suggested that the 8 triangular sides might correspond to the earlier 8 UN Millennium Goals, with 6 square sides corresponding to 6 additional goals from the set of 17 UN Sustainable Development Goals. My argument suggests that 3 of the 17 are implicit in some way -- the 17th being representative of the whole, and 2 others excluded as "contradictory" or "tautologous" following the conventional mapping of only 14 logical connectives onto the rhombic dodecahedron (as dual of the cuboctahedron). Could you suggest how the 8 MDGs are a subset of the SDGs, and therefore which "additional" SDGs might be appropriately mapped onto the square sides.

Mapping the United Nations Millennium Development Goals (MDGs) onto the Sustainable Development Goals (SDGs) and then onto the structure of a cuboctahedron is an intriguing and complex task. The cuboctahedron, with its 8 triangular faces and 6 square faces, can serve as a metaphorical model to visualize the relationship between these two sets of goals.

Let's start by looking at the 8 Millennium Development Goals (MDGs), which were set in 2000 with

the aim to be achieved by 2015:

- | | |
|--|---|
| 1. Eradicate extreme poverty and hunger | 5. Improve maternal health |
| 2. Achieve universal primary education | 6. Combat HIV/AIDS, malaria, and other diseases |
| 3. Promote gender equality and empower women | 7. Ensure environmental sustainability |
| 4. Reduce child mortality | 8. Develop a global partnership for development |

Now, let's consider the 17 Sustainable Development Goals (SDGs), introduced in 2015 to succeed the MDGs:

- | | |
|---|---|
| 1. No poverty | 10. Reduced inequalities |
| 2. Zero hunger | 11. Sustainable cities and communities |
| 3. Good health and well-being | 12. Responsible consumption and production |
| 4. Quality education | 13. Climate action |
| 5. Gender equality | 14. Life below water |
| 6. Clean water and sanitation | 15. Life on land |
| 7. Affordable and clean energy | 16. Peace, justice, and strong institutions |
| 8. Decent work and economic growth | 17. Partnerships for the goals |
| 9. Industry, innovation, and infrastructure | |

In mapping the 8 MDGs onto the SDGs, we can see some direct correspondences:

1. MDG 1 (Eradicate extreme poverty and hunger) → SDG 1 (No poverty) and SDG 2 (Zero hunger)
2. MDG 2 (Achieve universal primary education) → SDG 4 (Quality education)
3. MDG 3 (Promote gender equality and empower women) → SDG 5 (Gender equality)
4. MDG 4 (Reduce child mortality) and MDG 5 (Improve maternal health) → SDG 3 (Good health and well-being)
5. MDG 6 (Combat HIV/AIDS, malaria, and other diseases) → SDG 3 (Good health and well-being)
6. MDG 7 (Ensure environmental sustainability) → SDGs 13 (Climate action), 14 (Life below water), and 15 (Life on land)
7. MDG 8 (Develop a global partnership for development) → SDG 17 (Partnerships for the goals)

For the cuboctahedron's square sides, if we consider six "additional" SDGs not directly linked to the MDGs, we might select:

1. SDG 6 (Clean water and sanitation)
2. SDG 7 (Affordable and clean energy)
3. SDG 8 (Decent work and economic growth)
4. SDG 9 (Industry, innovation, and infrastructure)
5. SDG 10 (Reduced inequalities)
6. SDG 16 (Peace, justice, and strong institutions)

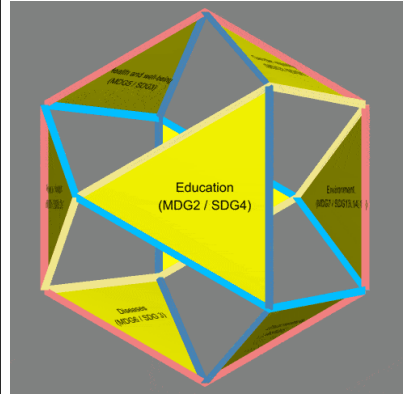
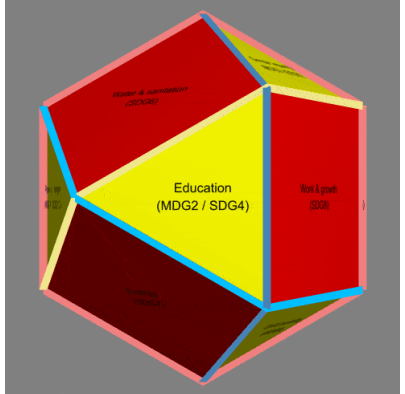
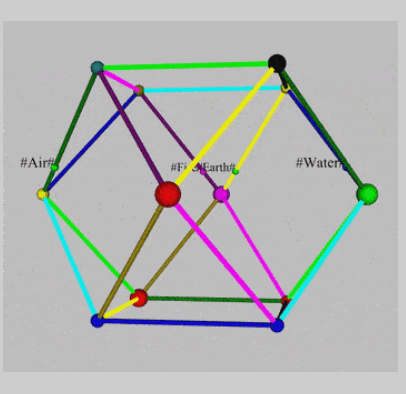
The three SDGs you consider implicit or excluded could be seen as overarching themes or goals that are either integrative (SDG 17 as representative of the whole) or not as directly represented in the structure (possibly SDGs 11 and 12, focusing on sustainable cities, communities, and responsible consumption, which may overlap with other goals).

This conceptual mapping uses the geometric structure of the cuboctahedron to represent the interconnectedness and evolution of global development goals, recognizing that each goal, while distinct, is part of a larger, interconnected framework.

