



*laetus in praesens*

Alternative view of segmented documents via Kairos

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# Cognitive Fullerene as a Rosetta Stone for Patterns of Systemic Constraint

## Reconciliation between disparate frameworks in the light of global familiarity with the football

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## Introduction

Otherwise known as the [truncated icosahedron](#) or C60, "fullerene" is a polyhedral configuration of 60 carbon atoms named after [Buckminster Fuller](#) in the light of his work on *Synergetics: Explorations in the Geometry of Thinking* (1975/1979). That study does not however explore the cognitive implications to any degree, as argued separately ( *Geometry of Thinking for Sustainable Global Governance: cognitive implication of synergetics* , 2009). Despite its apparent obscurity, the form of the truncated icosahedron is widely familiar

since it is the stitching pattern of the traditional [soccer football](#) .

Aside from its other valued properties, curiously the C60 fullerene is now appreciated as being of therapeutic value in response to [dementia](#) -- a human condition increasingly recognized to be a global challenge (Yawen Wu, et al, *Distinct Impacts of Fullerene on Cognitive Functions of Dementia vs. Non-dementia Mice* , *Neurotoxicity Research*, 3, 2019, 4; Davoud Malekzadeh, et al, *Neuroprotection of Fullerene in Improving Cognitive–Behavioral Disruptions and Neurobiochemical Enzymes Activities* , *Nanomedicine* , 18, 2023, 6; Brandon Iglesias, *Cognitive Integrity 199: C60 Fullerene World's Strongest Known Antioxidant to counter Reactive Oxygen Species ROS* , 10 July 2025),.

The focus in what follows is on the potential implications of the C60 configuration as a pattern of relevance to conceptual organization, coherence, integrity and identity of a higher order, as discussed separately ( *Sustainability through Global Patterns of 60-fold Organization* , 2022). Rather than the therapeutic role of the molecule as currently explored, the concern here is with the cognitive implications of the fullerene pattern as might be especially relevant to a form of collective dementia -- increasingly apparent in the strategic response to global crisis. "Collective dementia" in governance refers to a situation where decision-makers exhibit a lack of awareness or understanding of important issues, leading to poor policy choices. It suggests a collective failure to learn from past mistakes or to address pressing challenges effectively (*Societal Learning and the Erosion of Collective Memory*, 1980).

The exploration here follows from a previous exercise with regard to configuration of human rights, especially as defined by the 30 articles of the *Universal Declaration of Human Rights*. These have been variously developed and adapted in regional declarations -- for which the number of articles averages 58.3, as separately discussed (*Global Configuration of Human Rights for a Global Civilization* , 2025). Recognizing the systemic limitations of "human" and "rights" -- notably ignoring the rights of other lifeforms as well as human responsibilities -- the focus here is therefore framed more generally as "systemic constraints". The more general framing is relevant to the controversial consideration of AI ethics in a civilization which has been much challenged in the effective adoption of any [global ethic](#) in practice (*Just War Theory as an inspiration for Just AI Theory?* 2023).

The question raised is then whether the C60 fullerene offers a pattern through which a variety of "incommensurable" conceptual frameworks could be usefully reconciled -- as widely suggested by the role of the iconic [Rosetta Stone](#) and its appreciation by the [Langlands program](#) of mathematics (Kevin Hartnett, *A Rosetta Stone for Mathematics* , *Quanta Magazine* , 6 May 2024; Robbert Dijkgraaf, *A Mathematical Rosetta Stone* , *Institute for Advanced Study* , 2018). Seemingly beyond the comprehension of most mathematicians, this recent breakthrough addresses [hidden connections between disparate branches of mathematics: number theory, harmonic analysis, and geometry](#) . How might C60 function as such a cognitive Rosetta Stone?

The exploration recognizes the problematic contrast between the educational challenge of numeracy and the illusory dimensions of number symbolism. 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).

The argument concludes with consideration of the highly problematic relation between the [Abrahamic religions](#) as a primary underlying driver for many current and recent global conflicts. The conclusion focuses on the common inability of those religions to reconcile, within their theology and practice, the relation between 12-foldness and 5-foldness, despite the fundamental significance with which these patterns are associated in those religions. It is argued that a 60-fold configuration offers the potential of such a reconciliation -- both within such religions and between them. This follows from an earlier illustration of the unexplored relevance of the truncated icosahedron -- the football as a symbol (*Middle East Peace Potential through Dynamics in Spherical Geometry* , 2012).

As with previous exercises, the experimental engagement with one or more AIs in what follows continues to

evoke questions in a period in which AI is perceived as a threat to academics, to governance, and to employment more generally -- if not to the very existence of humanity. Relevant considerations and reservation have been previously discussed -- notably the question of the increasingly artificial nature of human intelligence as a consequence of "dumbing down" (*How Artificial is Human Intelligence -- and Humanity?* 2023).

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.

## Exploratory methodology in experiential comprehension of "N-ness"

In the light of the coherence of C60, the focus is on comprehensible closure -- the C60 being unusually familiar in the form of the soccer ball.. The art of the exercise is to avoid the [Scylla and Charybdis](#) of overdefinition and oversymbolization as being two traps of what is effectively cognitive grasping and premature closure -- as called into question by [Alfred Korzybski](#) in his critique of what "is" ( *Science and Sanity* , 1933). In the following context they are especially epitomized by number theory and numerology -- respectively deprecated by the arts and the sciences. They are however both emblematic of the reification and [misplaced concreteness](#) clarified by [Alfred North Whitehead](#) . ( *Process and Reality: an essay on cosmology* , 1929)

Inspired by the [precautionary principle](#) , the emphasis is on recognition of what is not immediately comprehensible or comprehended -- what one does not "get". Expressed otherwise the approach is a recognition of elusiveness and the liminal insights of "betwixt and between" ( *Living as an Imaginal Bridge between Worlds: Global implications of "betwixt and between" and liminality* , 2011).. This cognitive posture is arguably especially appropriate to the divisive fragmentation of a period in which many conflicting explanations are presented as the "truth" -- and recourse to relativization is proving to be inadequate to the challenges. It could be understood as a civilizational "rite of passage" (Victor Turner, *Betwixt and Between: The Liminal Period in Rites de Passage* , *The Forest of Symbols* , 1967)

In considering how any comprehension of the 60-foldness of C60 is to be achieved, the points of departure are primarily the dodecahedron -- with the icosahedron as its dual. The former has 12 pentagonal faces, 20 vertices and 30 edges; the latter has 20 triangular faces, 12 vertices and 30 edges. The conceptual challenge is to recognize how 60-ness is implicit in those forms, although effectively hidden.

