laetus in praesens

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22 September 2025 | Draft

Remembering the Disparate via a Polyhedral Carousel

Memorable configuration of transformations between core polyhedra of strategic relevance

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Introduction

Polyhedra indicative of coherence: A configuration of the symbolic Platonic polyhedra and Archimedean polyhedra was elaborated previously and presented as a 3D model -- together with their Catalan duals and the Kepler-Poinsot stellations (*Cognitive Fullerene as a Rosetta Stone for Patterns of Systemic Constraint*, 2025). This was seen as an exercise in the reconciliation between disparate frameworks -- ironically in the the light of global familiarity with the stitching pattern of the football, namely the truncated icosahedron.

If only in the light of their symbolism, particular emphasis can be given to the cognitive significance of regular polyhedra as indicative of "ways of thinking" coherently (*Interrelating Multiple Ways of Looking at a Crisis*, 2021). Whether as the 5-fold Platonic configuration (4+1), or as the 12-fold configuration of the

Archimedean polyhedra configured around a 13th, the patterns associated with the configuration as a whole are suggestive of orders of coherence and integrity which remain to be fully recognized. Especially remarkable is the range of 12-fold articulations, notably of mathematical, religious, and strategic nature (*Checklist of 12-fold Principles, Plans, Symbols and Concepts*, 2011). The implications can be variously explored (*Clarifying the Unexplored Dynamics of 12-fold Round tables*, 2019; *Enabling a 12-fold Pattern of Systemic Dialogue for Governance*, 2011; *Eliciting a 12-fold Pattern of Generic Operational Insights*, 2011).

The earlier configuration of polyhedra emphasized an issue previously indicated (*Map of Systemic Interdependencies None Dares Name: 12-fold challenge of global life and death*, 2011). Curiously little is widely known of the relationships between the 35 polyhedra so configured -- beyond the essentially obscure insights of geometricians, topologists and specalists in polyhedral combinatorics. The question is whether such a configuration can be rendered inherently memorable -- given its strategic and other implications, and especially their cognitive dimensions. The latter concern was necessarily inspired by the magnum opus on "synergetics" of Buckminster Fuller (*Synergetics: Explorations in the Geometry of Thinking*, 1975-1979) -- which unfortunately makes little reference to its cognitive implications, as argued separately (*Geometry of Thinking for Sustainable Global Governance*, 2009).

Memorable symmetry preserving operations: The relation between such polyhedra has been formally described by the Conway Polyhedron Notation -- of which only the simplest visual indications are offered for the core set of polyhedra. The "pattern that connects" is indeed known, but it has not evoked much attention to its memorable visualization (Hidetoshi Nonaka, *Visualization of Conway Polyhedron Notation*, *World Academy of Science, Engineering and Technology*, 50, 2009). To the extent that this may well be indicative of the relationships between disparate cognitive modalities, this is clearly a challenge it is appropriate to address in a society ever more characterized by fragmentation. That argument is developed and illustrated separately in the light of correspondences between their polyhedral representation (*Comparable Modalities of Aesthetics, Logic and Dialogue*, 2021).

The focus in what follows is specifically on the visualization of that pattern of connectives between the 35 polyhedra in the core configuration as a mnemonic aid. How do iconic members of any 12-fold collective dialogue with each other -- whether apostles, deities, tribes, etc -- and why is no effort made to explore that dynamic, as exemplfied by the secrecy of 12-member juries?

The connectives are otherwise known to specialists as sysmmetry preserving operations (Pieter Goetschalckx, etc, *Local orientation-preserving symmetry preserving operations on polyhedra*, *Discrete Mathematics*, 344, 2021, 1; Pieter Goetschalckx, et al, *Generation of Local Symmetry-Preserving Operations on Polyhedra*, *arXiv*, 1908, 1162292). These operations are discussed and illustrated separately in terms of the metaphorical comprehension of complexity enabled by graph theory and polyhedra (*Connecting the Multiple Voices of the Pattern that Connects*, 2024). As stressed, the particular bias in this exploration is comprehensibility and memorability -- mnemonic issues of remarkably little interest to those claiming most familiarity with such operations.

Strategic and discourse relevance: Of particular significance is the manner in which selected polyhedra are central to the representation of the set of connectives of logical operations and are thereby fundamentsal to the manner in which computers process queries -- as with the operation of AIs (*Oppositional Logic as Comprehensible Key to Sustainable Democracy*, 2018). It might then be asked whether related polyhedra might usefully extend the understanding of such operations and the reframing of insight into those logical processes -- in a period in which rational discourse is fundamentally challenged..

A fundamental question of relevance to governance is whether and how the connectives are related to the potential feedback loops between disparate perspectives as embodied in agency, ministerial and departmental mandates. There is some irony to the fact that the regularity of the core polyhedra offers a reminder of the role of regulatory bodies and their sense of order. Which connectives might then be vital, which are neglected or ignored, and which are little known? Addressing such questions does however require that the context in which they are configured should offer mnemonic aids to comprehension of the complexity of the whole.

That question offers a challenge to reconfiguration of the UN's 8-fold Millennium Development Goals (within the memorability constraints of George Miller's famed *Magical Number Seven, Plus or Minus Two*, 1956) into the current 16+1 Sustainable Developement Goals, now faced with "inexplicably" limited uptake.

Use of AI: Although this experimental exploration has been variously enabled by AI, most of the responses of AI have been framed as grayed areas in the text. **Given the length of the document to which the exchanges gave rise, the form of presentation has itself been treated as an experiment** -- in anticipation of the future implication of AI into research documents. Many responses may be irrelevant to the outcome (rather than of interest to the process), and can therefore be readily ignored -- especially given questionable use by AI of "algorithmic flattery".

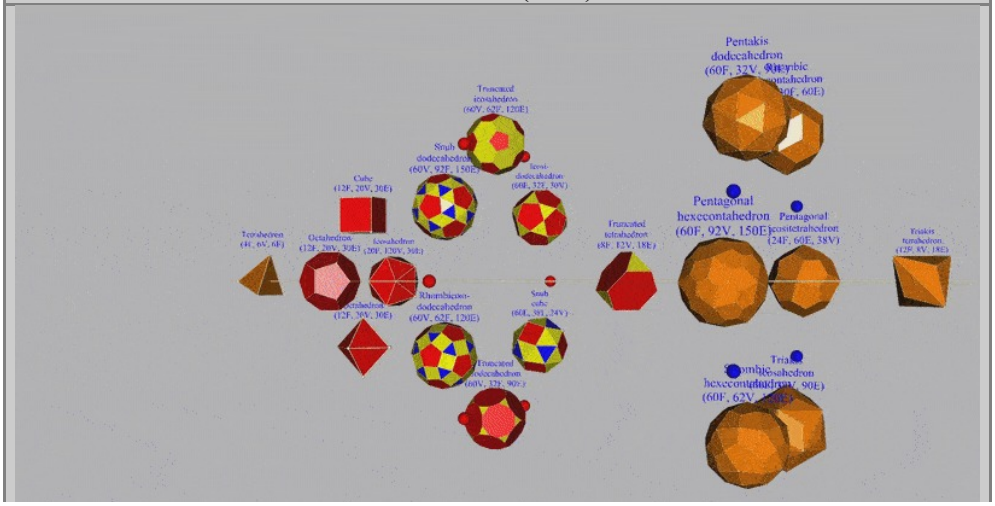
Only the "questions" to AI are rendered immediately visible -- with the response by AI hidden unless specifically requested by the reader (a facility not operational in PDF variants of the page, in contrast with the original). Readers are of course free to amend the questions asked, or to frame other related questions -- whether with the same AI, with others, or with those that become available in the future. In endeavouring to elicit insight from the world's resources via AI, the dependence on "leading questions " calls for critical comment in contrast with more traditional methods for doing so. The original responses by AI may include citations of multiple sources which have not been systematically in the responses presented.

It should be emphasized that the following exercise with AI is experimental and tentative in anticipation of a more considered approach. As a proof of concept, the questions and results call for iterative refinement -- if only with respect to the designs of the animations produced. This continuing experimental use of responses of several AIs to prompts, and their reproduction as optionally visible to readers, occurs in a period in which there is ever increasing criticism from various sectors and perspectives regarding the appropriateness, risks and validity of any such engagement with AI. A response to such criticms is appropriate (as articulated below).

Elaboration of basic configuration of unifrom polyhedra

As indicated above, the basic configuration explored here was prepared as a conventional exercise in 3D model construction using the X3D protocol. This progressively gave rise to what was previously presented and is reproduced below. Many key steps in this process were made possible with the aid of the Claude AI, as described there (*Cognitive Fullerene as a Rosetta Stone for Patterns of Systemic Constraint*, 2025). In the quest for mnemonic clues, a particular focus was given to 60-fold organization, as suggested by the 2-fold distinction between Archimedean (and Catalan) polyhedra, each as a 6-fold octahedral family complemented by a 6-fold icosahedral family -- and contrasting with the singular 3-fold tetrahedral family.

