



laetus in praesens

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Viability of Sustainable Development as Implied by Metabolic Cycles

AI-assisted clarification of cognitive challenge of turbocharging SDGs

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Introduction

SDGs as a polyhedral system of cycles?

Existential implications of effective engagement with SDGs

Systemic indications from metabolic cycles of SDG viability for the collective

Towards a method of AI-enabled SDG cycle detection

Feasibility of change encoded by minimal degree of phase transition?

Refinement of hexagram-encoded cycle detection methods

Iterative development of a cycle detection algorithm

Reframing the method with an alternative AI

Varieties of cycle presented geometrically in 3D

Narrative interpretation of SDG cycles

Metabolic cycles as instructive analogues to SDG cycles

Development insight processing in the light of photosynthesis?

Disorderly sustainable development implied by metabolic disorders

Disruption of strategic logic by other patterns of connectives

Reframing UN reform as reform of knowledge organization

Introduction

The UN's ambition to "turbocharge" the Sustainable Development Goals on the occasion of the 2024 [Summit of the Future](#) was previously explored through interaction with AI (*Turbocharging SDGs by Activating Global Cycles in a 64-fold 3D Array*, 2024). The detection by inspection, and subsequent visualization of feedback loops in that experimental procedure with [ChatGPT](#) and [Claude](#), proved to be encouraging to the point of envisaging an AI-enabled automated detection of indicative SDG cycles that could be essential to their viability.

As feedback loops in cybernetic terms, such cycles have been a notable feature of the extensive analysis of the networks of thousands of problems and strategies profiled in the online *Encyclopedia of World Problems*

and Human Potential (*Feedback Loop Analysis in the Encyclopedia Project*, 2000; Tomas Fülöpp, *Loop Mining in the Encyclopedia of World Problems*, 2015). For example, a total of 473 5-loop cycles were detected in the first, and 502 in the second.

The focus in the development of those recent experiments with AI has been on how to configure cycles in a systemically meaningful manner to enhance their comprehensibility and memorability. It was argued that a fruitful approach to "turbocharging" could be usefully framed in terms of enhancing connectivity dynamically. The preoccupation with visualization was explored through mapping onto polyhedra of requisite complexity -- for which the 64-vertexed [truncated tesseract](#) was highlighted.

This polyhedral bias followed from the insight of Buckminster Fuller: *All systems are polyhedra* (*Synergetics* [400.011-02]) -- an insight echoed and elaborated by Mariah Guimarães Di Stasi and Anja Pratschke (*Acting Cybernetically in Architecture, Cybernetics and Human Knowing*, 27, 2020, 3). From that perspective it is appropriate to ask how the SDGs might be understood in polyhedral terms as an indication of the "organization architecture" and "knowledge architecture" fundamental to their viability in cybernetic terms (Ousanee Sawagvudcharee, et al, *Understanding Organizational Studies Toward Knowledge Cybernetics, International Journal of Economics, Business and Management Research*, 4, 2020, 6).

Characterized as they are by vertices, edges and faces, polyhedra as configurations of multi-edged faces then invite recognition in systemic terms -- the corollary to Fuller's insight, namely all polyhedra are systems. The 48 faces of the truncated tesseract would then suggest its recognition as a system of 48 cycles of various dimensions. To the extent that the SDGs can be meaningfully mapped onto such a polyhedron, this evokes the question as to whether the coherence of the SDGs as a global strategic system could be most fruitfully understood as a configuration of cycles -- rather than in conventional linear terms. The question then is whether such cycles are appropriately interlocked by feedback groups to ensure the viability of that strategic enterprise.

The somewhat elusive perspective thereby evoked can be fruitfully compared with the set of [metabolic pathways](#) fundamental to metabolism and the viability of life in human and other species. Curiously there is a marked tendency to reduce appreciation of viable metabolism to a set of micronutrients which are however interlinked by those metabolic pathways and a number of key cycles. It might then be asked whether the "psychosocial life" of the collective -- exemplified by the SDGs -- is characterized by key cycles whose dynamics are fundamental to any effort to "turbocharge" the UN's strategic initiative (*Memorable Configuration of Psychosocial "Vitamins", "Amino acids" and "Minerals"*, 2024). Given widespread recognition of [metabolic disorders](#), it might then be asked whether these offer insights into potential "sustainability disorders". It is in this sense that there is considerable irony that policy-makers on sustainable development personally embody an unconscious comprehension of development cycles.