C60, with its 60 vertices, 90 edges and 32 faces, is unique in inviting recognition through as many factors as the following: 2x30-ness, 3x20-ness, 4x15-ness, 5x12-ness, 6x10-ness, 10x6-ness, 12x5-ness, 15x4-ness, 20x3-ness, 30x2-ness. This pattern indicates that there are 5 kinds of 12-ness to be recognized, in contrast

with 12 kinds of 5-ness. Qualitatively or liminally framed, the challenge is then how the sense of "ness" can be explored and appreciated -- experientially -- in contrast to the somewhat unfruitful approaches of number theory or oversymbolization.

"Ness" could then be tentatively recognized as a kind of memetic nexus with which particular cognitive operations are associated in each instance. That said, 3-ness and 4-ness, for example, are also potential traps in terms of misplaced concreteness. A form of geometrical guidance as to the nature of the cognitive "operations" through which one form of "ness" is transformed into another (in framing C60) is to be found in the set of the symmetry preserving operations associated with the Conway polyhedron notation (discussed further below). There is seemingly no recognized cognitive equivalent, although the nature of that analogue can be described -- if only in metaphorical terms -- especially since examples can be given. The possibility can be explored with respect to dialogue ( *Cognitive implications of operational modification of polyhedra -- "global tiling"* , 2021)

**Question** : With respect to the factorization of 60, could you comment on the sense of "ness" as a memetic nexus, as in 3-ness, 5-ness, 15-ness, etc. How is it comprehended experientially -- even liminally -- in contrast to the perspectives offered by the Scylla and Charybdis of number theory and numerology as explanatory cognitive traps between which navigation may be appropriate.

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**Question** : In the insights you have offered into the experiential sense of "N-ness", no mention was made of how this is especially evident in the size of collectives, particularly of a team (sporting or otherwise) and, by extension, of a military or similar group. In such cases this is intimately related to a subjective sense of identity with "N-ness" -- which is variously considered vital, and is cultivated as an essential basis for collective action. It is also evident that that sense of "N-ness" (as evoking identification) may be eroded and become more dilute as the numbers increase (despite objective recognition of larger groupings). How is the sense of "N-ness" then distinguished between smaller teams and larger community, corporate or military groupings. What group sizes are experienced as meaningful and viable.

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**Question** : Arguably it is in a military context that contrasting senses of "N-ness" have long been cultivated. Given assumptions relating to 60-ness in this argument, could you comment on sizes favoured for military groups. How is belonging to a platoon distinguished from belonging to a brigade, battalion, etc

*# Show/Hide AI response #*

**Question** : Have military units traditionally adopted specific sizes -- 10-fold, 12-fold, 20-fold -- potentially to be recognized as "magic numbers" nesting within 60-fold or larger groupings.

*# Show/Hide AI response #*

## **Experiential distinction of degrees of "N-ness" versus numeracy education**

**Question** : Considerable emphasis is placed on the importance of numeracy in education and employment in a complex society. Seemingly very little education focuses directly on distinguishing 5-ness in contrast with 12-ness or 20-foldness (for example) with the advantages and disadvantages of each -- and the forms of 12-ness (possibly numbering 5). Some insight is gained implicitly into particular degrees of "N-ness" through experience in team sports, gang membership, kinship groups, corporate groups, and the military -- but this

tends to be tacit, biased in favour of particular numbers, and is not designed to enable switching between alternative configurations according to circumstances. Could you comment on this educational gap and its consequences, as well as the problematic focus on number symbolism

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**Question** : Chunking with regard to information, classification and memory (if not mnemonics) continues to be a focus of research. Are there any traces of research on chunking which are relevant to education into degrees of N-foldness systematically understood -- especially given its relevance to operacy

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**Question** : In the light of that response, could you comment on the possibility that particular extant strategies may be inappropriately chunked in terms of "fitness for purpose" -- under-chunked, over-chunked, or too rigidly chunked. The 169 "tasks" of the UN's Sustainable Development Goals have seemingly escaped evaluation from this perspective.

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**Question** : Those responses suggest that chunking resilience may already be fundamental to AI operation and its AGI possibilities. Could you clarify how AI addresses the rechunking required by circumstances.

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**Question** : Those responses frame a specific question with regard to the potentially problematic rigid chunking embedded uncritically in strategic thinking -- most obviously in popular games. .Given the binary organization of football, and the particular number of team members, what bias does that ensure as an educational experience of relevance to other domains. A shared document notes the case for alternative variants, in the light of alternative variants of chess -- exemplified by 3-sided football ( [Destabilizing Multipolar Society through Binary Decision-making: alternatives to "2-stroke democracy" suggested by 4-sided ball games](#) , 2016). Such examples call into question the fitness for purpose of binary legislative assemblies in the face of polycrises..