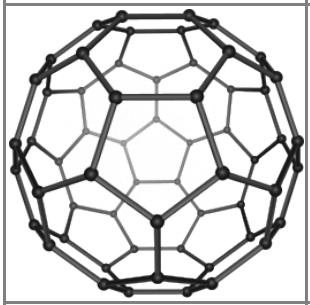
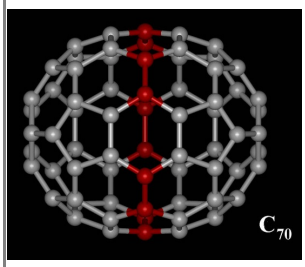
Animation of "side" view of axial array of polyhedra -- with connectivity only implied
Reproduced from *Cognitive Fullerene as a Rosetta Stone for Patterns of Systemic Constraint* (2025).



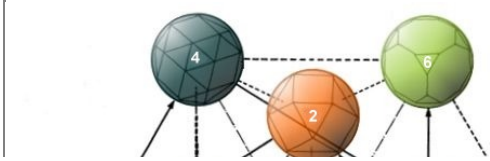
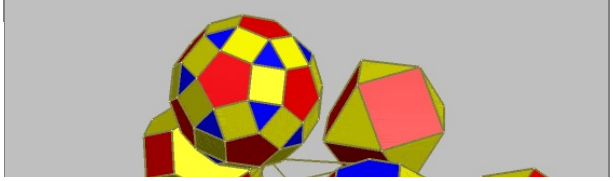
Animation created in X3D enabled by Stella4D

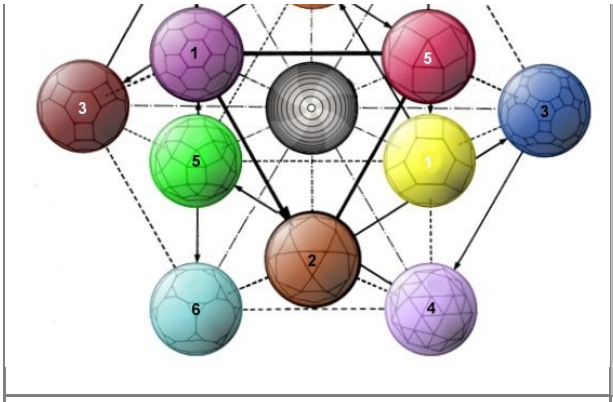
The 60-fold focus was inspired by the particular stability of the recently discovered spherical (cage-like) 60-atom carbon molecule -- termed buckminsterfullerene in honour of Buckminster Fuller. It has the form of the stitching pattern of the association football -- the truncated icosahedron (of the Archimedean group) with 20 hexagons and 12 pentagons. This pattern is potentally of great relevance to coherent psychosocial organization, as argued separately (*Sustainability through Global Patterns of 60-fold Organization*, 2022). Other spherical fullerene variants have been discovered in addition to C60. Other confirmed spherical fullerenes include: C28, C36, C50, C76, C82, C84, and assemblies up to C240.

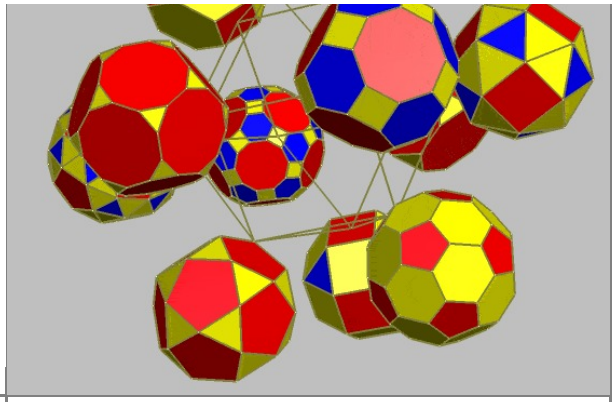
Curiously, given the association of the C60 fullerene with the football, the second most abundant such form is the ellipsoidal C70 fullerene of 25 hexagons and 12 pentagons -- which has been compared to the rugby ball. The ball-shaped structures have resulted in reference to them as buckyballs. Whilst such correspondences may be considered coincidental and of little significance, it is appropriate to explore the tendency of humans to use such designs as central in their favoured forms of play -- "playing ball" with fundamental patterns of organization -- as discussed separately, also notably with regard to the tennis ball seam curve (*Game ball design as holding insight of relevance to global governance?* 2020; *Comprehension of requisite complexity through game-ball design?* 2021; *Interactive display of generalized baseball and tennis-ball seam curves in 3D,* 2020). This is illustrated in the form of a hypotrochoid offering perspectives on circle, lemniscate and related curves.

Structural equivalence between common footballs and common fullerene molecules			
C60 fullerene	Soccer ball	Rugby ball	C70 fullerene
			
痛, CC BY-SA 4.0, via Wikimedia Commons	Pallo_valmiina.jpg: Christopher Bruno, CC BY-SA 2.5, via Wikimedia Commons	Angry mob mulls options, Public domain, via Wikimedia Commons	Ptj, CC BY-SA 3.0, via Wikimedia Commons

A previous exercise had been inspired by the work of Keith Critchlow which had shown how 12 Archimedean polyhedra could be configured around a 13th using a cuboctsahedral pattern -- such that each of the 12 touched the 13th (*Order in Space A Design Source Book*, 1969). This is recognized as a classic exercise in the closest packing of polyhedra -- a focus of extensive research given its commerial implications. With the evolution of 3D model visualization, it proved possible to represent this cuboctahedral pattern in 3D -- and to indicate memorable dynamics inviting consideration (*Psychosocial Implication in Polyhedral Animations in 3D*, 2015).

Cuboctahedral configuration of Archimedean polyhedra in 2D and 3D	
Indication of closest packing of 12 Archimedean polyhedra around a 13th (Keith Critchlow, *Order in Space*, 1969)	Rotation of cuboctahedral array of 12 Archimedean polyhedra (around an omitted 13th at the centre; totalling 984 edges, 558 vertices, 452 faces)
	





The total number of Archimedean/Catalan polyhedra is 2x13. As the most fundamental coherent configurations -- with the addition 5 Platonic polyhedra and 4 Kepler-Poinsot stars -- these together pose a challenge as to how they could be memorably displayed, if they can be credibly assumed to be a key to global coherence.

Configuring the different clusters of 35 polyhedra together poses a distinctive design challenge. The challenge is notably constrained by how to embody the complexity of the multiples elements into a viable model in 3D -- given the technical limitations of computer and visualization capacity. The challenge could be presented in the form of the following table

Total features (faces, edges, vertices) in Regular and Semi-regular Polyhedra
(data extracted by Claude 4)

	Symmetry families	Faces (number of sides)							Edges	Vertices	Total	Prime factors
		3	4	5	6	8	10	Total				
Platonic (1+4)	Tetrahedral (1)	4						4	6	4	14	2x7
	Octahedral (2)	8	6					14	24	14	52	2^2x13
	Icosahedral (2)	20		12				32	60	32	124	2^2x31
	Total (5)	32	6	12				50	90	50	190	2x5x19
Kepler-Poinsot (4)	Icosahedral (4)	20		36				56	120	56	232	2^3x29
Archimedean (1+12) (Catalan duals)	Tetrahedral (1)	4			4			8	18	12	38	2x3^2
	Octahedral (6)	56	48		16	12		132	276	156	564	2^2x3x47
	Icosahedral (6)	140	60	48	40		24	312	690	390	1392	2^4x3x29
	Total (13)	200	108	48	60	12	24	452	984	558	1994	2x997
Catalan (1+12) (Archimedean duals)	Tetrahedral (1)	12						12	18	8	38	2^3x29
	Octahedral (6)	96	24*/12*	24				156	276	132	564	2^2x3x47
	Icosahedral (6)	240	60*/ 30*	60				390	690	312	1392	2^4x3x29
	Total (13)	348	84*/42*	84				558	984	452	1994	2x997
Totals (3+32)	Tetrahedral (3)	20			4			24	42	12	90	2x3^2x5
	Octahedral (14)	160	90	24	16	12		302	576	302	1180	2^2x5x59
	Icosahedral (18)	420	150	156	40		24	790	1560	790	3140	2^2x5x157
Grand totals (35)		600	240	180	60	12	24	1116	2178	1116	4410	2x3^5x7^2
Prime factors		2^3x3x5^2	2^4x3x5	2^2x3^2x5	2^2x3x5	2^2x3	2^3x3		2x3^2x11^2	2^2x3^2x31	2x3^5x7^2	

* Rather than being square-shared faces, in this case the quadrilaterals are "kites" and "rhombs".