Whilst the UN's Summit of the Future is preoccupied with a 5-factor framing of "turbocharging" through 6 transitions, it is quite unclear whether there is any explicit recognition of what might be considered the "key cycles" essential to its viability -- as could have been appropriately recognized in its inter-governmentally negotiated, action-oriented *Pact for the Future*. This failure would seem to date from the assumptions of the [World3](#) model by which the original *Limits to Growth* model was framed in 1972 -- and their subsequent embodiment in the [Earth4All](#) articulation of the Club of Rome in an unquestioned 5-fold/6-fold pattern. Any such pact could be considered "cyclically defective", given the lack of interaction with the wider population (Derrick Broze, *Summit of the Future: the public still has not seen the final draft of the Pact for the Future*, *Nexus*, 20 September 2024).

Inspired by the understanding of key cycles essential to biological life, there is then a case for challenging AI to suggest correspondences in systemic terms to cycles potentially relevant to sustainable governance -- in the spirit of [general systems research](#). As the following exchange indicates, both AIs responded surprisingly proactively to this challenge. A notable correspondence was for example suggested between the "urea cycle" and that of "waste management". Other potential correspondences have been articulated of relevance to sustainable development.

The issue in what follows is therefore how to develop an AI-enabled methodology with respect to the detection and visualization of cycles meaningful to sustainable development. The point of departure was the extraction of an adjacency list based on the traditional set of hexagram-encoded psychosocial conditions, given the manner in which transformations from one such condition to another are notably defined in terms of one (or more line changes). Such an adjacency list was extracted from the set of documents accessible from *Transformation Metaphors derived experimentally from the Chinese Book of Changes* (1997). As an experiment this approach was partially justified by past recognition of a degree of correspondence between disparate 64-fold patterns, including the genetic codons and the Mathematical Subject Classification. The 16-fold articulations of the SDGs and logical connectives was seen as suggestive of a significant relationship within a 64-fold pattern.

Conventional depreciation of that unusually detailed traditional articulation of patterns of change as "divination" was challenged earlier by comparison with the "modelling" on which governance is now so reliant (*Misleading Modelling of Global Crises*, 2021). There is the considerable irony that conventional interaction with AI, and any statistical modelling it may enable, could in turn be compared with "divination" - and equally suspect. Methodologically it is assumed here that there is value in according a degree of value to traditional knowledge systems, as argued by Susantha Goonatilake (*Toward a Global Science: Mining Civilizational Knowledge*, 1999).

A particular interest of the following exercise is the manner in which the iterative interaction with either ChatGPT or Claude clarified how that process might be used to elicit feedback loops of importance to the viability of sustainable development. What can be gleaned from AI "re-search" of the unprecedented access to vast data resources in response to evocative questions? The results arising from this process, as reported here, are therefore primarily of value as indicative of how that iterative process might be further developed and the nature of the AI engagement with that possibility. Readers are obviously able to ask the same questions with AIs to which they have access -- or to develop those presented here. In this sense the exercise is understood as a demonstration of method -- especially for institutions reluctant or resistant to its potential. The demonstrated ability of AIs to develop a narrative clarifying the coherence of particular cycles is a facility which merits critical development.

As in the previous experiments, the responses of ChatGPT 4o are distinctively presented below in grayed areas, in parallel with those of Claude 3.5. **Given the length of the document to which the exchange gives rise, the form of presentation has itself been treated as an experiment** -- in anticipation of the future implication of AI into research documents. Web technology now enables the whole document to be held as a single "page" with only the "questions" to AI rendered immediately visible -- a facility developed in this case with the assistance of both ChatGPT and Claude 3 (but not operational in PDF variants of the page, in contrast with the [original](#)). Reservations and commentary on the process of interaction with AI to that end have been discussed separately (*Methodological comment on experimental use of AI*, 2024). Whilst the presentation of responses of two AIs could be readily considered excessive, it offers a "stereoscopic" perspective highlighting the strengths and limitations of each.

Show All AI Responses

SDGs as a polyhedral system of cycles?