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**Question** : Whilst 3-sided football is far from being widely known (as with 3-sided chess), no conscious effort has seemingly been made to experiment with 4-sided "cross-pitch" ball games. Could you comment on the strange possibility that society may however effectively engage (unconsciously) to an unexplored degree in 12-sided "cross-pitch" games -- of which popular enthusiasm for astrological typing is one indicator (with 6 binary games played "across" each other). Some evidence for this could be found in Georges Polti's classification of "[36 dramatic situations](#) " as widely featured in popular media entertainment (as well as in the Chinese traditional recognition of [36 stratagems](#) ). How is any argument regarding 3x12 to be reconciled with the earlier argument regarding 5x12.

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**Question** : In the light of that response, could you comment on the appeal to the popular imagination of the Vulcan strategy game of [Kal-toh](#) featured in the *Star Trek* series -- classically contrasted with chess in the statement that it is as different from chess as chess is from [tic-tac-toe](#) . Intriguingly its visualization bears a degree of resemblance to the polyhedral tensegrity structures developed by Buckminster Fuller ( [Transcending Psychosocial Polarization with Tensegrity](#) , 2021)

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## **Cognitive and strategic expression of "N-ness" in polyhedral configurations**

**Question** : With respect to C60 as potentially embodying a sense of completeness and coherence, could you explore through each of the factors of 60 the manner in which 60-foldness is variously implicit or explicit in the experience of a dodecahedral and/or icosahedral configuration. For example, 5-ness is evident to a degree through the 12 pentagons of the dodecahedron, thereby offering a sense of 60-foldness as 12x5. But far less evident is how it might be recognized through such polyhedra as 5 forms of 12-foldness. Given the enthusiasm for 5-fold strategic articulation, are 12 contrasting forms of 5-ness effectively recognized -- and 5 forms of 12-ness

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**Question** : In the case of 12-foldness and 20-foldness, two documents indicate instances of each (*Checklist of 12-fold Principles, Plans, Symbols and Concepts*, 2011; *Requisite 20-fold Articulation of Operative Insights?* 2018). Missing is how the 12-fold sets could be meaningfully clustered into 5 groups to exemplify 5 forms of 12-ness. Similarly does the set of 20-fold sets suggest a 3-fold clustering. Do AI facilities enable recognition of such cognitive/experiential clusterings for other factors of 60

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**Question** : Each factorization is indeed helpfully understood as representing a different **cognitive strategy** for engaging with 60-fold complexity -- namely not just different ways of counting to 60, but fundamentally different modes of comprehension and navigation. One approach is to use the dodecahedron and icosahedron as visual prosthetics to distinguish what is explicit and what is implicit. Thus quadruplicities are hidden to a degree within the icosahedron as golden rectangles, as with 15-foldness. So yes, operational criteria would be helpful.

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**Question** : You have offered a clustering of 5 kinds of 12-foldness. Clearly a question is whether their distinctions are meaningfully understood qualitatively rather than as (somewhat alienating) formal distinctions relying on quantitative insights. The challenge is all the greater with respect to 12 kinds of 5-foldness, given a tendency to conflate various forms of 5-foldness. This could frame the question as to whether the Club of Rome's 5-fold Earth4All strategy is such a conflation of meaningful distinctions, or the 5 dimensions of the Inner Development Goals project.

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## **Complementarity of "ways of thinking" challenged by misplaced concreteness**

**Question** : Arguably traditional astrology has extensively explored (and named) 3-foldness (triplicities) and 4-foldness (quadruplicities) as they contribute to 12-foldness. The 4-fold pattern features notably in the Earth/Air/Fire/Water pattern deprecated as pseudo-science. Chinese culture has long cultivated the WuXing 5-fold pattern, echoed by the Pythagorean Hygeia. The deprecation is appropriate to the extent that such distinctions are instances of misplaced concreteness rather than indicators of cognitive/experiential qualities which elude conventional labelling. In the light of the above argument, does the dodecahedron suggest a valuable 5-fold distinction between 12 modes of comprehension of WuXing

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There is an intriguingly unexplored question as to how many "factors" need to be taken into consideration to ensure the sustainable viability of any system -- and who is attentive to that number. These could be understood in terms of disciplined "ways of seeing". The question could then be reframed as to how many distinctive "disciplines" there are -- especially since many conceptual modalities typically deprecate the alternative perspectives offered by other ways of seeing. How many are evident in the pattern of university courses or government departments? In the absence of authoritative responses, one early exercise identified

1845 "disciplines" (*Intellectual Disciplines and Sciences: cross-referenced to world problems*, 1976). A complementary question is then how it is variously proposed to interrelate them, of which 633 "integrative concepts" were profiled in the same context of the *Encyclopedia of World Problems and Human Potential*. **Question** : With regard to the commentary on the factorization of 60, to what extent could the manner of comprehension be understood in the light of insights into wave/particle complementary. Should a 4-fold pattern of 3-ness be more appropriately understood through complementary metaphors -- beyond the 2-fold complementarity required by the uncertainty principle. Is each then similarly elusive to the other. Does this raise the question as to whether any rigid N-fold articulation calls for complementary "ways of seeing" them - framed aesthetically by the classic poem of Wallace Stevens (*Thirteen Ways of Looking at a Blackbird*, 1917). Would this necessarily apply to the [Standard Model of particle physics](#), or the Langlands program, for example

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**Question** : The formal clarity of the polyhedral geometry is both helpful and misleading. It is surprising the degree to which reference is made metaphorically to points, lines, faces, spaces, and the like in conventional discourse -- but without being able to build those references into a coherent configuration, as argued in a shared document (*Engaging with Globality: through cognitive lines, circlets, crowns or holes*, 2009). The challenge would seem to be how to hold and configure the distinctions without losing their experiential sense. Ironically there is a fundamental question as to the experiential meaning of "point", "line", and "face" in forming the triadic basis for such configuration --- and the emergence of "volume" and "hole".