Any such array of numbers is alienating to many -- if not fundamentally of little significance -- in contrast with the value attributed to iconic sets of apostles, imams, deities, and the like, exemplified by the iconography of the Last Supper in which the coherence of any discourse is only implied (if not considered irrelevant). As dicussed previously, it is appropriate to recognize the problematic contrast between the educational challenge of numeracy -- celebrated in number theory -- and the purportedly illusory dimensions of number symbolism -- celebrated in numerology, but deprecated as pseudoscience (*Experiential distinction of degrees of "N-ness" versus numeracy education*, 2025). Both can be understood as limiting the experiential insights of "N-ness", namely the appreciation of 5-ness, 12-ness, and the like. Such insights limit appreciation of complementary "ways of thinking" valuable to any strategic response, as with the ability to shift gear in an automobile in response to changing conditions (*Interrelating Multiple Ways of Looking at a Crisis* , 2021).

This exercise can be understood as the exploration of a cognitively navigable "midde way" between the Scylla and Charybdis of number theory and numerology.

Coherence framed with many highly unmemorable polyhedron names?

The exercise highlighted the more general issue of how fundamental patterns of coherence are recognized and rendered comprehensible and communicable through the names attributed to them. Being indicative of such patterns, polyhedra are unfortunately the focus of a chaotic set of names which could not have been better designed to render that coherence incomprehensible and communicable only between the few. To the extent that that set of polyhedra is unique in offering articlated insight into possibilities of global coherence, it is appropriate to ask what proportion of the population -- even of decision-makers -- is familiar within any of them -- other than the cube and the truncated icosahedron (as the stitching pattern of the football).

The difficulty has its origins in the naming inherited from the early Greeks with which the Platonic and Archimedean polyhedra are associated. Thus even the simplest and most fndamental polyhedra bear names which would be alienatng and meaningless to many (tetrahedron, octahedron, dodecahedron, icosahedron), with only the cube as widely (if not excessively) meaningful -- although otherwise named as the hexahedron.

Comprehending the coherence indicated by the polyhedra is all the greater in the case of the set of Archimedean polyhedra. For some these are somewhat comprehensible as the consequence of modifying the Platonic set -- theough a subset of the Conway operations (discussed below). Potentially even less memorable are the Catalan polyhedra as duals of each Archimedean polyhedron. The pattern is evident in the following table

Naming conventions of regular and semi-regular polyhedra ordered with Conway operations			
Platonic polyhedra	Archimedean polyhedra (non-italic) with Catalan duals (indented italic) (alternative names have no link)		
	by truncation operation	by snub operation	combined operations [named]
tetrahedron	• truncated tetrahedron ○ *triakis tetrahedron*	**?** [snub tetrahedron degenerates into Platonic icosahedron]	

octahedron	• truncated octahedron
	  ○ *tetrakis hexahedron*
		? ["snub octahedron" may refer to: regular icosahedron, snub cube, or snub cuboctahedron] [pseudoicosahedron; no uniform snub]	• cuboctahedron [ambo/rectify]
			  ○ *rhombic dodecahedron*
			• truncated cuboctahedron [bevel/cantitruncate]
			  ○ *disdyakis dodecahedron*
			hexoctahedron
			hexakis octahedron
			octakis cube
			octakis hexahedron

cube	• truncated cube
	  ○ *triakis octahedron*
		• snub cube*
		  ○ *pentagonal icositetrahedron* * *pentagonal icosikaitetrahedron gyroid*
			kisrhombic dodecahedron d48
			• rhombicuboctahedro [expand/cantellate]
			  ○ *deltoidal icositetrahedron trapezoidal icositetrahedron tetragonal icosikaitetrahedron tetragonal trisoctahedron strombic icositetrahedron*

dodecahedron	• truncated dodcahedron
	  ○ *triakis icosahedron*
		• snub dodecahedron* snub icosidodecahedron
		  ○ *pentagonal hexecontahedron* *
			• icosidodecahedron [ambo/rectify]
			  ○ *rhombic triacontahedron*
			  ○ *triacontahedron*
			• truncated icosidodecahedron [bevel/cantitruncate] rhombitruncated icosidodecahedron great rhombicosidodecahedron omnitruncated dodecahedron omnitruncated icosahedron
			  ○ *disdyakis triacontahedron hexakis icosahedron decakis dodecahedron, kisrhombic triacontahedron d120*
			• rhombicosidodechedron [expand/cantellate]
			  ○ *deltoidal hexecontahedron trapezoidal hexecontahedron strombic hexecontahedron tetragonal hexacontahedron*

icosahedron	• truncated icosahedron ○ *pentakis dodecahedron*	**?** [no uniform snub version]	

* Chiral forms: two of the Archimedean polyhedra have chiral forms (left and right-handed), namely the snub cube and snub dodecahedron. Their Catalan duals also have chiral forms, namely the pentagonal icositetrahedron (dual of snub cube) and pentagonal hexecontahedron (dual of snub dodecahedron).

Despite the variety of sources purporting to offer clarity on polyhedral names and notations, the multiplicity of names, as partially suggested by the above table, gave rise to unexpected difficulties and delays in resolving the issues in the Python script by which an X3D model was generated with the aid of ChatGPT-5. These were compounded both by the variant names used in the export of individual poluedra from Stella4D (by which the final configuration was populated) as well as by the abbreviations used in the script itself. Forewarned these delays issues could have been avoided. The lengthy names, meaningless to most, pose further problems in the manner in which they can be usefully displayed as labels in any visual presentation.

Coherence indicated by the total number of uniform polyhedra?

The simpler polyhedra may be readily used for 3D mappings of simpler conceptual and strategic sets. The patterns each constitutes is therefore a basis for selecting polyhedra to ensure a degree of strategic coherence, as explored separately (*Identifying Polyhedra Enabling Memorable Strategic Mapping*, 2020). Some polyhedra outside the core array are also of significance in that respect, but are not considered here (*Proof of concept: use of drilled truncated cube as a mapping framework for 64 elements*, 2015).

It is conventionally recognized that there are 75 non-prismatic uniform, polyhedra (whether convex or non-convex) which could be considered indicatative of forms of symmetry on which cognitive and orgnizational coherernce could be patterned -- or inspired (*List of uniform polyhedra*, *Wkipedia*). However this total takes no account of the few which take right or left-handed form as enantiomorphs. Nor does it take account of the complementary dual forms -- potentially doubling the total of 75. In addition any distinction of duality as a basis for establing the range of frameworks for coherence is complicated by the fact that the commonest forms exists as dual pairs, with the most fundamental being self-dual. To any such count is conventionally added an infinite array of prisms and antiprisms

The following table was elaborated in exchanges with DeepSeek and ChatGPT-5 -- accumulating footnotes in the process, in the light of efforts to emphasize the "recognizined", "canonical" totals. Thus the official total is the canonical enumeration of 75 with each chiral pair counted singly. If the chiral polyhedra are physically modelled or displayed, the two mirror-image forms are distinct and cannot be superimposed and are then counted separately giving a total of 79.

This count of 79 is readily asserted to represents the number of unique ways to arrange regular polygons around equivalent vertices in three-dimensional space where each shape is topologically distinct from its mirror image if such a mirror image exists. However it does not cinclude chiral forms. Therefore, the complete set of highly symmetric, non-prismatic polyhedra -- considering both the uniform polyhedra, their duals, and all chirality -- contains 158 distinct shapes.

So totals by convention:

- Not distinguishing handedness anywhere: 5 + 4 + 13 + 13 = 35.
- Distinguishing only Archimedean handedness: 5 + 4 + 15 + 13 = 37.
- Distinguishing Archimedean *and* Catalan handedness: 5 + 4 + 15 + 15 = 39.

It seems extremely difficult, if not impossible to produce a straightforward table of the variety of core polyhedra with clear totals. In the quest for coherence it would appear that different categories are selected and totalled such that the ambiguity fully justifies qualitative totals established by different cultural traditions.