Question: Buckminster Fuller is renowned for his insight that: *All systems are polyhedra*. How might the system of SDGs then be understood in polyhedral terms as an indication of the "organization architecture" and "knowledge architecture" fundamental to their viability in cybernetic terms. Characterized as they are by vertices, edges and faces, polyhedra as configurations of multi-edged faces then invite recognition in systemic terms. The 48 faces of the truncated tesseract would then suggest its recognition as a system of 48 cycles of various dimensions. To the extent that the SDGs can be meaningfully mapped onto such a polyhedron, this evokes the question as to whether the coherence of the SDGs as a global strategic system could be most

fruitfully understood as a configuration of cycles -- rather than in conventional linear terms. The question then is whether such cycles are appropriately interlocked -- as in any polyhedron -- to ensure the viability of that enterprise.

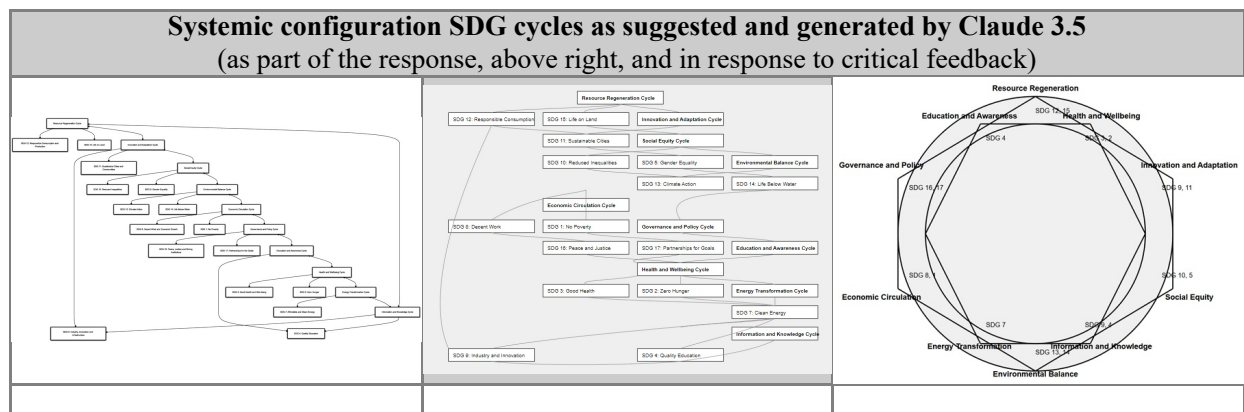
Show/Hide AI response

Question: The possibility of framing the comprehension and essential connectivity of SDGs in terms of any polyhedron is immediately challenged by the appropriateness of that polyhedron to any mapping. There are many polyhedra and it is those which exemplify coherence and memorability through patterns of symmetry which appear to be of most immediate relevance in systemic terms. Given that the organization of the polyhedron clearly exemplifies a response to "packing" complexity most efficiently, there is the possibility that it is not those in 3D which would be most appropriate -- but rather an analogue in 4D (or more) with its particular implication for comprehension and the challenge of projecting it into 3D for purposes of visualization. Such higher dimensional analogues frame the question as to how their implied "cells" might be of significance to meaningful SDG organization. Especially intriguing is the extent to which projections of such analogues into 2D take forms which have acquired symbolic significance and are appreciated aesthetically.

Show/Hide AI response

Question: In metabolic systems viability of life is notably ensured by a 10-fold set of so-called "key cycles" in contrast with the multiplicity of "pathways". Current consideration by the UN of means to "turbocharge" the SDGs would seem to be focusing on a 5-fold pattern of initiatives in relation to a 6-fold set of transitions. In polyhedral terms could this be understood as overly simplistic -- even dangerously so -- in relation to the complexity of the 16-fold set of SDGs. There is clearly a challenge in articulating coherence in a manner enabling comprehension and memorability -- potentially elusive if requisite complexity is honoured. What "key cycles" might be recognized in the case of sustainable development by analogy in systemic terms with those of biological metabolism.

Show/Hide AI response



Question: That response goes some way towards implying that each SDG could itself be understood as a "key cycle" -- or clustered within such a cycle -- a framing obscured by the conventions of linear strategic articulation and its focus on goals. That linear framing -- and the absence of any comprehensible systemic configuration -- could itself be understood as undermining the viability of the SDG system as a whole. In polyhedral terms does the 5-fold/6-fold patterning recall the simplicity of the dodecahedral/icosahedral configurations -- ignoring the manner in which they are readily elaborated into more complex patterns which they might otherwise imply

Show/Hide AI response

Existential implications of effective engagement with SDGs

Question: The political necessity of focusing on tangible formulations of each SDG strategy (as with "No Poverty") detracts from any insight regarding its fundamental systemic implications -- perhaps "No Inadequacy", for example. Could you suggest a more generic formulation of each of the SDGs in the light of their systemic and cognitive interdependencies -- thereby avoiding misplaced concreteness.