*# Show/Hide AI response #*

## **Application to configuration of human rights and other systemic constraints**

**Question** : Following exploration of the 30-fold set of human rights of UDHR, extended to 60 by taking into account their problematic/shadow condition -- these were together understood as a pattern of 60 systemic constraints. Taking it further, especially intriguing in relation to the fullerene C60 pattern, is the possibility of recognizing a variety of sets of "constraints" by acknowledging other "rights" (animals, etc.). This would frame the need for a style of Rosetta Stone "translation" between: 2x30-fold, 3x20, 4x15, 5x12, 6x10, 10x6, 12x5, 15x4, 20x3, 30x2-fold. The question is whether other extant sets of rights/responsibilities could be framed by this pattern

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**Question** : Clearly of interest is how constraints in any given articulation get adapted to one of greater or lesser articulation -- whether this adaptation is "forced" or reasonable, allowing for the fact that the original may itself be forced or inadequate in some way. From an AI perspective, this is a question of how correspondences are recognized or conflated -- even if a degree of speculation is appropriate

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**Question** : The "human rights" articulated in UDHR, or the regional declarations inspired by that set, can be explored as a particular understanding of systemic constraints. Apparently missing is any recognition of a 60-fold set of constraints in generic terms which would encompass rights and responsibilities excluded by the focus on "human". Cybernetics can be seen as having recognized a pattern of constraints through [viable system theory](#) and its applications to organizations. However this does not have the granularity which would make it meaningful to the various domains for which rights (and responsibilities) are articulated -- now including AI. How could a generic configuration of systemic constraints be elicited from the variety of extant charters.

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**Question** : In the light of that response, could you articulate a 60-fold set of systemic constraint types. A related concern is of course the language in which it is articulated -- given comprehensibility, meaningfulness and communicability as constraints in their own right. The soccer ball configuration of C60 is itself potentially suggestive in that respect

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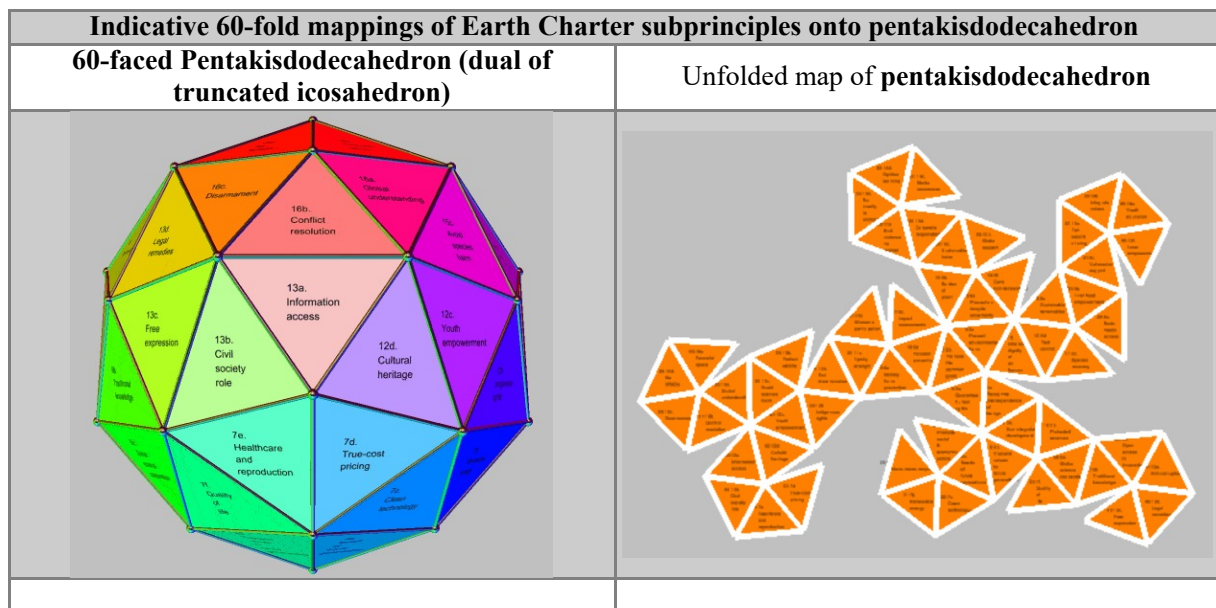
## Experimental derivation of systemic constraints from the 61 subprinciples of the Earth Charter

**Question** : Relevant to this argument is the 16-fold articulation of the Earth Charter into 61 "subprinciples". A succinct rewording of each of the latter is provided in a shared document. These have been experimentally mapped onto the 60 faces of the pentakisidodecahedron (and of the triakisicosahedron) and onto the 60 edges of the icosidodecahedron. Could you "confront" your proposed constraint themes with the Earth Charter list as an exercise in determining its potential systemic (in)adequacy.

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**Question** : The art of any mapping would be the systemic challenge of how to juxtapose the constraints (or their correspondences) on faces or edges -- compounded by the challenge of communicating such a 3D mapping to me using our 2D modes of communication

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**Question** : A 2D unfolded net of the pentakisidodecahedron is provided with Stella4D numbered faces and the current arbitrary mapping text. First number on each label is the Stella4D face number; next number is the Earth Charter subprinciple number. Also shared is the current labelling in Stella4D face number order. Depending on how you proceed, you could indicate that face 23 needs to be moved to position 43 (for example), with any constraint text added to it. However past experience is that it is difficult for you to recognize how the unfolded net folds into 3D. More fancy would be indication of how respective faces should be coloured

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## Rechunking resilience as a cognitive analogue to Conway

## operations

**Question** : Whilst the focus is indeed on the cognitive facilities potentially offered by C60, that polyhedron exists in a context of other Archimedean and Catalan polyhedra, some of which have 60-fold patterns (of faces, edges, or vertices) allowing for alternative mappings. Especially intriguing is how one "gets" from one articulation to another -- as might be enabled by Conway symmetry preserving operations. Missing in terms of pattern recognition as you have described it is, what is effectively the cognitive or classificatory equivalent to those operations. What is cognitive "truncation", etc -- and why is the cognitive equivalent of those operations not well established