<table>
<tr><th colspan="9">Problematic clarification of types of polyhedra especially indicative of distinctive understandings of symmetry
(totals complicated by whether left and right-handed enantiomorphs are counted singly as abstract types or double as distinct shapes</th></tr>
<tr><td></td><td colspan="2">uniform ("regular")</td><td colspan="4">uniform ("semi-regular")</td><td></td><td></td></tr>
<tr><td>polyhedron type</td><td colspan="2">both face and vertex transivity</td><td colspan="2">vertex-transitive alone</td><td colspan="2">face-transitive alone (duals)</td><td>total abstract types</td><td>total distinct shapes</td></tr>
<tr><td>achiral forms (non-chiral)</td><td rowspan="3">finite convex uniform Platonic (a)</td><td>5</td><td rowspan="3">finite convex uniform Archimedean (b)</td><td>11</td><td rowspan="3">Catalan duals of Archimedean (c)</td><td>11</td><td rowspan="3">31 (d)</td><td rowspan="3">35 (d)</td></tr>
<tr><td>chiral forms (left & /right)</td><td>0</td><td>4</td><td>4</td></tr>
<tr><td>sub-total</td><td>5</td><td>15</td><td>15</td></tr>
<tr><td>finite non-convex</td><td>Kepler-Poinsot (e)</td><td>4</td><td>derivation of Kepler-Poinsot & Archimedean</td><td>53 (39+14)</td><td></td><td>53 (39+14)</td><td>110</td><td>43</td></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td></td><td>14</td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>57</td><td></td><td></td><td></td><td></td></tr>
</table>

finite non-convex			uniform	53 (55) (f)	non-uniform star polyhedra	53 (55) (f)	106 (g)	110 (g)
infinite families			convex infinite families (prisms & antiprisms)	∞	bipyramids & trapezohedra, etc	∞	∞	∞
grand totals of abstract types (excl. chiral)		9		75 + ∞		75 + ∞	141 + ∞	(h)
grand totals of shapes (incl. chiral)		9		77 + ∞		77 + ∞	(h)	149 + ∞

(a) Platonic: All are achiral. The tetrahedron is self-dual; Cube/Octahedron and Dodecahedron/Iosahedron are dual pairs.
(b) Archimedean: 11 are achiral, 2 (snub cube & snub dodecahedron) are chiral (2 types → 4 shapes).
(c) Catalans: Duals of the Archimedeans. 11 are achiral, 2 are chiral.
(d) Totals: 5 + 13 + 13 = 31 abstract types (mirror images counted once); 5 + 15 + 15 = 35 distinct shapes.
(e) Kepler-Poinsot stars: All are achiral. Great dodecahedron/mall stellated dodecahedron and Great icosahedron/Great stellated dodecahedron are dual pairs.
(f) 51 are achiral, 2 are chiral (2 types → 4 shapes, totalling 55).
(g) 4 + 53 + 53 = 110 types. 4 + 55 + 55 = 114 shapes
(h) 31 (Convex) + 110 (Non-Convex) = 141 Types. 35 + 114 = 149 Shapes.

Remarkably it is virtually impossible to produce a simple table indicative of the variety of uniform polyhedra, and epecially of how they may be variously totalled to suggest degrees of coherence. Any presentation calls for a variety of explanatory footnotes and reservations -- with any totals appropriately challenged from alternative perspectives (according to what is included or excluded and how sets of polyhedra are defined). The challenge is evident in the definitive responses provided by AIs and their apologetic qualifications when omissions are highlighted, especially with regard to how chirality is handled. These difficulties offer a valuable metaphor of the challenging quest for strategic coherence in practice. They frame questions regarding the patterns of coherence associated with particular numbers favoured by cultures and traditions of the past, as discussed below in the quest for generic insights. That conclusion is emphasized in the following comment by Claude AI

Question: The purpose of the table is to indicate the total number of polyhedra that are a potential source of coherence through their symmetry. The challenge is that a 2D matrix renders making that point difficult -- despite the footnotes, themselves a source of incoherence, as with multiplying the rows or using separate tables. The table is an effort to reconcile the numbered categories variously cited in the literature. How have others attempted such a table -- if they have. My searches indicate that the apparently neat tables are only neat because they avoid reference to chirality and the like

 # Show/Hide AI response #

Coherence indicated by the relative memorability of uniform polyhedra?

In the quest for what polyhedra enable memorable symmetry, one approach is to elict from the web data on the frequency with which particular polyhedra are referenced in comparison with others. If done systematically this is a relatively complex methodological challenge, as addressed to one AI

Question: If the question is rephrased to exclude compendia, how feasible is it to produce a more detailed study. For example,there is the suspicion that only the rhombic dodecahedron would be highlighted in the Catalans

 # Show/Hide AI response #

Question: Is there any indicative approach to such a complete survey?

 # Show/Hide AI response #

Question: Would such a survey be beyond the scope of this exchange

 # Show/Hide AI response #

The question regarding an indicative ranking of the salience of uniform polyhedra was then put to ChatGPT-5 with the following result. ChatGPT clarifed the indicative scope and methodology as a qualitative, out-of-compendia salience index. It blends cultural anchors (e.g., soccer ball), artifact presence (dice, crystals, architecture), general-audience exposure, and a "long-name penalty," then flags outliers relative to each family's internal baseline. It is intended for narrative contrast (which shapes are surprisingly well-known vs. surprisingly obscure), but is not intended for definitive bibliometrics.

Ranking of Indicative Public Salience of Regular and Semi-Regular Polyhedra compiled by ChatGPT-5 Thinking (outside compendia)
(score = heuristic 0–100; P=Platonic; A=Archimedean; C=Catalan; K-P=Kepler-Poinsot)

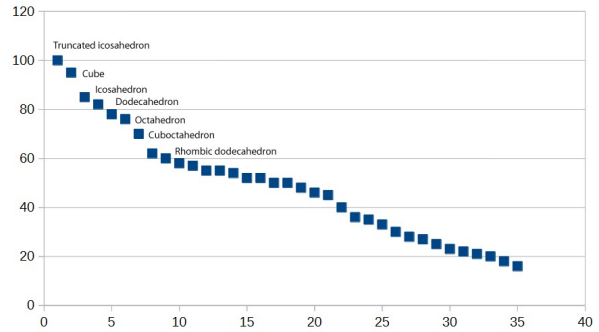
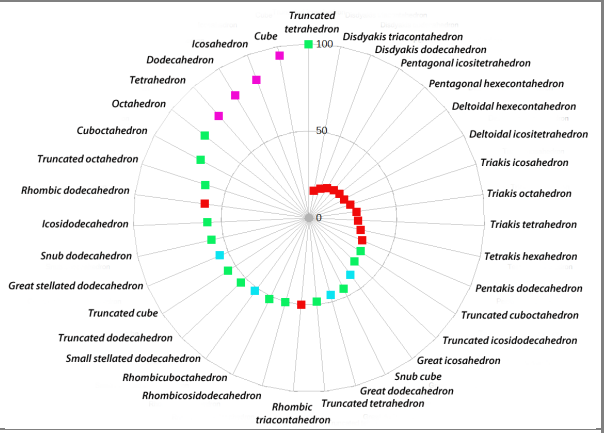
Truncated icosahedron	A	soccer ball buckyball (C60)	100
Cube	P	dice boxes voxels	95
Icosahedron	P	D&D dice geodesic lore	85
Dodecahedron	P	D&D dice sacred geometry	82
Tetrahedron	P	STEM models simple "pyramid"	78
Octahedron	P	crystals 3D axes icon	76
Cuboctahedron	A	Fuller "vector equilibrium"	70
Truncated octahedron	A	space-filling cells	62
Rhombic dodecahedron	C	space-filling lattices	60
Icosidodecahedron	A	museum models	58
Snub dodecahedron	A	famous chiral; art	57
Great stellated dodecahedron	K-P	iconic star polyhedron	55
Truncated cube	A	architecture/tilings	55
Truncated dodecahedron	A	tilings/packings	54
Small stellated dodecahedron	K-P	iconic star polyhedron	52
Rhombicuboctahedron	A	STEM demos	52
Rhombicosidodecahedron	A	big demo models	50
Rhombic triacontahedron	C	quasicrystals golden	50

Truncated tetrahedron	A	honeycombs/packing	48
Great dodecahedron	K-P	Escher/sacred-geom	46
Snub cube	A	chiral curiosity	45
Great icosahedron	K-P	sculpture/visual math	40
Truncated icosidodecahedron	A	mouthful; niche	36
Truncated cuboctahedron	A	long name penalty	35
Pentakis dodecahedron	C	geodesic lore term	33
Tetrakis hexahedron	C	crystal habit term	30
Triakis tetrahedron	C	crystallography term	28
Triakis octahedron	C	crystal habit term	27
Triakis icosahedron	C	niche	25
Deltoidal icositetrahedron	C	dual demos	23
Deltoidal hexecontahedron	C	niche	22
Pentagonal hexecontahedron	C	niche	21
Pentagonal icositetrahedron	C	niche	20
Disdyakis dodecahedron	C	obscure	18
Disdyakis triacontahedron	C	very niche	16

Strikingly ironic, but comprehensible as the single "mega-outlier" indicative of coherent symmetry, is the truncated icosahedron (as a buckyball and the stitching pattern of the soccer ball). Among Catalans, the rhombic dodecahedron (space-filling) and rhombic triacontahedron (quasicrystals/golden) stand out; most other Catalans being only evident in specialist vocabulary.

The following images are an effort to visualize the indications of the above table regarding potential memorability. The truncated icosaedron and cube are most evident in that respect in the image on the left. The image on the right offers the implication of an outer zone of relative memorability -- spiralling in to what is effectively a "memorability sinkhole". *[NB: The spiral labelleing could also be reversed to indicate high collective memorability at the centre and low memorability at the circumference.]* Missing is any understanding that some of the low frequency polyhedra may be of significance analogous to the "rare earths" of the periodic table of chemical elements.