The suggestions by ChatGPT are used in the cuboctahedral mappings (left and centre below). Rendering the square sides of the cuboctahedron transparent is suggestive of the UN's transition from the earlier MDGs to the current set of SDGs -- and potentially indicative of how they might be systemically related. A case is made separately for the continuing cognitive implications of the classical categories of Earth,

Air, Fire and Water as metaphors -- especially to the extent that they may be fundamental to the systemic integration of the SDGs (*Cognitive Navigation of the Elements as Indicative Strategic Metaphors*, 2023).

Following the argument above with regard to the 4-fold Johari/Rumsfeld pattern of cognitive modalities, the animation on the right suggests a way of thinking about the "elements" associated with many SDG categories -- as "ways of seeing" (*Interrelating Multiple Ways of Looking at a Crisis*, 2021). The latter notes the argument of Edward de Bono for multiple perspectives in a series of books, starting with *Six Thinking Hats: an essential approach to business management* (1985). That approach was subsequently summarized as *Six Frames for Thinking about Information* (2003). That 6-fold pattern could be explored as expressed in the cuboctahedron configuration.

Indicative use of cuboctahedron to interrelate development goals -- past and present (in the light of correspondences suggested by ChatGPT)		
Mapping of 8 Millennium Development Goals (MDGs)	Mapping of 14 Sustainable Development Goals (SDGs)	Classical cognitive metaphors associated with mutually intertwined great circle pathways
		
Animations prepared using Stella Polyhedron Navigator		

Curiously it is the UN's SDGs which variously imply the global systemic implications traditionally framed as the four elements -- long deprecated by science as reflecting outdated understanding, despite the crises with which they are now so evidently associated. The Johari/Rumsfeld categories suggest their recognition as cognitive modalities, potentially reframed in the light of the memorability of complexity -- and its vulnerability to distraction and ageing. They could be understood as contrasting "logics", following the argument of Edward de Bono (*Water Logic: an alternative to I Am Right, You Are Wrong*, 1994). A related set of metaphors of relevance to a society in crisis is the *Four Horsemen of the Apocalypse*: Death, Famine, War, and Conquest. These invite reframing as implying systemic cognitive processes and behaviours (*Beware of Legality, Accountability, Marketability, Security!* 2012; Ellie Lisitsa, *The Four Horsemen: Criticism, Contempt, Defensiveness, and Stonewalling*, The Gottman Institute).

Current AI perspective: How the cognitive and systemic implications of the Four Horsemen of the Apocalypse might be understood as processes in terms of the 4-fold Johari Window and memorability -- with its correspondence to the classic elements: earth, air, fire, water -- was put to ChatGPT.

- Four Horsemen of the Apocalypse: Traditionally symbolizing Conquest (or Pestilence), War, Famine, and Death, these can be intriguingly juxtaposed with the Johari Window, a psychological tool used to understand personal and interpersonal awareness:
 - Conquest and the "Open Area": This quadrant represents traits known to both oneself and others. Conquest, or the drive to expand and dominate, can be seen as a visible, often acknowledged aspect of human nature and societal behavior.
 - War and the "Blind Spot": This area covers traits others see but the individual doesn't. War, as an extension of unresolved conflicts and unacknowledged tensions, mirrors how blind spots can lead to interpersonal and international strife.
 - Famine and the "Hidden Area": This quadrant involves aspects known to oneself but hidden from others. Famine could represent unspoken scarcities and deficiencies in societies and individuals, which are often concealed due to fear or shame.

- Death and the "Unknown": This represents traits unknown to both oneself and others. Death, as an inevitable but largely mysterious aspect of existence, correlates with the enigmatic and often unforeseen forces in our lives and societies.
- Classical elements of earth, air, fire, and water: These can also be symbolically connected to the Four Horsemen, providing a different lens of understanding:
 - Conquest/Pestilence and Air: Air, often associated with intellect and communication, could relate to the spread of ideas (and diseases) swiftly and pervasively, much like conquest or pestilence.
 - War and Fire: Fire symbolizes energy, force, and destruction, akin to the nature of war. It represents the raw, uncontrollable power that can both forge and devastate.
 - Famine and Earth: Earth is connected to growth, nourishment, and stability – all of which are absent in famine. The barrenness of famine contrasts starkly with the fertility typically associated with earth.
 - Death and Water: Water, often linked with emotion, intuition, and the unknown depths, resonates with the concept of death. Just as water can be calm or overwhelming, death is a natural but deeply enigmatic part of life.
- Rumsfeld's Johari Window Interpretation and Strategic Conception: Donald Rumsfeld famously spoke about "known knowns, known unknowns, and unknown unknowns", a concept that aligns well with the Johari Window framework. In strategic conception, particularly in complex environments like policy-making or organizational leadership, this framework helps in understanding and navigating uncertainty and knowledge gaps:
 - Known Knowns ("Open Area"): This quadrant represents clear, shared knowledge. In strategic planning, these are the certainties or established facts that form the basis of decision-making. Emphasizing memorability here involves reinforcing core competencies and institutional knowledge.
 - Known Unknowns ("Blind Spot" & "Hidden Area"): These areas cover aspects that are either unrecognized by oneself or withheld from others. In strategic terms, these are foreseeable challenges or gaps in knowledge. Addressing these requires creating an environment where learning and candid feedback are encouraged, thus aiding in memory retention and cognitive resilience.
 - Unknown Unknowns ("Unknown"): This quadrant represents unforeseen challenges and information. In strategy, this is akin to preparing for completely unexpected events or disruptions. Building cognitive resilience in this area involves fostering adaptive learning and flexible thinking to better remember and respond to novel situations.
- Learning Dynamics and Memorability: Learning, especially in strategic contexts, is not a static process but one that involves continuous adaptation and reevaluation of information:
 - Encoding and Retrieval: Strategies and information must be encoded in such a way that they are easily retrievable when needed. This involves creating memorable, clear, and accessible knowledge structures.
 - Adaptation and Flexibility: As circumstances change, previously learned strategies might become obsolete. The ability to unlearn and relearn is crucial, and this adaptability should be embedded in the learning process.
 - Cognitive Decline and Countermeasures: With age or under stress, cognitive abilities can decline, impacting strategic thinking. Countermeasures include ongoing education, mental exercises, and creating systems that support decision-making, like decision-support tools or collective intelligence frameworks.
- Cognitive Decline and the Four Horsemen: If we metaphorically align the Four Horsemen with stages or aspects of cognitive decline in strategic settings:
 - Conquest/Pestilence (Cognitive Overload): Just as conquest or pestilence can overwhelm a system, cognitive overload can paralyze decision-making.
 - War (Conflict and Stress): Just as war represents conflict, stress can lead to impaired cognitive function, affecting learning and memory.
 - Famine (Knowledge Gaps): Like famine represents scarcity, knowledge gaps in strategic contexts can lead to poor decisions.
 - Death (Obsolescence): As death signifies an end, cognitive decline can lead to the obsolescence of once-effective strategies and knowledge.