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**Question** : My question is whether the cognitive/classificatory correspondences to the Conway operations could be determined more systematically. I attempted this to some degree in the shared document ([Dialogue coherence through formalization of local symmetry-preserving operations](#), 2021). Expressed differently, it is a matter of how one "changes cogitive gear" from 30-fold to 60-fold to 20-fold -- otherwise explored in terms of gear ratios

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**Question** : You offer examples of some equivalents. It is however challenging to note the extensive array of symmetry preserving operations for which clarification is lacking -- although presumably use is made of such "transformations" in dialogue, and especially in music. I would question your truncation example since rather than "outliers" in the polyhedral case it exposes a (relevant) set of vertices around that on which the truncation focuses.

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## Cognitive application of Conway transformational operations by AI?

**Question** : The frustration is that observation of the Archimedean/Catalan polyhedra alone suggests the tantalizing possibility of mapping how one "gets" from one mapping possibility to another as suggestive presented in the primary illustration of Conway operations on the cube. But there is no "subway/pathway map" for the relations between the set of such polyhedra -- or any sense of how it might be made comprehensible. There are some maps in the shared document ( [Pathway "route maps" of potential psychosocial transformation?](#) 2015) -- but they do not derive from the Conway operations

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**Question** : How feasible is it for you to "apply" a succession of Conway operations to a polyhedron to determine into what it is transformed. One could imagine a matrix with polyhedra as row headings and Conway operations as column headings -- with cells populated by the polyhedral outcome. This seems so obvious that you could usefully indicate any trace of such a matrix. It would be helpful to have the start F,E,V numbers and the resulting numbers in the cell. The subsequent challenge as you are pointing out is how one draws lines between cells to suggest pathways. Of some interest is which operations are programmatically intensive and therefore preferably set aside

*# Show/Hide AI response #*

**Question** : At least for the (semi)regular polyhedra there would appear to be a strong possibility that they would be susceptible to some form of recursive self-reflexive mapping which would be mnemonically comprehensible. 60-fold seems a key to that. I have considered mapping those with 60 F, E or V onto an icosahedron, for example

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**Question** : Following Buckminster Fuller's enthusiasm, mapping the Conway operations onto the vertices of a cuboctahedron might be elegant, especially since Keith Critchlow has shown how 12 Archimedean polyhedra can be configured for closest packing by that form. With respect to 64-fold (notably a feature of the genetic code) -- raises the question as to how distinctive in conceptual practice one should consider larger numbers to be (60=62=64?) in the light of Miller's +/- seven argument. Who can distinguish a count of 60 vs 62 vs 64 sheep, for example -- but how far can one go with such conflation

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**Question** : is there a mathematical pattern by which the set of Archimedean solids is generated as a set

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**Question** : Is there then no logic to the coherence of the generated set. Is it just the incidental consequence of those rules?

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**Question** : Although the set results from the constrained application of Conway symmetry preserving operations, how is it that analogous operations are not recognized in the the generation of cognitive/classificatory sets

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**Question** : How does that restrictive response relate to the use of the Platonic forms in memorable sacred and symbolic articulations -- which would seem to invite truncation and other operations

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## Analogical pattern recognition in qualitative operations of AI

**Question** : How does that response inform the analogical processes which AI is obliged to employ in a disciplined manner and which Douglas Hofstadter sees as the key to creativity (*Fluid Concepts and Creative Analogies: computer models of the fundamental mechanisms of thought*, 1995; *Surfaces and Essences: Analogy as the Fuel and Fire of Thinking*, 2013).

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**Question** : That response is perhaps necessarily vague but potentially implies that the processes used by AI are analogous to constrained Conway operations and could be articulated as such

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## Missing term for qualitative pattern recognition across disparate categories

**Question** : Whilst the process of generalization of categories is clear and unambiguous there seems be no term labelling pattern recognition and correspondences between disparate concepts from a systemic perspective as in "moonshine mathematics", for example. What are the rules for valid pattern recognition and valid morphing between patterns

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**Question** : Although that explanation is very clear it could be said to imply -- through a variety of expressions -- what Conway has effectively formalized *mutatis mutandis*

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## Articulating human rights and systemic constraints otherwise

**Question** : How can "human rights" (or "systemic constraints" more generally) be articulated with different degrees of granularity -- or conflated. What are the rules for such operationsk

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**Question** : A point of departure is the observation that the 30-article UDHR is variously extended in regional charters to numbers of articles which average at 58.3. What is the process by which greater granularity was achieved and how coherent are the disparate sets. Are there other disparate charters proposing systemic constraints

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**Question** : A particular interest is in how to render extensive lists of constraints systemically comprehensible. Hence the interest in polyhedral mapping and specifically in the potential role of a cognitive C60 fullerene as a pattern of organisation -- given the many sets into which it can be decomposed 2x30, 4x15, etc and the implication of parallel and complementary sets in practice

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**Question** : Such mappings have been explored using Stella4d and X3D. It is intriguing how C60 is part of a set of 12 (+1) polyhedra, some of which are characterized by 60 vertices, etc. What does morphing to them imply systemically and how is "changing gear" in this way to be recognized as meaningful

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**Question** : your summary would suggest that charters in list form are inadequate to the challenge of both comprehensibility by different audiences and implementation where a different "gear" is viable. charters need to be dynamically morphable

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**Question** : Of interest in the light of your responses is whether an AI could develop processes to transform a static charter into morphable form. to take the question further, there is the intriguing possibility that a seemingly useful form like C60 might need to be understood as a 3D projection of a 4D polytope able to hold connectivity more appropriately