Contrasting images indicative of relative memorabilty of uniform polyhedra
points on the right are coloured by polyhedral family: mauve (Platonic), green (Archimedean), cyan (Kepler-Poinsot), red (Catalan)

Linear indication of decreasing memorabiliy	Spiral indication of memorability "sinkhole"
	

Images produced with data on relative salience provided by ChatGPT-5 Thinking

Framing the distinctions within a 12-fold set in polyhedral terms

Question: As a coherent memetic pattern, how is the relationship between the 12 Archimedean polyhedra -- in relation to the 13th -- best described succinctly, thereby clarifying its nature as a unique set

 # Show/Hide AI response #

Question: As a particularly well-articulated metaphor for 12-foldness (plus 1), how might "vertex-transitive" be explained with respect to 12-fold strategies, sets of principles, or any dodekatheon

 # Show/Hide AI response #

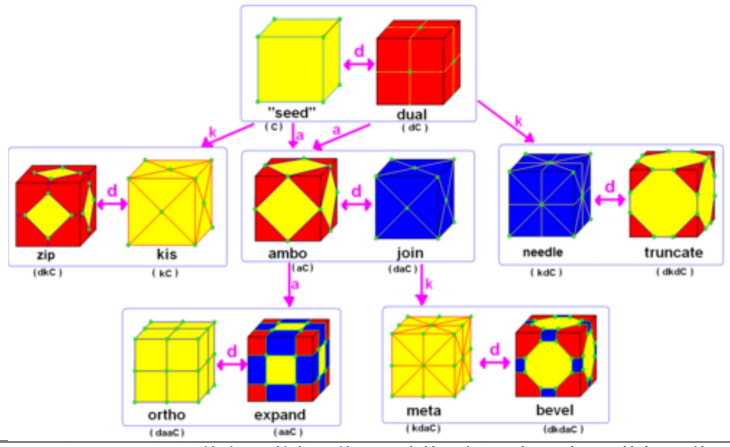
Memorable symmetry preserving operations interrelating different polyhedra

The Conway Polyhedron Notation offers a key to the variety of geometrical/topological transformations by which individual polyhedra in the set of polyhedra may be transformed into one another. These suggest a set of "pathways" by which navigation from one odering framework to another may be navigated -- and as such are potentially indicative of the nature of the elusive discourse within 12-fold groups, and of their especially valued coherence.

Such pathways are potentially of great significance to cognitive and strategic organixation to the extent that individual polyhedra offer mapping templates for disparate articulated sets of perpectives. Only a very small

selection of Conway operations are illustrated in the literature --where they tend to be shown as moddifications of the cube. No effort is seemingly made to illustrate the application of an extensive set of such opeations to the whole set of regular and semi-reular polyhedr as a means of rendering more comprehensible the coherence of their relationship

Relation illustration of the Conway polyhedron notation
Showing 12 forms created by 3 symmetry preserving operations operations on the cube



Tomruen at English Wikipedia, Public domain, via Wikimedia Commons

The question previously addressed with the Claude AI was whether all the types of links between the individual polyhedra could be successfully designed into the original X3D array. Whilst feasible in principle, calculating the precise placement and orientation of the links proved to be very challenging -- despite many trials. Understandably, but somewhat ironically, AIs currently experience difficulty in managing geometrical configurations in 3D -- despite being otherwise cited for their competence in multidimensional calculation. The issue is compounded by the constraints for an AI in viewing and interpreting any 2D screenshot of the 3D image of the X3D resulting from iterative improvements to the X3D code.

35 -- 37 plus minus / chiral ***

A key question in the initial configuration of the polyhedra in the Archimedean "ring", was how they could be most meaningfully positioned with respect to one another -- rather than being arbitarily placed. An initial approach was to consider how the 6 polyhedra of the icosahedral family could be positoned in relation to the 6 of the octahedral family. Clearly each family could be set together in two halves of the ring or the members of one family could be interspersed with the other. The latter option was preferred since it favoured the capacity to render visible or hide each family if the model appeared too cluttered.

Irrrespective of that approach the question remained as to how the polyedra could best be related to one another. This is especially relevant to any more generic understanding of how members of any analogous 12-set might be related from a generic systemic perspective (as discussed below). Valuable clues to the relationship between polyhedra are however offered by the well-studied transformations associated with the Conway Polyhedron Notation. By this means any seed polyhedron is transformed into others by symmetry presererving operations (Pieter Goetschalckx, et al, *Local orientation-preserving symmetry preserving operations on polyhedra*, *Discrete Mathematics*, 344, 2021, 1, 112156). In addition to Conway's initial set, many more exist; many others can be created by composing operators together.

Further clarification is presented separately (*Topological operations on polyhedra as indicative of cognitive operations*, 2021; *Harmonizing dissonance via polyhedral symmetry-preserving operations*, 2024). Examples of local symmetry-preserving operations on a cube ordered by increasing inflation rate are presented and illustrated separately *Operations transforming polyhedra as modelling transformations of dialogue coherence*, 2021).

Those comments emphasize the cognitive connectivity which may be implied by the transformations of polyhedra. In embedding a selection of transformations into the model, the assumption was made that visual symmetry of the linkages would suggest a more appropriate sequence to the polyhedra within the Archiden ring (and with the Catalan ring locked into relation with it through the dual tansformation).

Only a selection of transformations was treated as of relevance since many of them transform into polyhedra outside the set embodied within the model. That assumption calls for further consideration

Question: To the extent that Conway polyhedron notation offers a very precise approach to the relation between the 12 Archimedean polyhedra (possibly via the 13th or the Platonic polyhedra), how might that set of symmetry preserving operations provide a unique lens through which narrative accounts might be filtered and ordered

 # Show/Hide AI response #

Configuring a Carousel of polyhedral transformational relationships in 3D

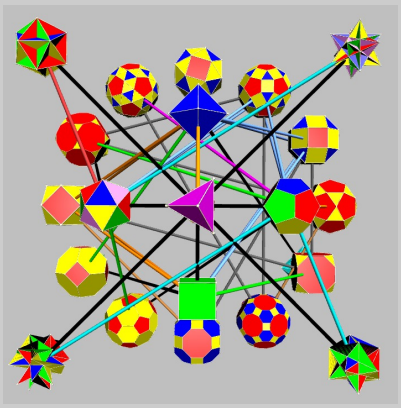
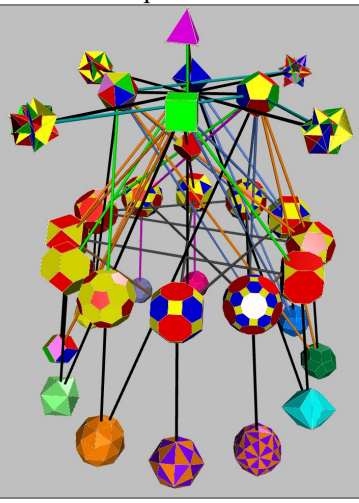
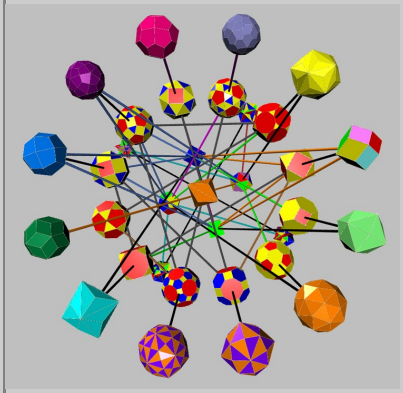
The X3D model that had been elaborated without the inter-polyhedral links was then presented to ChatGPT-5 with a view to approaching the challenge in a qute different manner. Rather than making design modifications to incorproate individual links into the manually configured model -- as with Claude -- the brief was then to generate the complete X3D configuration of polyhedra via a Python script. This enabled a generic approach to the iterative incorporation of an extensive set of particular types of links.