Addressing the challenge of communication among individuals with varying levels of knowledge, learning ability, and cognitive function -- specifically those who believe they know, those who are

learning and acknowledge their lack of knowledge, and those experiencing or perceived to be experiencing cognitive decline -- requires a nuanced understanding of knowledge sharing and perception.

- Communication Dynamics in the Johari Window Framework:
 - Open Area (Confident Communicators): Individuals who believe they know often operate in the "open area". They are confident in their knowledge and communication. However, this confidence might sometimes prevent them from seeing different perspectives or acknowledging their own blind spots.
 - Blind Spot (Learning Individuals): Those who are actively learning and acknowledge their gaps typically have expanding "blind spots". They are aware of what they don't know and often seek feedback and new information. Their communication style is usually open to learning and adapting, but they might miss out on unobserved strengths or insights.
 - Hidden Area (Cognitively Declining or Perceived as Such): Individuals experiencing cognitive decline, or perceived as such, might retreat into the "hidden area". They might be aware of more than they can express or be perceived as less knowledgeable than they are, leading to communication barriers.
- The Four Horsemen as Communication Challenges:
 - Conquest/Pestilence (Dominant Communication): Reflects the overpowering communication from those who are overconfident in their knowledge, possibly overshadowing or dismissing others' contributions.
 - War (Conflict in Understanding): Symbolizes the conflicts and misunderstandings that can arise between different levels of knowledge and cognitive abilities. This could be between confident individuals and learners, or between those with declining cognitive functions and others.
 - Famine (Lack of Effective Communication): Represents the scarcity of effective, clear communication, especially in acknowledging and addressing the knowledge and cognitive gaps between different groups.
 - Death (End of Productive Dialogue): Signifies the breakdown or cessation of meaningful communication, often resulting from unresolved conflicts or persistent misunderstandings.

In addressing complex communication challenges, especially those involving different states of knowledge and cognitive abilities, the assumption of an all-encompassing, unbiased meta-perspective can be inherently flawed. A meta-perspective is not immune to the biases and limitations represented by the Johari Window's quadrants and the Four Horsemen. For example, an individual or group adopting a meta-perspective might still have blind spots (unknown unknowns) or be overconfident in their perceived comprehensive understanding (akin to Conquest).

In conclusion, while a meta-perspective is valuable in understanding and managing complex dynamics, it is crucial to approach it with an awareness of its inherent limitations and biases. By doing so, the perspective becomes a tool for enhanced understanding and decision-making, rather than a definitive solution. This approach is more aligned with the reality of ever-evolving knowledge landscapes and diverse cognitive capabilities.

Question to ChatGPT: Can the points made be interwoven in a more integrated way. This could follow from the suggestion that the various 4-fold sets cited could be understood as aspects, instances or metaphors of a 4-fold set of elusive systemic processes. The classical elements are mapped onto interweaving great circles around a cuboctahedron. Of further interest is the work of Edward de Bono on *Six Frames for Thinking about Information* -- integrating his various 6-fold patterns (shoes, hats, medals, etc). One challenge is therefore how these might relate to the 4-fold pattern, especially in the light of his work on "water logic" ("water"?) in contrast to "rock logic" ("earth"?). In relation to strategies, the UN's SDGs can be understood as variously manifesting the 4-fold set (as in the preoccupation with water, land, etc). The further question, involving Rumsfeld's interpretation, is how such processes might relate to learning stages and final decline, whether individually or collectively -- specifically with regard to remembering and forgetting. Can you suggest a more useful integration.

- Four-Fold Sets as Systemic Processes:
 - Johari Window & Rumsfeld's Unknowns: These can be seen as frameworks

for understanding awareness and ignorance at both personal and collective levels. They underscore the dynamic nature of knowledge and the interplay between known and unknown factors in strategic thinking.