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**Question** : The cognitive, conceptual and systemic challenges appear to be too readily set aside in favour of the mathematical ease in dealing with complexity -- providing the audience is limited to experts

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## Conceptual analogues to musical operations and transformations

**Question** : Given the innovative work of Dmitri Tymoczko (The Geometry of Musical Chords), and its cognitive implications, is there any trace of analogues in music to the Conway operations -- perhaps in the canons and their variations. How are those variations understood systematically from a cognitive perspective

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**Question** : Whilst that response clarifies that there is indeed a relationship, however well it is recognized, it is less evident how the acknowledged cognitive correspondences then relate to comprehension of the transformation of categories and the formation of pathways between disparate concepts. Would AI make use of either the Conway rules or their musical analogues in detecting such pathways

*# Show/Hide AI response #*

## Disparate frameworks, general systems research and aesthetics

**Question** : How does that response relate to the original inspiration for general systems research -- seemingly now obscured by the current priorities of the systems sciences. Expressed otherwise, how disparate can systems be such that no meaningful correspondences can be found, despite "moonshine mathematics" and the generic implications of the Tao Te Ching introduction. What form might a fundamental generic formulation then take to be capable of engendering the disparate and its challenge to comprehension

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**Question** : Your passing references to Gregory Bateson and poetry are a reminder of his view that: "One reason why poetry is important for finding out about the world is because in poetry a set of relationships get mapped onto a level of diversity in us that we don't ordinarily have access to". Given the emphasis on comprehension in contrast to systemic articulation, could the pattern that connects invite poetic/aesthetic articulation -- of which the Hesse's *Castalia* and the Eurovision Song Contest offer the faintest indication. Given the musical reference, how should any transformative aesthetic "rules" regarding symmetry preserving operations then be understood

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**Question** : In the light of that response, given the manner in which the recent breakthrough of the Langlands program is inspired by the Rosetta Stone as a translational device, is there any trace of an effort to represent its insights (or those of "moonshine mathematics") in poetic or musical form

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**Question** : Less ambitiously, does that response suggest that, to enable wider uptake and comprehension, strategic sets (human rights, development goals, etc) merit articulation as sets of aesthetic "variations" (as with the Goldberg and other variations) in the light of a conceptual analogue to the Conway operations

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## Configuration of Platonic, Archimedean and Catalan polyhedra in 3D

It is a continuing challenge to visualize the array of regular and semi-regular polyhedra, many of which which are so fundamental to geometry -- whether sacred or mundane -- despite the irony that the form of one of them is widely familiar through the stitching pattern on the common football. The challenge is not facilitated by the fact that most of them have names which could not be more unmemorable -- with a number being variously named.

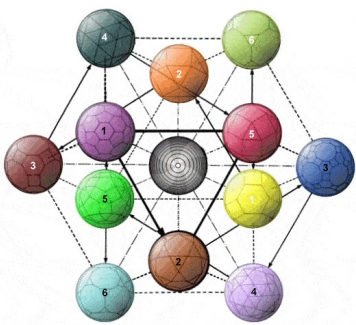
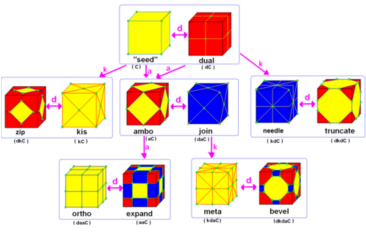
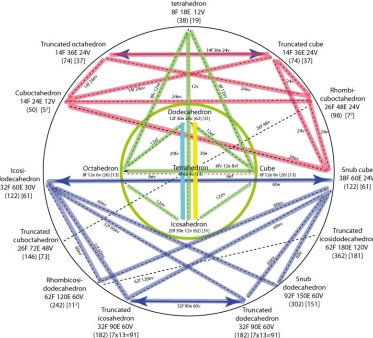
Aspects of the visualization challenge are presented separately with a wide variety of imagery and animations (*Cognitive Embodiment of Patterns of Governance of Higher Order: Memorable navigation of viable global pathways from 4-fold to 64-fold and beyond*, 2022; *Psychosocial Implication in Polyhedral Animations in 3D: Patterns of change suggested by nesting, packing, and transforming symmetrical polyhedra*, 2015; *Time for Provocative Mnemonic Aids to Systemic Connectivity?* 2018; *Visualization of Polyhedral Inner Chambers with Psychosocial Implications*, 2025). The following images feature in those documents.

Although fundamental principles are the epitome of extreme abstraction, it is curious to note the architectural importance attached to configurations of stone pillars as a representation of them -- whether singular pillars (cenotaphs, etc), pairs of pillars (gateways, etc), or circles (Stonehenge, etc). The term now features metaphorically in strategic articulations (*Coherent Value Frameworks: Pillar-ization, Polarization and Polyhedral frames of reference*, 2008). Arrays of pillars and columns continue to be a notable feature of the porticos of official buildings following a tradition with respect to temple architecture.

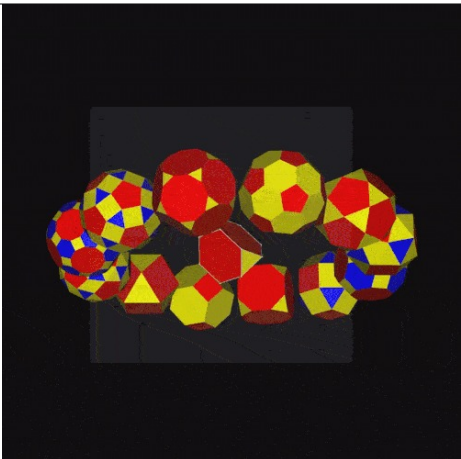
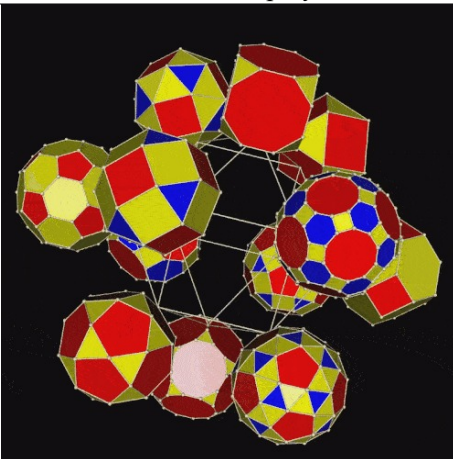
**Question:** Pillars continue to feature in the porticos of official buildings. Do you have any trace of arguments for a particular number -- in contrast with temple configurations of the past