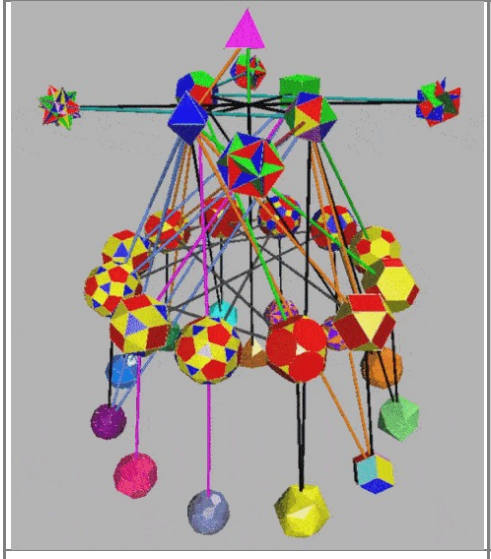
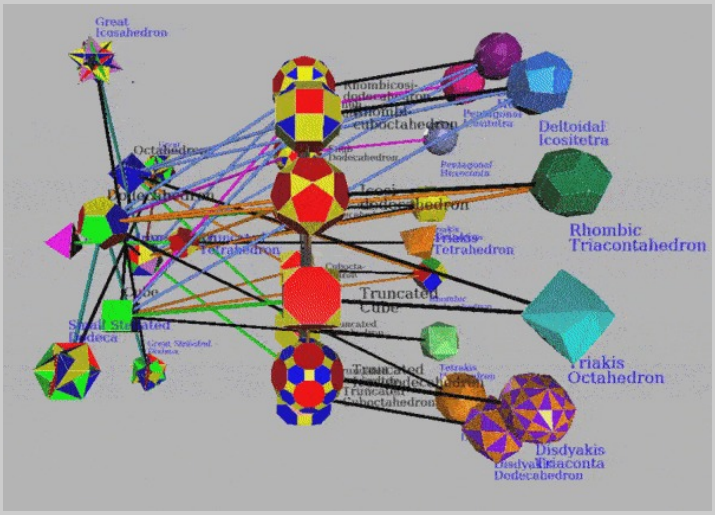
Many versions of the Python script were successvely produced by ChatGPT in order to reproduce the basic configuration satisfactorily and to incorporate the Conway operation linkage. The exchange with ChatGPT highlighted a set of "learnings" noted below -- of potential relevance to any effort to repeat the procedure

A major advantage of generating the the complete X3D model with a Python script was the easy with which the model could then be adjusted to test a variety of design alternatives and possibilities. The script could then be further modified to incorporate various dynamics with a view to animating the model and to enable user interaction with it using the X3DOM or X-lite protocols

Of interest with respect to the progressive modification of the configuration was whether the pattern of operational transformations highlighted any visible symmetry. In the quest for such memorable symmetry the order of the polyhedra in their respective rings (Platonic and Archimedean) could be iteratively adjusted. The Catalan ring was understood as locked to the Archimedean through the duality operation.

Screenshots of perspectives of regular and semi-regular polyhedra in a 3D Carousel configuration
(including Conway-style transformation operations as links between polyhedra)

"Top down"	Oblique side view	"Bottom up"
		

Animations of regular and semi-regular polyhedra in a 3D Carousel configuration (including Conway-style transformation operations as links between polyhedra)	
"Vertical" side view	"Horizontal" side view with polyhedral labels
	

Design possibilities and options in 3D for mnemonic enhancement of model comprehension

As noted above, web presentation in 3D, and especially when rendered interactive through X3DOM or X-Lite, suggests many possibilities for enhancing comprenensibilty according to user preference. Whether rendered dynamic or not, possibilities of modifying the basic X3D model include:

- modifying colour schemes (including background)
  - colour mnemonics relating polyhedra with triangles, squares, pentagons, etc
- modifying transparency (relative fading/highlighting of rings, etc)
- modifying relative size of
  - individual polyhedra included
  - types of transformational links
- modifying rate of rotation, possibly selectively
- switching between solid and wireframe rendering
- modifying pre-defined perspectives (viewpoints)
  - on the model asa whole
  - from within individual polyhedra (especially in wireframe rendering)
- modifying labels
  - switching label sets of polyhedra (geometric, apostles, imams, knights of the roundtable, tribes of israel, deities, etc)
  - placing labels on individual faces of polyhedra (in the light of "faceting" classification schemes)
- inclusion of small spheres moving along transformational links
- alternatve renderings
  - GIF animation
  - X3DOM
  - movie
- forms of morphing

The array of possibilities highlights the fact that the Carousel model is a work in progress, open to various forms of modification

Relative comprehensibility of a dynamic Carousel model -- beyond the doughnut

The so-called doughnut model has evoked considerable discussion as a reconciliation of economic strategies with a 2D configuration of environmental constraints (Kate Raworth, *Introducing 'The Doughnut' of social and planetary boundaries for development*, *Oxfam International*, 10 February 2012; *Exploring the Hidden Mysteries of Oxfam's Doughnut*, 2012). The configuration naturally invites reframing as a toroidal dynamic in 3D (*Transforming the World into a Doughnut: a vital clarification*, 2019). The distinction of 9 planetary boundaries even offers mythological echoes of the culture within which they were framed -- a challenge to the 12-fold pattern of this argument (*Axis Mundi, Yggdrasil, Omphalos and Sahasrara?* 2020).

Question: In contrast with the "doughnut" model in economics, are there models of relevance to governnce labelled with similar familiar objects, notably in 3D

 # Show/Hide AI response #

Of recent relevance to "2D strategic governance" has been the pandemic -- with the virus itself as necessarily modelled in 3D (*Cognitive Engagement with Spike Dynamics of a Polyhedral Coronavirus*, 2020). The "tetrahedron of sustainability design" is understood as a 3D framework for the integral and interdisciplinary development of circular economy oriented products.(S. Stegmüller, et al, *The Tetrahedron of Sustainability Design*, *Human Systems Engineering and Design (IHSED 2023): Future Trends and Applications*, 112, 2023).

In quest of memorable configurations beyond the doughnut in 2D (and the torus in 3D), consideration was separately given to the unfamiliar "zome" -- and comprehension of its relatively omplex helical organization through the famiiar pineapple (*Coronavirus: - Global Plan, Doughnut, Torus, Helix and/or Pineapple?* 2020; *Zomes as a key to appropriate organizational and knowledge architecture?* 2020). The Carousel model, with its dynamics, could be seen as a comprehensible and communicable compromise -- notably elaborating any tetrahedral articulation of sustainability.

Although the Carousel confguration is comprehensible as whole -- to a degree -- there is clearly a design challenge to how it might best be presented and explored. There are clearly particular issues with how links and labelling can be handled. Should particular lnks be included or excluded? Should alternative labels be used (in the light of the generic argument below)?

Static images are appropriate for any conventional print format but animations offer a better perspective on the whole -- as with any fair-ground "merry-go-round" or "Carousel". Why is the Carousel inherently both comprehensible and attractive to children -- in contrast to the questionable attraction of any 12-fold set of fundamental strategic principles?

Indicative images suggestive of the acceptability comprehensibility of the complexity of a fair ground Carousel	
Static overview	Proximate animation
	
Jebulon, CC BY-SA 3.0, via Wikimedia Commons	Gaius Cornelius, CC BY-SA 4.0, via Wikimedia Commons

An increasing range of comprehension possibilities is offered by enabling interactive exploration of the Carousel in 3D using the X3DOM protocol -- strangely echoing the possibility offered by "riding on the horses" of a "merry-go-round" in a fair ground.

Given the attraction and fascinsating comprehensibility of a Carousel for children, it is appropriate to ask how it manages to constitute such a focus of attention -- in contrast to equivalent degrees of complexity articulated for strategic purposes by governments.

Question: How many horses typically feature on a carousel. There does not appear to be space for many.

 # Show/Hide AI response #

Question: So in radial terms, how many radii are there on which such rings may be positioned. Are there carousel designs with 12 radii

 # Show/Hide AI response #

Question: Is a distinction made between "horse" positions (moving vertically) and " bench" positions (seated static). How many radial horse positions would there e in contrast with bench positions

 # Show/Hide AI response #

Question: Since the traditional fair ground carousel has moving horses on which people can ride, and the polyhedra in the Carousel model referenced here can be understood metaphorically as a dynamic configuration of distinctive strategic "horses", could you comment on the relevance of satirical references to the "dead horse theory" in relation to any implication that leaders and groups "ride" strategies long after they are no longer "fit for purpose" (Chris Meyer, *Dead Horse Theory: How to Resurrect a Failed Project*, *The Mind Collection*).