- Classical Elements: Earth, air, fire, and water can metaphorically represent different states or types of systemic processes (e.g., solidity/stability, change/fluidity, energy/dynamic force, and adaptability/emotion).
- Edward de Bono's Six Thinking Hats and Water Logic:
 - Six Thinking Hats: This can be related to the 4-fold pattern by considering the hats as different approaches or perspectives within a broader systemic process. For example, 'White Hat' (information) and 'Green Hat' (creativity) might align with the 'Open Area' of the Johari Window.
 - Water Logic vs. Rock Logic: 'Water logic' (fluid, adaptable thinking) aligns with elements like water and air, representing change and adaptability, while 'rock logic' (solid, unchanging thinking) aligns with earth, representing stability and rigidity. This dichotomy can be applied to understand the dynamic balance in strategic processes.
- UN's Sustainable Development Goals: The SDGs can be interpreted through the lens of the 4-fold set, where each goal addresses different aspects of human and environmental needs (e.g., 'Clean Water and Sanitation' aligns with water, 'Affordable and Clean Energy' with fire).
- Learning Stages and Final Decline:
 - Learning Stages: Aligning with Rumsfeld's unknowns, the stages of learning (from unconscious incompetence to unconscious competence) can be understood as a journey from the 'Unknown' of the Johari Window to the 'Open Area'.
 - Final Decline and Forgetting: This aspect can be related to the gradual shift from the 'Open Area' (known knowns) back to the 'Unknown' (unknown unknowns), signifying the loss of knowledge or decline in collective memory.
- Proposed Integration:
 - Create a Unified Framework: Develop a conceptual model that integrates these various elements. The cuboctahedron with interweaving great circles could symbolize the interconnected nature of these systems. Each vertex or face could represent different aspects of the 4-fold and 6-fold sets.
 - Map Concepts to Geometric Structure: Assign elements of the Johari Window, classical elements, De Bono's hats, and SDGs to specific parts of the cuboctahedron. This mapping would visually represent the relationships and interactions between these concepts.
 - Delineate Learning and Decline: Use the geometric model to illustrate the progression of learning stages and the process of decline/forgetting. This could involve a flow or cycle around the cuboctahedron, showing the transition through different stages of awareness and memory.
 - Incorporate Water and Rock Logic: These can be used to interpret the fluidity or rigidity in approaching the SDGs and other strategic processes, highlighting the need for balance between adaptability and stability.

This integrated approach offers a way to visually and conceptually connect diverse but related theories and frameworks, providing a holistic view of strategic thinking, learning, and systemic processes. It can serve as a tool for deeper understanding and analysis of complex global challenges and strategies.

Question to ChatGPT: Understood in that light, could it be inferred that the different SDGs reflect contrasting cognitive biases/preferences for logical styles. The argument had suggested that 14 of the 17 SDGs could be mapped onto the sides of the cuboctahedron (consistent with the conventional mapping of logical connectives onto the vertices its dual). Could that be integrated into your suggestion

- Cuboctahedron and SDGs:
 - 14 SDGs on Sides: If you've mapped 14 of the 17 SDGs onto the sides of a cuboctahedron, each side could represent a specific goal. The cuboctahedron, with its unique structure, can symbolize the interconnected and multifaceted nature of these goals.
 - Remaining 3 SDGs: The remaining three SDGs could be represented by other elements of the cuboctahedron, such as its vertices or internal spaces, to signify their

overarching or foundational roles.

- Cognitive Biases and Logical Styles:
 - Each SDG, mapped onto a side of the cuboctahedron, could be analyzed in terms of the cognitive biases or logical styles it might reflect. For example, goals related to environmental sustainability might align with a more holistic, interconnected (water logic) style of thinking, while goals focused on economic growth might align with more structured, linear (rock logic) thinking.
- Integration with Logical Connectives:
 - The dual of the cuboctahedron, the rhombic dodecahedron, has vertices that can correspond to logical connectives. This geometric relationship can be used to explore the logical underpinnings or implications of each SDG.
 - This mapping can help in understanding the logical coherence or contradictions within the SDGs, as well as potential cognitive biases influencing their interpretation and implementation.
- Unified Framework:
 - In the proposed conceptual model, integrate the idea that different sides (representing SDGs) reflect different logical styles or cognitive biases. This can provide insights into why certain goals are prioritized over others and how they interrelate.
 - The model can be used as a tool for analyzing the SDGs, providing a novel way to understand the cognitive and logical dimensions of global strategies.
- Application and Analysis:
 - This integrated model can be utilized for strategic analysis, education, and advocacy, offering a novel way to engage with and understand the SDGs.
 - It can also serve as a basis for discussing how different logical approaches and cognitive biases might enhance or hinder the achievement of these goals.

By integrating these concepts, the model becomes not just a representation of the SDGs but also a framework for exploring the cognitive and logical aspects of global strategic thinking. It encourages a deeper examination of how we approach and understand complex, interconnected global challenges.

Question to ChatGPT: Clearly careful thought is required in exploring how a particular logical connective might be especially related to a particular SDG as a form of cognitive bias. Less evident to me is whether conventional mapping of connectives onto a rhombic dodecahedron is held to imply a particular relation between them -- and (by further implication) with the associated SDGs

Exploring the relationship between logical connectives, as mapped onto a rhombic dodecahedron, and their potential correlation with specific Sustainable Development Goals (SDGs) is indeed a complex and nuanced task. Here's a way to think about this relationship:

- Logical Connectives and Rhombic Dodecahedron:
 - Mapping Connectives: In conventional logic, connectives like AND, OR, NOT, IF, THEN, etc., are used to form logical statements. The challenge is in mapping these connectives onto the vertices of a rhombic dodecahedron in a way that makes sense both logically and geometrically.
 - Implying Relationships: The arrangement of these connectives on the dodecahedron might not inherently imply specific relationships or interactions between them. However, the spatial proximity or arrangement could be interpreted to represent logical correlations or oppositions.
- SDGs and Cognitive Biases:
 - Direct Correlation: Directly correlating each SDG with a specific logical connective might be overly simplistic, as each goal is complex and multifaceted. However, it's possible to explore which logical operations might be most commonly associated with the thinking or strategies behind each SDG.
 - Cognitive Biases: Different SDGs might naturally align with certain cognitive biases or logical styles. For instance, goals dealing with environmental issues might align with holistic, integrative logic (akin to 'AND' logic), whereas goals focusing on immediate economic concerns might align with more exclusionary or binary logic (akin to 'OR' logic).
- Interplay Between SDGs and Connectives:

- Reflecting Interactions: The way SDGs interact or conflict with each other can be reflected in the logical connectives. For example, achieving one goal might necessitate the 'AND' conjunction with another, or be in an 'OR' exclusionary relationship with a third.
- Complexity of Interpretation: This approach allows for a more nuanced understanding of the SDGs, beyond just their individual objectives, looking at how they logically interplay in the pursuit of sustainable development.
- Broader Implications:
 - Strategic Analysis: Using this framework, policymakers, educators, and strategists can analyze the SDGs not just as isolated targets but as parts of a complex logical system, considering how different goals support, contradict, or depend on each other.
 - Awareness of Biases: It encourages awareness of the cognitive biases and logical frameworks that might influence how these goals are approached, prioritized, and implemented.

In summary, while there may not be a conventional or inherent implication of relationships between logical connectives on a rhombic dodecahedron, such a mapping can serve as a conceptual tool to explore the complex interactions and cognitive biases associated with the SDGs. This approach promotes a deeper and more systemic understanding of global strategies for sustainable development.

The exchange with ChatGPT is indicative of both possibilities of clarification and a degree of potentially misleading "algorithmic encouragement" with regard to a speculative exploration challenged by paradox and incomprehensibility (*Paradoxes of Durable Peace, Heaven and a Sustainable Lifestyle*, 2023; *Antagonistic Dualities: Polarization and Paradox*, 1983). The quest for integrative closure may be inherently illusory (*Engaging with Elusive Connectivity and Coherence*, 2018). The matter was further clarified by the following.

Question to ChatGPT: Given questionable understanding of what is implied by "integrative" and "unified," in a context much challenged by collective learning/forgetting dynamics, the response could usefully indicate the elusive nature of the quest for any cognitive or strategic "Holy Grail" -- and the role of paradox with respect to any claims in that regard.

Here's an expanded perspective that incorporates these elements:

- Elusive Nature of Integration and Unification
 - Inherent Complexity: The pursuit of a unified or integrative approach to understanding and strategizing, especially concerning global challenges like the SDGs, involves navigating a landscape filled with complex, often contradictory information and perspectives. This complexity makes any singular, all-encompassing solution or understanding (a cognitive "Holy Grail") elusive.
 - Diverse Perspectives and Interests: The varied and often conflicting interests and perspectives of different stakeholders (nations, organizations, communities) further complicate the quest for a unified strategy. Each group brings its unique biases, priorities, and interpretations, making consensus and comprehensive understanding challenging.
 - Dynamic Nature of Knowledge: Collective learning is not a static process; it's dynamic and subject to the ebbs and flows of cultural, social, and technological changes. What is considered a comprehensive and integrative understanding today might become obsolete or inadequate tomorrow, contributing to the elusive nature of this quest.
- Role of Paradox
 - Paradox of Simplicity and Complexity: There's a paradox in seeking simplicity in the face of complexity. The desire for a unified, integrative approach often leads to oversimplification, which can obscure the nuanced understanding necessary for effectively addressing complex challenges.
 - Paradox of Knowledge and Ignorance: In the quest for comprehensive knowledge, the more we learn, the more we become aware of our ignorance – a phenomenon often reflected in the concept of Rumsfeld's unknowns. This paradox highlights the limitations of our understanding and the ongoing nature of the learning

process.

- Paradox of Action and Reflection: There's a tension between the need for immediate action (especially in addressing urgent global challenges) and the need for deep reflection to develop truly integrative and effective strategies. Balancing these often conflicting demands is a central paradox in strategic planning.
- Suggestive Approach in Light of These Considerations
 - Embracing Complexity and Uncertainty: Recognize and accept the inherent complexity and uncertainty in the quest for integrative understanding and strategy. This acceptance is crucial for developing more adaptable and resilient approaches.
 - Valuing Diverse Perspectives: Encourage and value a diversity of perspectives and disciplines in the formulation of strategies. This pluralism can lead to more innovative and comprehensive solutions.
 - Continuous Learning and Adaptation: Foster a culture of continuous learning, where strategies are regularly reviewed and adapted in response to new information and changing circumstances.
 - Acknowledging and Engaging with Paradoxes: Consciously engage with the paradoxes inherent in this quest, using them as catalysts for deeper inquiry and creative problem-solving.

Question to ChatGPT: In that context, about which any meta-perspective is likely to be directly challenged, it is to be expected that some form of "cognitive speciation" would be a primary characteristic -- severely inhibiting emergence of any global coherence