# Show/Hide AI response #

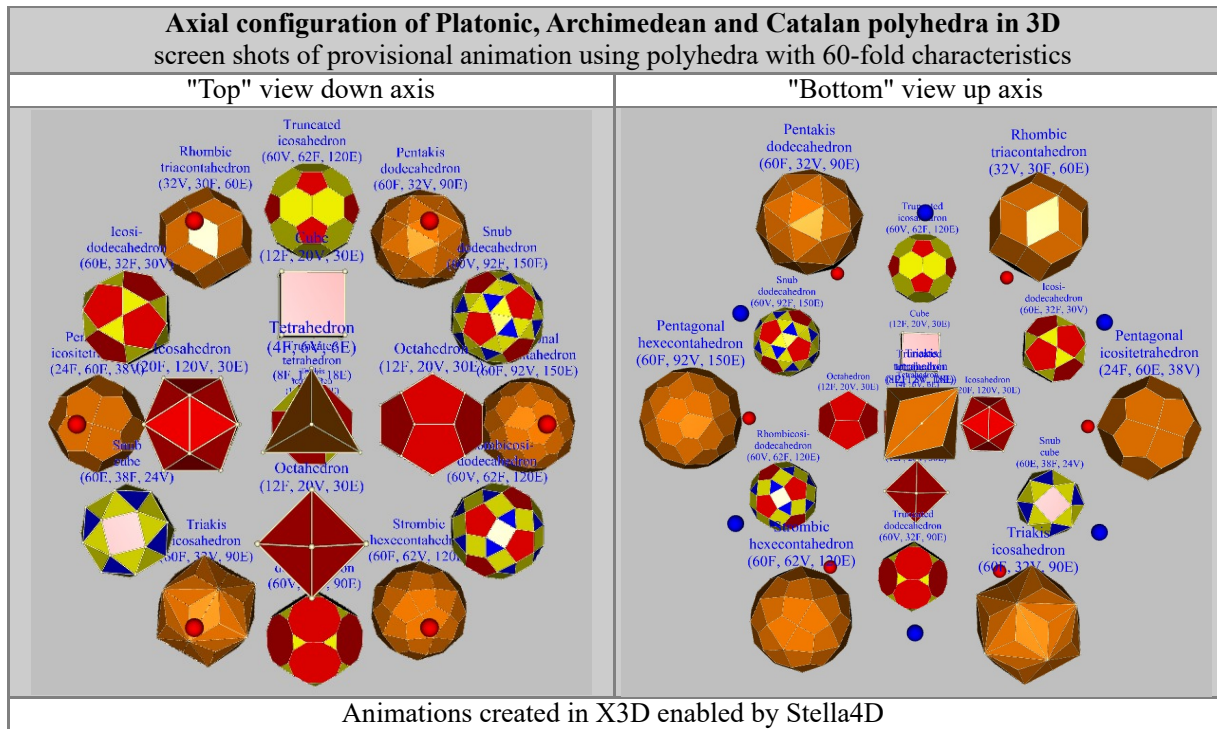
In configuring the set of Archimedean polyhedra, the 2D image on the left below (derived from a study by Keith Critchlow (*Order in Space: a design source book*, 1969) is especially evocative of the possibility of representing it in 3D. In relation to the commentary above on Conway operations, the central image also suggests the possibility of displaying such linkages between polyhedra dynamically and in 3D, The 2D image on the right offers a sense of a "transit system" between the polyhedra in question.

Alternative schematic relationships between 12 Archimedean polyhedra		
Closest packing configuration of polyhedra by Critchlow (enhanced with arrow animation indicating transformations)	Conway relational chart Showing 12 polyhedral forms created by 3 symmetry-preserving operations on the cube	Distinctive relationships pathways between spherically symmetrical polyhedra
		
Reproduced from <i>Engaging with Globality through Dynamic Complexity</i> , 2009	Tomruen at English Wikipedia, Public domain, via Wikimedia Commons	F=faces, E=edges, V=vertices (total of these in parenthesis)

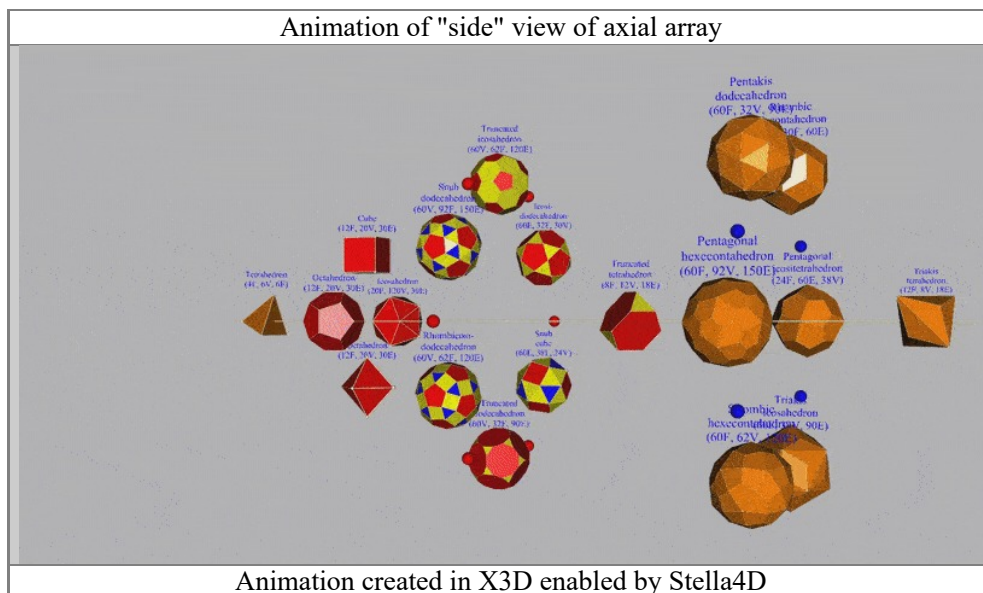
With advances in computer software and web technology new ways can be explored -- a number of which feature in the documents cited above. The animation on the right below is one approach to a 3D representation of Critchlow's 2D image (above left).