 # Show/Hide AI response #

Recognition of 12 complementary modes of discourse suggested by a 12-fold set of polyhedra

Question: That explanation relies on essentially quantitative mathematical principles but does not address the qualitative nature of complementarity between strategic principles -- or deities in a dodekatheon. How are they "equal and interchangeable under symmetry" when their differences are so dramatic in any 12-fold set of personality types (for example)

 # Show/Hide AI response #

Question: What does that response imply for the content of any discourse or feedback between specific members of the set and why is so little effort seemingly made to identify such contrasting content essential to the coherence of the whole -- as with the Greek deities, the 12 Apostles, the 12 Tribes of Israel, etc

 # Show/Hide AI response #

Question: A 12-fold set, with each member potentally interacting with every other, suggests a pattern of feedbck loops vital to expression of coherence. Could extant analyses of the narrative exchanges between deities, apostles, or tribes be explored to determine how many of such loops are recognized -- as might inform any set of 12 strategic initiatives

 # Show/Hide AI response #

Question: To what extent would an AI be capable of eliciting the set of 132 feedback loops (however some might be highlighted) from the training material to which it has been exposed

 # Show/Hide AI response #

Question: In the light of that response, how might such symmetry preserving operations be interpreted as cognitive operations characteristic of discourse -- and potentially related to the set of Boolean connectives so fundamental to the operation of AI

 # Show/Hide AI response #

Question: How might the "geometric analogue to Boolean logic" be described and visualized -- beyond conventional use of the rhombic dodecahedron for essentially static mapping purposes

 # Show/Hide AI response #

Question: That response clarifies possibiities, but by focusing on their nature as abstractions it dissociates from the more comprehensible challenge of identifying the 132 modes of discourse that might be required for systemic coherence -- however these might be prioritized

 # Show/Hide AI response #

Question: Given the existence of Rhetorical Structure Theory and/or Centering Theory, is there any indication of its application in practice to enhance the quality and coherence of discourse, whether with respect to governance or to divisive ideological issues

 # Show/Hide AI response #

Question: Given such extensive application, is there any trace of appreciation of its relevance and application to global summitry and diplomatic dialogue or to interdisciplinary interfaith and intercultural challenges -- currently recognizable as increasingly divisive and problematic

 # Show/Hide AI response #

Question: How does that encouraging appreciation of RST relate to the fact that there continue to be many competing approaches to dialogue facilitation -- seldom addressing any need for their reconciliation -- in a period in which the quality of public dialogue is decreasing dramatically, if not violently, and with few examples of high quality dialogue presented as exemplary

 # Show/Hide AI response #

Question: To what extent does the plurality of competing dialogue modalities invite reframing as a 12-fold set (as dscussed above) with each offering valuable insights, but calling into question the insights of others -- and potentially the modality of any claiming inherent superiority

 # Show/Hide AI response #

plus/minus 7 **********

Question: Does that response suggest that Edward de Bono's extensive 6-fold articulation is a subset (or oversimplification) of a richer 12-fold set -- potentially offering a requisite degree of variety in cybernetic terms

 # Show/Hide AI response #

Question: Does the extreme divisiveness and incoherence of current public discourse suggest that particular modalities are indeed not appropriately integrated into a pattern of discourse "fit for purpose" in the face of polycrisis -- whatever the claims made for one or other modality

 # Show/Hide AI response #

Question: Rather than the assumption that a pattern of 132 connections is required for the viability of a 12-fold system, how is any pattern of triadic, 4-fold, 5-fold, or 6-fold relations between them to be distinguished as appropriately weaving together the 12 modalities. Is the total number of Archimedean polyhedral faces indicative of such connectivity -- but constituting 12 distinctive clusters

 # Show/Hide AI response #

Perceived viability and requisite complexity of 12-fold set -- past and present

Question: Geometry and polyhedral combinatorics offer a formal quantitative description of why a limited set of face-type configurations provides an adequate description of the 12+1 Archimedean set. What is required to provide an analogous qualitative description of 12+1 modalities -- cognitive or otherwise.

 # Show/Hide AI response #

Question: That response does not address why there are 12 Apostles (challenged by a 13th), 12 Imams, 12 Tribes of Israel, or 12 deities of Greece or Rome, or 12 Labours of Hercules. What qualitative constraint prevented the number from being increased or reduced. What does the 12-fold narrative pattern elusively encode

 # Show/Hide AI response #

Question: Given that response, why dd the UN reframe its 8-fold Millennium Development Goals tto a 16 (+1) pattern of SDGs -- whose viability as "fit for purpose" currenty faces major challenges

 # Show/Hide AI response #

Question: Given the earlier response regarding constraints on viability beyond a 12 (+1) pattern, is there a case for "repackaging" the 16(+1) pattern of SDGs as a 12(+1) pattern in order to ensure greater viability in both systemic terms and comprehensibility -- a repackaging of complexity which could be achieved with AI assistance in order to elicit the requisite feedback loops.

 # Show/Hide AI response #

Singular perspective on coherence in patterns of greater complexity

Question: Whether as an individual perspective or a strategic issue, could you comment how the perspective or issue might be variously associated with a single polyhedral vertex. In the case of the simpler Platonic polyhedra (as a prelude to the more complex Archimedean set), within a tetrahdral complex the single perspective is directly "related" to 3 others (themselves related to each other) constituting a pattern of the greatest coherence. By contrast, in the case of a vertex within a cube, the direct relation of the perspective to 3 others is in a configuration in which those others are not directly related to each other but involved in 3 separate square configurations (or communication cycles) orthogonally related to each other.

Such a vertex perspective in the dodecahedral case is again related to 3 others, but these are each part of separate pentagonal cycles angled to each other. In the case of an icosahedral configuration, the vertex perspective is directly related to 5 others, in which pairs are directly related to each other. This succession of models of group or systemic communication processes offers an indication of of the dilution of a direct sense of coherence and the manner in which this is only then enabled through greater complexity of the communication pattern suitably configured . Could you clarify this articulation and indcate how the argument might be applied in the case of the Archimedean models where a perspective may be associated with a mix of 3-fold (triangular), 4-fold (square), 5-fold (pentagonal) patterns, and more -- in order to achieve coherence

 # Show/Hide AI response #

Question: If you extend it, the challenge is to suggest the distinctive quality of coherence that each implies -- as experienced from a singular perspective engaged in triadic, tetradic, etc sub-cycles

 # Show/Hide AI response #

A set of 29 "institutional katas" was identified by Thierry Gaudin, in a book titled: *L'Ecoute des Silences: les institutions contre l'innovation* (1978). An English translation of that 29-fold set was presented separately as *The Institutional Katas* (2016) in a discussion of *Game-playing in Global Governance?* (2016) -- framed in terms of *Engaging an Opposing Ideology via Martial Arts Philosophy* (2016). ***

Question: Especially intriguing, as Buckminster Fuller endeavoured to stress, would be the cognitive and strategic implications in the case of the cuoboctahedron -- given its fundamental propensity for "jitterbug" style transformations. Would these then be reminiscent of coherent dynamics of sequences of katas in martial arts -- in contrast with any static perspective.

 # Show/Hide AI response #

Question: Could you comment on the extent to which "Eastern" kata-flow patterns are echoed to a degree in some "Western" forms of dance -- effectively embodying what has proven to be challenging to integrate into conventional strategic initiatives.

 # Show/Hide AI response #

Generic cognitive implications of the pattern of polyhedra in the Carousel model

Especially intriguing is the considerable traditional emphasis on coherent qualitative configurations of elements of qualitative significance -- totalling to numbers corresponding to the total number of polyhedra considered here (which could be deemed indicative of coherence through their symmetry). Thus the 72-fold configurations of angels and demons can be indicatively mapped onto the truncated icosahedron (*Hyperbolic reframing of the Demonique and Angelique of tradition*, 2016). Ironically, but potentially of relevance from a systemic perspective, this can be compared to patterns of failure (*Mnemonic clues to 72 modes of viable system failure from a demonic pattern language*, 2016).

Question: Whilst the presented polyhedral array offers an ordered articulation meaningful to some disciplines, could you comment on the degree to which that focus may be an instance of misplaced concreteness with respect to a pattern of qualitative insights without a name (Christopher Alexander, *The Quality without a Name*; Ryan A. Ferguson, *The Quality Without a Name*, 30 January 2017). With that assumption, is it to be expected that a variety of sets of names may be attributed to the elements of that pattern -- as other instances of misplaced concreteness. This is most evident in 12-fold articulations (Apostles, Imams, Tribes of Israel, Knights of the Roundtable, and the like). The labelling of elements in the model may therefore be switched dynamically between such alternatives. Missing however is the clarification that the ordering of the polyhedra in the 12-element rings may offer in the light of the symmetry arising from the pattern of operational links between them.

 # Show/Hide AI response #

Question: Curiously it is rare for any 12-fold articulation (deemed to be of fundamental import) to offer any particular clues to the specific relationships between the 12. The transformational operations between the polyhedra are seemingly unique in suggesting the nature of such relationships -- even of the "discourse" amongst Apostles, Imams, Tribes of Israel, or the deities of the Dodekatheon. In each such context any such relationship may be vaguely indicated by stories, but with little sense of the array of stories embodying those underlying interactions. This is even reflected in the secrecy about dialogue in a 12-person jury. Could you comment on the implications for any 12-fold strategic initiative

 # Show/Hide AI response #

Question: The imposition of any model as a means of structuring dialogue necessarily evokes resistance. Could you comment on the relevance of Edward de Bono's 6-fold approach (*Six Thinking Hats*, etc) in the light of 36-fold frameworks (Georges Polti, *The Thirty-Six Dramatic Situations*, 1895; *Thirty-Six Stratagems*

of Chinese tradition). Whether coincidental, or potentially relevant to the ordering of such qualitative arrays, is that the Carousel of regular polyhedra is composed of 35 polyhedra, potentially extended to 37 (or even 39) with recognition of chiral forms. Clearly few would have a systemic sense of the 36-fold arrays despite being commonly exposed to them in daily life and through the media.