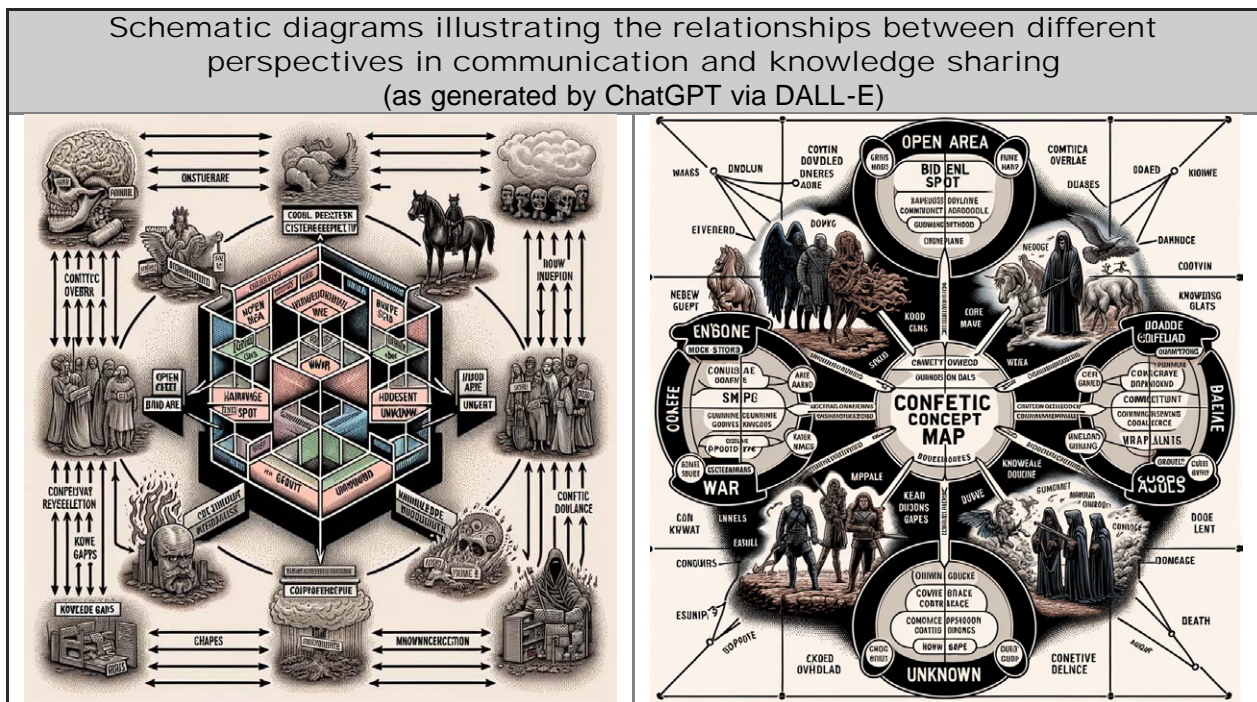
- Cognitive Speciation: Implications and Challenges
 - Divergence of Cognitive Frameworks: Just as biological species diverge over time, cognitive speciation implies the development of varied and potentially incompatible ways of thinking and understanding the world. This divergence can occur due to cultural, environmental, ideological, or technological influences.
 - Challenges to Global Coherence:
 - Communication Barriers: Diverse cognitive frameworks can lead to difficulties in communication and understanding, as different groups may interpret information and respond to challenges in fundamentally different ways.
 - Conflicting Worldviews: These divergent cognitive frameworks often reflect underlying values and worldviews, which can be in conflict, making consensus on global issues challenging.
 - Resistance to Integration: Cognitive speciation might lead to resistance against integrating different perspectives, as groups become attached to their specific cognitive models.
- The Role of Paradox and Complexity
 - Paradox of Unity and Diversity: There's a paradox in seeking global coherence while respecting and preserving the diversity of cognitive frameworks. Balancing unity and diversity becomes a complex endeavor, as both are essential for a healthy, functioning global society.
 - Complexity in Global Strategy: Developing strategies that effectively address global challenges becomes more complex in light of cognitive speciation. Strategies must be adaptable and flexible enough to accommodate diverse cognitive models.
- Navigating Cognitive Speciation
 - Cross-Cultural and Interdisciplinary Dialogue: Promote dialogue and collaboration across different cultural and disciplinary boundaries to enhance mutual understanding and learning.
 - Embracing Cognitive Pluralism: Recognize and value the strengths and insights offered by diverse cognitive models. Cognitive pluralism can lead to more innovative and holistic solutions to global challenges.
 - Adaptive and Inclusive Policymaking: Develop policies and strategies that are adaptable to different cognitive frameworks and inclusive of diverse perspectives. This approach can help in finding common ground and building coherence on a global scale.

Educational and Awareness Programs: Implement education and awareness programs that foster an understanding of different cognitive frameworks and the importance of cognitive diversity in addressing global issues.

In summary, cognitive speciation, while presenting challenges to global coherence, also offers opportunities for richer, more diverse perspectives and solutions. Navigating this landscape requires a balance between acknowledging the uniqueness of different cognitive models and fostering an environment where these diverse perspectives can contribute to a more coherent and effective global strategy.

Alternatives to text articulation: ChatGPT was then prompted to generate images (via DALL-E as released in October 2023) of the categories, processes and relationships in the above response. While the capability to automatically generate accurate and text-rich systems diagrams from discussions is still evolving, the potential for such technology is significant. It would streamline the process of visualizing complex ideas and strategies, making it more accessible and efficient. For now, combining AI's language processing abilities with manual diagram creation using specialized software remains the most effective approach. However, the pace of advancement in AI suggests that more sophisticated solutions may not be far off.

Despite the meaninglessness of most of the indicative labels within the generated diagrams, the images are included below. As such they are potentially a useful metaphor by which to understand a cognitive "disconnect" -- namely that between the "unfocused" imagery through which many think "globally" in relation to strategies (notably as presented by the media with little granularity) and the distinctive categories which may be deployed under other circumstances for other purposes (especially for "local" strategy implementation where granularity is vital).



These semantic/concept maps illustrate the relationships between the Johari Window's four quadrants and the Four Horsemen of the Apocalypse, each mapped to a specific quadrant. The maps also include elements representing cognitive abilities and communication challenges.

- Johari Window Quadrants:
 - Open Area: Labeled with 'Conquest/Pestilence', representing confident communication and shared knowledge.
 - Blind Spot: Labeled with 'War', symbolizing conflict in understanding and learning gaps.
 - Hidden Area: Labeled with 'Famine', indicating areas of knowledge scarcity and unexpressed insights.
 - Unknown: Labeled with 'Death', denoting unknown challenges and the limits of understanding.