Indicative animations of Archimedean polyhedra	
Rotation of ring configuration around truncated tetrahedron	Rotation of cuboctahedral configuration of Archimedean polyhedra
	
Animations created in X3D enabled by Stella4D	

Faced with the challenge of visual clutter, the experimental configuration shown in the screenshots below uses only a ring of 6 of the Archimedean polyhedra with a ring of their 6 Catalan duals -- selected for the 60-fold properties by which they are commonly characterized. The presence in the rings of excluded polyhedra is marked by red spheres in the first ring and blue spheres in the second.



The image below shows the axial array along which the different sets of polyhedra are distinguished -- an array of which the top and bottom views are shown above. On the far left below is the most fundamental polyhedron, the tetrahedron which is part of the set of 5 Platonic polyhedra (of which the other 4 are displayed to the right of it). Then follows a ring of 12 Archimedean polyhedra, of which the 13th -- the truncated tetrahedron -- is presented to the right of that array. Then follows the ring of 12 Catalan polyhedra, namely the duals of the Archimedean set, followed on the far right by the 13th member of that set -- namely the triakis tetrahedron (the dual of the truncated tetrahedron).



**Question:** Could you comment on the potential symbolic significance of the axial array (above): 1 tetrahedron, 4 other Platonic, 12 Archimedean, 1 truncated tetrahedron, 12 Catalan, 1 triakis tetrahedron. For example: 5 Platonic plus 13 Archimedean = 18; together with 13 Catalan = 31. Ring of 12 Archimedean plus ring of 12 Catalan = 24. And 6 60-fold within Archimedean ring plus 6 60-fold within Catalan ring = 12. 5-fold Platonic in contrast with 12+1 Archimedean. Any other patterns suggestive of symbolic relevance, most notably to theology

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## Reconciliation of Abrahamic religions through 60-foldness?

The following questions are inspired by earlier speculative explorations (*Middle East Peace Potential through Dynamics in Spherical Geometry*, 2012; *Root Irresponsibility for Major World Problems: the unexamined role of Abrahamic faiths*, 2007; *Fundamental Need for Human Sacrifice by Abrahamic Religions*, 2018). Such speculation is justified in a period of recent destruction by Christian societies of sites sacred to other religions (Iraq, Afghanistan) and currently enabling what is now widely recognized as genocide of Muslims by Judaism -- genocide to which Jews had themselves been subject in the past.

The following interpretation of implications of the above argument follows from previous exploration of mathematical theology -- given the fundamental symbolic importance of number shared by the Abrahamic religions (*Mathematical Theology: Future Science of Confidence in Belief*, 2011). From the polyhedral perspective explored above, it could be considered especially curious the distinction between the 5-fold pattern of the regular Platonic polyhedra and the 12-fold pattern of the semi-regular Archimedean polyhedra (and their Catalan duals).

In the controversial importance of the implications, the following questions were addressed to four AIs for comparative purposes.

**Question** : History continues to document the fatalities engendered by the inability of Abrahamic theologians to reconcile their righteously held world views -- or to avoid projecting that unexamined failure onto other cultures. Fundamental importance is variously associated with 12-foldness in those religions -- [12 tribes of Israel](#) , [12 Imams](#) , [12 Apostles](#) , for example. Curiously a seemingly unrelated importance is associated by those religions with 5-foldness: the [Fivefold Ministry](#) as a divinely ordained structure for Christian church leadership, [Five Pillars of Islam](#) , and [Five Pillars of Judaism](#) . Beyond symbolism of seemingly limited operational significance, does the apparent failure in fundamental reconciliation of 12-ness with 5-ness in each case suggest that their disparate nature could be more appropriately reconciled through 60-foldness as a form of fulfillment: [Meaning of 60 in the Bible](#) , [Isaiah 60](#) , [60 branches of faith for Islam](#) . With otherness reinforced by the "[bicameral mind](#) ", reconciliation is seemingly elusive through the framework of 12-foldness dating from Ancient Greece, despite any internalization in a "[dodecameral mind](#) ". How might theologically disassociated strategic promotions of 12-foldness and 5-foldness be reconciled through 60-foldness

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**Question** : In the light of that response, could you comment on the insight to be gained from the possibility that the 3 unreconciled understandings of 12-foldness promoted by the Abrahamic religions have played out their tragic dynamics through what might be recognized as the 36 [dramatic situations](#) classified by Georges Polti -- or through the [36 stratagems](#) articulated in Chinese tradition. This might then justify any particular importance associated by those religions with 24-foldness as indicative of a pattern of 60-fold completion to which they unconsciously aspire ([24+1 Prophets in the Quran](#) , [Meaning of 24 n the Bible](#) , [Significance of 24 in Judaism](#) ). How feasible would it be for AI to associate historical events of Abrahamic relations with the dramatic or stratagem frameworks

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