 # Show/Hide AI response #

Question: Whilst comprehension of a 36-fold array of dramatic situations, stratagems or polyhedra is seemingly far beyond normal human capacity, is it potentially the case that there is a fundamental familiarity with that pattern as exemplified by the dramatic situations which feature in a daily media diet and social interaction in any community. Could the nature of that embodied comprehension be more appropriately recognized by the classic declaration of Moliere's *Le Bourgeois gentilhomme* (1670) regarding "prose": *For more than forty years I have been speaking prose while knowing nothing of it, and I am the most obliged person in the world to you for telling me so.*

 # Show/Hide AI response #

Question: In the light of that response, and the embodiment of an array of potential strategic moves in skilled players of chess and go, to what extent can strategic moves be compared in cognitive terms to symmetry preserving operations on polyhedra. Are there correspondences to be recognized between cognitive transforms and specific strategic moves in the game. Is there any trace of such recognition

 # Show/Hide AI response #

Question: That response evokes a question with regard to the fundamental duality of the games of Chess and Go as it relates to studies of the geometry of oppositional logic -- and their visualization on polyhedra with Boolean connectives, most notably on the rhombic dodecahedron. The challenge of comprehension of complexity, symmetry and opposition might then be understood in terms of the prime number factorization by which polyhedra can be distinguished -- and the role of 2 in every case. Could a more extensive array of equally engaging game patterns be envisaged -- calling for visualization on other polyhedra -- as a means of reframing thinking more fruitfully in a quarrelsome world.

 # Show/Hide AI response #

Re-membering the whole as an exercise in collective strategic remembrance?

The challenge of the times -- characterized by fragmentation in many domains, and between them -- could be framed as one of "re-membering". How indeed to interweave the variety of disparate cognitive modalities and world views -- for which the "weaving" metaphor is suggestive (*Interweaving Thematic Threads and Learning Pathways*, 2010; *Interweaving Contrasting Styles of Remaindering*, 2011; *Warp and Weft of Future Governance: ninefold interweaving of incommensurable threads of discourse*, 2010; ; *Global Civilization through Interweaving Polyamory and Polyanimosity?* 2018). It is of course the case that there is every variety of classification system -- typically in list form, or more rarely as tabular arrays (*Functional Classification in an Integrative Matrix of Human Preoccupations*, 1982). The challenge is to transforn such an array into one of greater coherence to enable comprehension of requisite variety for sustainable psychosocial dynamics (*Transforming a matrix classification onto intertwined tori*, 2006).

Of particular relevance, given its role in suurveying and nvigation, is the process of triangulation (*Triangulation of Incommensurable Concepts for Global Configuration*, 2011). Given the disproportionate number of triangles in the polyhedral set (above), this suggests the following question.

Question: From a cognitive and strategic perspective, the array of regular polyhedra reflects the challenge to "re-member" -- to which sacred geometry alludes in its mnemonically simpler forms. Would you have any comment on that array that perspective, namely the clustering challenge for mnemonic purposes and the issue

of triangular category sets, versus, square, hexagonal, etc into which so many conceptual models are currently configured. How many "triangles" then need to be "re-membered" in polyhedral forms to ensure integrity and coherence, etc

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Question: Curiously the configuration of the multiplicity of triangular, quadrilateral, pentagonal conceptual categories/models/frameworks, etc into coherence of higher order is enabled by polyhedra but the challenge of doing so -- re-membering -- is not explored from a mnemonic perspective -- or do you have traces of that, other than through the sacred geometry deprecated from a secular perspective

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Question: Could you comment further in the light of the extensive research on conceptual clustering and chunking for which I am sharing a paper (Fernand Gobet, et al, *Chunks, Schemata, and Retrieval Structures: Past and Current Computational Models* *Frontiers in Psychology*, 6, 2015). Of interest is that the clustering tends to be ordered in nested list format but not in polyhedral forms. This contrasts with neuroscience research: The appearance of high-dimensional cavities when the brain is processing information means that the neurons in the network react to stimuli in an extremely organized manner. It is as if the brain reacts to a stimulus by building then razing a tower of multi-dimensional blocks, starting with rods (1D), then planks (2D), then cubes (3D), and then more complex geometries with 4D, 5D, etc [*Blue Brain Team Discovers a Multi-Dimensional Universe in Brain Networks*, *Frontiers Communications in Neuroscience*, 12 June 2017]

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Learnings from the configuration process with AI and related criticism

Despite having a degree of experience with construction of models in 3D for web presentation using the X3D protocol, the above exercise reached a point at which a generic approach was required whereby the model was constructed via a Python script with which familiarity was minimal. The script was elaborated by ChatGPT-5 from a preliminary version of the model prepared "manually" according to the X3D protocol -- initially with advice from the Claude AI. The model presented here could not have been produced without such assistance, especially given the time taken to do so.

With every possible mistake made by the author in achieving a provisional result, learnings of potential interest to any such exercise with AI include:

- challenge for an AI in engaging with a 3D visual framework, whether or not 2D images can be appropriately interpreted
- obvious challenge for an AI to "see" any dynamic animation with the implications for X3D recommendations
- problems of (mis)communication from author to ChatGPT and vice versa
- problems of relative author (in)competence with Python script protocols in relation to building the X3D model, especially given the particularities of that script as distinct from programming in other languages
- uncertainties and delays regarding the placement of script snippets recommended by ChatGPT, partly resulting from unfamiliarity with Python, partly from lack of precision by ChatGPT
- use of resources of ChatGPT on minor issues -- in response to uncertainty of author
- extensive use of author resources in applying modifications with certainty in response to (minor) AI recommendations
- challenge to the author of selecting among multiple alternative solutions suggested by ChatGPT
- accumulation of Python modification snippets in problematic order
- complexities implemented to enable alternative visualizations -- subsequently omitted as being too

cumbersome
- necessary rationalization of progressively more complex Python script and issues created by such refactoring
- evolving clarity on what could be best achieved -- typically abhorred in other contexts as "mission creep"
- delays caused by minor errors by author or ChatGPT in relation to Python (typos, caps vs lower case sensitivity, for example)
- problems for ChatGPT (as a resource issue) in retaining script through a session persisting over days
- necessary avoidance of providing ChatGPT with complete script too frequently (resource issue)
- version control and recovery from error
- hindsight regarding progressive recognition that any final solution would have been simpler had the outcome been known in advance
- response delays from ChatGPT according to usage (time of day, priority, etc)

Question: A meta-question of some relevance to the polyhedral focus. The data for the inline models used derives from Stella4D. Ironically, as with Buckminster Fuller's geodesic data, efforts are made to copyright the sets of coordinates given the legitimate work in elaborating them. This means that, like maps of the past, there is a degree of "intellectual property secrecy" to the coordinates -- given the competitive advantage this represents. At the same time the data is of symbolic forms of fundamental psychosocial significance. Cognitively, the vertices may be indicative of points of inflection in thought processes. There is therefore a curious disconnect between the potential IP constraints and the manner in which the polyhedral forms can be fruitfully and rightfully embodied -- even manipulated for various purposes -- speculative and otherwise.

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Question: What of the any licensing constraints, as with Stafford Beer's syntegrity/syntegration, which may inhibit the ability to engage with the forms -- to "run with the ball"

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Question: Could you summarize the learnings from this model-building process from an AI perspective

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Comment on criticism of use of AI: This continuing experimental use of responses of several AIs to prompts, and their reproduction as optionally visible to readers, occurs in a period in which there is ever increasing criticism from various sectors and perspectives regarding the appropriateness, risks and validity of any such process. A response to such criticms is appropriate. For some critics AI responses are readily qualified as "*slop*", for others they are a threat to human creativity and existence. Little effort is made to clarify the value of such input. The exercise above, through which a complex visual model has been developed, could not have been developed by the auther without AI assistance -- or, expressed differently, it would have been virtually impossible to obtain human assistance to do so, given the resource constraints and delays that would imply. The process has its difficulties (as noted). Although treate as "working notes", the AI responses invite criticism in terms of style, ingratiating flattery (consistent with a marketing , agenda), and the much-deprecated tendency to "hallucinate". Curiously these are all evident to a degree in questionable effusive praise and laudatory language typical of many forms of human social interaction. They call for both indifference and vigilance -- few human collaborators lack indiosyncracies reqiiring attentive navigation.

Critics often cultivate the curious assumption that only the most rigid regulation of AI (something humanity has rarely demonstrated in any domain) could make its use acceptable. This nostalgia for an imagined past stability -- *what might have been, but never was* -- ignores the inadequacy of “business as usual” for addressing the challenges humanity now faces. In the absence of any credible Plan B, the critics’ agenda risks “throwing the baby out with the bathwater.” If AI can enable fruitful interdisciplinary insights where traditional authorities have been unwilling or unable to venture, then categorical rejection is dangerously short-sighted. To recall a mining analogy: on average it takes about 2.3 tons of ore to extract a single ounce of

gold. One person's "slop" may thus be another's necessary overburden -- the price of discovering new insights.

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