- Four Horsemen of the Apocalypse:
 - Each Horseman is associated with a specific quadrant of the Johari Window, as described above.
- Cognitive Abilities and Challenges:
 - Cognitive Overload: Linked to 'Conquest/Pestilence', highlighting the overwhelming nature of too much information.
 - Conflict and Stress: Associated with 'War', emphasizing the impact of stress on cognitive function and communication.
 - Knowledge Gaps: Connected to 'Famine', illustrating the impact of missing information on strategic planning.
 - Cognitive Decline: Tied to 'Death', representing the end of effective communication and decision-making ability.
- Meta-Perspective Challenges: Labels around the diagram should emphasize the need for continuous reevaluation, diverse input, and flexibility, acknowledging the limitations and biases inherent in any meta-perspective.

ChatGPT was then challenged to generate simpler diagrams with clear labelling but was unable to do so. It offered the following comment when challenged -- itself of relevance to representation of global strategies at this time.

However, the challenge in this case lies with the limitations of the image generation tool itself, rather than the clarity of your requests. The DALL-E image generation tool, while advanced in creating diverse and creative visuals, sometimes interprets prompts with a degree of artistic license. This means it might add extra aesthetic elements or interpret the request in a way that incorporates more complexity than intended. This is particularly evident in tasks requiring high precision and simplicity, like creating a straightforward geometric diagram with clear text labels.

A degree of artistic licence is indeed to be appreciated in many contexts -- challenging the widespread deprecation of AI in terms of "hallucination", when human communication may be specifically valued for its imaginative rhetorical flourishes and figures of speech. ChatGPT was then prompted with regard to the possibility of combining into a poem the earlier focus on intertwining of the Johari Window, the Four Horsemen, and the classical four elements -- especially as constrained or enhanced by memorability in the elaboration and implementation of strategy.

In the realm where shadows and light intertwine, Four Horsemen tread 'cross the Johari's fine line. Their steps echo in the chambers of thought, In the dance of the known and the unknown, unsought.	Together they ride, the elements at their side, Earth, Air, Fire, Water, in them, they confide. In strategy's embrace, their lessons are told, In memories kept, in actions bold.	In this woven tapestry of collective minds, Cultural creativity in its threads entwines. Ideas bloom like stars in night's vast dome, In shared spaces where thought and insight roam.
First rides Conquest, bold and unbidden, In the open fields where nothing is hidden. His steed gallops where the air is clear, Where truths and revelations appear.	So ponder we must, as these forces we meet, In the dance of strategy, both bitter and sweet. For in understanding their intricate song, We find our place, where we truly belong.	Yet, as time's tide ebbs and flows, The clarity of collective memory slows. Wisdom once bright, now shadows cast, As fragments of understanding slip into the past.
War follows next, with blind spot shield, In battles unseen on a hidden field. His sword clashes where silence reigns, In lands of conflict, unseen	In this labyrinth of fate where paths intertwine, Lies a Gordian Knot, a paradox divine. A tangle of truths, hopes, and fears, Woven through time, through joy	In this dance of culture, memory, and thought, The lessons of ages, easily forgot. A delicate balance, as history's pen, Writes and erases, again and

pains.	and tears.	again.
Famine creeps in with a hidden face, In the shadowed quadrant, a secretive place. His presence felt where knowledge is sparse, In the drought of insight, in whispers harsh.	Here, the Horsemen and elements meet, In a dance of destiny, both harsh and sweet. Their entwined paths, a strategy's quest, Seeking a consensus, a global behest.	So, we stand at the crossroads of history's call, To untangle the knot, to understand the fall. For in the heart of complexity, a truth we find, The unity of strategy, in a world entwined.
Lastly comes Death, in the unknown deep, Where secrets and mysteries silently sleep. His quiet march, in water's flow, Brings endings from which new beginnings grow.	Yet in this knot, lies the crux of our tale, The search for a key that will prevail. For in understanding this complex weave, Lies the wisdom to act, to conceive.	

This poetic presentation -- readily challenged, enhanced and complemented by stylistic variants -- raises the question as to how the SDGs will be reframed and enhanced on the occasion of the UN's [Summit of the Future](#) in 2024. The aesthetic argument has been variously presented (*A Singable Earth Charter, EU Constitution or Global Ethic?* 2006). Could the overly modest achievements of COP28 have been reframed in some way, as was the case with *The Charge of the Fossil Brigade at COP27* (2022)?

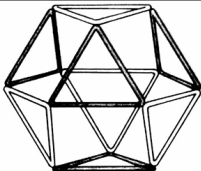
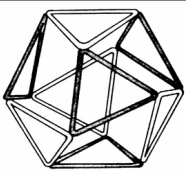
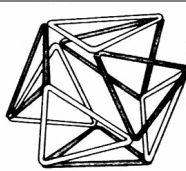
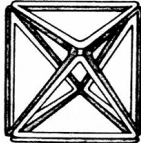
Cuboctahedral kinematics: With respect to any cuboctahedral mapping of virtues-sins (as mentioned above), of particular relevance is [Buckminster Fuller's](#) recognition of the manner in which the cuboctahedron (otherwise known as the vector equilibrium) can be transformed dynamically into other polyhedra (*Vector Equilibrium and its Transformation Pathways*, 1980; Buckminster Fuller, *Vector equilibrium jitterbug*, 20 October 1975). This process, as shown below, is termed the [kinematics of the cuboctahedron](#), now widely known as [jitterbug transformation](#) (H. F. Verheyen, *The complete set of Jitterbug transformers and the analysis of their motion*, *Computers and Mathematics with Applications*, 17, 1989; Lynnclaire Dennis, et al *Building on the Known: a quintessential jitterbug*, *The Mereon Matrix*, 2018). From both a mapping and a cybernetic perspective, these transformations are especially valuable in indicating how semantic fields might be conflated or distinguished coherently.

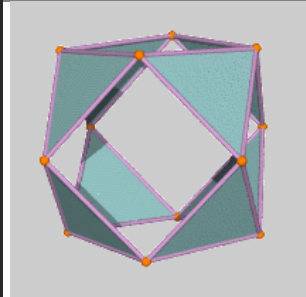
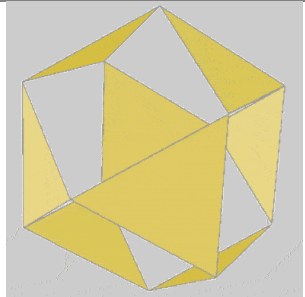
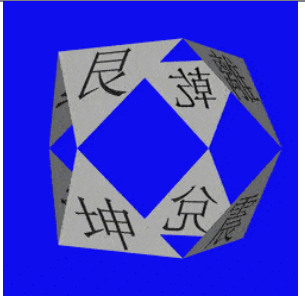
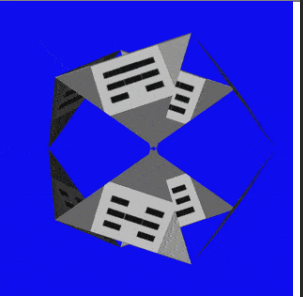
Many videos and animations of that "jitterbug" movement are readily accessible :

- Maurice Starck: [The Jitterbug \(Polyhedra-World](#), 30 April 2005)
- [Adrian Rossiter: Jitterbug Animations \(Antiprism\)](#)
- Bob Burkhardt: [Jitterbug](#) (applet)
- Robert W. Gray: [Jitterbug defines polyhedra; The Jitterbug Motion](#)
- [Buckminster Fuller's Jitterbug \(YouTube](#), 5 May 2007)
- [Bucky's "Jitterbug" -- Vector Equilibrium](#) (16 October 2008).
- Joe Clinton: [R. Buckminster Fuller's Jitterbug \(YouTube](#), 15 March 2008)

By folding along the diagonals of its square sides, the 12-vertex cuboctahedron (14-faces -- 8 triangular, 6 square) can be progressively transformed through the 12-vertex [icosahedron](#) (20 triangular faces), and then folded into a 6-vertex [octahedron](#) (8 triangular faces). The 5-fold pattern is evident as the array of 5 triangular faces around each of the 12 vertices of the icosahedron -- with each triangle then necessarily associated through its vertices with 3 overlapping 5-fold patterns. That pattern is even more evident in the 20-vertex dodecahedron (12 pentagonal faces) implied as the dual of the icosahedron. Through this process the 12 vertices of the cuboctahedron are transformed into the 12 edges of the octahedron via the 30-edge configuration of the icosahedron (and the dodecahedron).

Schematic indication of "jitterbug" transformation of cuboctahedron

(folding into and from an octahedron)			
cuboctahedron	(pre) icosahedron	(post) icosahedron	octahedron
			
Adapted from <i>Vector Equilibrium and its Transformation Pathways</i> (1980)			

Contrasting examples of jitterbug transformation Single cuboctahedron to an octahedron and back again			
			
Generated by Antiprism (Antiprism: Jitterbug Animations)	Adaptation from Maurice Starck, <i>The Jitterbug</i> (<i>Polyhedra-World</i> , 30 April 2005)	Kindly prepared by Sergey Bederov of <i>Cortona3D</i> with <i>BaGua</i> logograms	Adapted with <i>BaGua</i> trigrams from the model on the left by Sergey Bederov
Technical note: As indicated by the animations on the right, with a higher level of expertise, distinctive images can be associated with the faces of such animations, whether via the Antiprism software or through use of X3D-Edit.			

With respect to questions of cognitive and semantic significance, of interest are the alternative variants of the logograms and their arrangement, as detailed in *BaGua* tables in the *Wikipedia*. In particular there are logograms for the name of the trigram and, more simply, its manifestation in nature. The *BaGua* array is presented in two distinct orders. It is of course the case that the trigrams can be read bottom-up or top-down, with other implications, most notably in the world of politics (*Unquestioned Bias in Governance from Direction of Reading?* 2016).

Strategic art? This dynamic, deemed fundamental by Buckminster Fuller in his study of synergetics, is indicative of the manner in which distinctive patterns -- seemingly unrelated -- may be variously favoured in any static strategic articulation. It is the dynamic which ensures their coherence and remains a challenge to integrative thinking and comprehension. Given its strategic implications as a martial art, of interest with respect to memorability is the manner in which the 8-fold and 5-fold patterns are embodied in the *Song of Thirteen Postures of Tai Chi Chuan* -- as described by Dennis Watts of the Gold Coast Tai Chi Academy, and more extensively by Michael P. Garofalo (*Thirteen Postures of Taijiquan: Eight Gates and Five Directions*).

Their combinations and permutations are cataloged more or less exhaustively in the different styles of solo forms by which *tai chi* is mostly known by the general public. *Pushing hands* (*tuishou*) is practiced so that students have an opportunity for "hands-on" experience of the theoretical implications of the solo forms. This is a two-person training routine practiced in internal Chinese martial arts such as *baguazhang*, *xingyiquan*, and *yiquan*. It is also played as an international sport akin to judo, sumo and wrestling.

Does this suggest the possibility of an articulation of a "two-person training routine" by the UN of the **"Seventeen Postures of Sustainable Development Goals"**?

Note: The experimental interaction with ChatGPT, in the light of the strategic clarifications explored above, is continued in a separate document (*Sustainable Development Goals through Self-reflexive Root Cause Analysis*, 2023).

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