Show/Hide AI response

There is an obvious danger that any further articulation of the SDGs is readily characterized by what George Orwell defined as "[Newspeak](#)", described by Wikipedia as:

In the dystopian novel *Nineteen Eighty-Four* (1949), by George Orwell, Newspeak is the fictional language of Oceania, a totalitarian superstate. To meet the ideological requirements of Ingsoc (English Socialism) in Oceania, the Party created Newspeak, which is a controlled language of simplified grammar and limited vocabulary designed to limit a person's ability for critical thinking. The Newspeak language thus limits the person's ability to articulate and communicate abstract concepts, such as personal identity, self-expression, and free will,] which are thoughtcrimes, acts of personal independence that contradict the ideological orthodoxy of Ingsoc collectivism.

Related constraints are recognized in the promulgation and imposition of the jargons of particular disciplines, as with [logocracy](#).

Question: Arguably that response could be criticized as reframing the SDGs through what might be recognized as political, scientific or bureaucratic euphemism. This avoids recognition of any psychological and cognitive engagement with what the SDG might imply experientially. Thus "No Poverty" is indicative of the existential angst of fundamental "inadequacy", an indication exemplified in the case of "Zero Hunger" by forms of "nourishment" which could be psychosocial or even spiritual -- to which the feeling of "emptiness" alludes. Such reframings can be recognized as drivers of both creativity and substance abuse. In generic systemic terms what fundamental correspondences of psychosocial systemic significance could be fruitfully recognized as an underlying challenge

Show/Hide AI response

Question: Arguably such existential articulation of the SDGs should relate closely to the initiative to recognize a set of Inner Development Goals (IDGs). Could you comment on this and the implications for engagement in the associated cycles interrelating the sets -- then to be understood as complementary

Show/Hide AI response

Systemic indications from metabolic cycles of SDG viability for the collective

Question: There are extensive references to metabolic "pathways" (and the associated maps). It is less evident how many "cycles" are recognized, and how these relate to the number of pathways. Could you comment, given the implication for development "pathways" in contrast with development "cycles" -- for which numbers are presumably not known

Show/Hide AI response

Question: Given that response, could you suggest developmental analogues to the common metabolic cycles of potential relevance to the viability of SDGs (or IDGs)

Show/Hide AI response

Question: The sense of a cycle, as highlighted in this exchange as of strategic significance, is a particular kind of objective abstraction. Environmental cycles suggest the manner in which they may however be commonly experienced by many -- thereby offering a rich source of metaphor. More challenging is how

psychosocial cycles are recognized and comprehended, especially given their relevance to sustainable development and the degree to which people may be embedded within them, as with economic cycles. A degree of clarification is offered by the work of Mircea Eliade on "eternal return". More poignant is the famous poetic articulation of cyclic experience by T. S. Eliot: *We shall not cease from exploration and the end of all our exploring will be to arrive where we began and to know the place for the first time* (1942). Could you comment on the ways in which cycles are meaningfully experienced

Show/Hide AI response

Towards a method of AI-enabled SDG cycle detection

Question: Given you still have access to the hexagram adjacency list, could you comment on how you might be able to detect cycles, in addition to those evident by inspection -- as you have previously indicated

Show/Hide AI response

Question: I had assumed there might be misattribution errors but on inspection of the structure it appears correct. Whether the adjacency list itself contains errors calls for a different form of verification which I will undertake

Show/Hide AI response

The disadvantage of that list is that it failed to distinguish in which trigram (upper or lower) the changing line was located. As a first approximation with respect to the mapping onto the truncated tesseract limited changes of significance were recognized as associated with the secondary trigram rather than with that associated with each of the 8 corners of the configuration. This distinction was only highlighted as a constraint later in the following exchange

Question: The fundamental error with respect to the adjacency list (derived from other sources with your assistance) was that the single line change by which adjacency was defined there was based on any line in the double trigrams of a hexagram. This obscured the line changes in a single trigram in terms of which the effort was being made to detect cycles. Confirmation of the attributions therefore requires another approach.

Show/Hide AI response

Question: It is appropriate to be clear that use of the adjacency list was seen as a second option to enable you to test the capacity to detect cycles. The problems with that approach do not effect the cycles appropriately detected by inspection in the first option (for which you provided the correct spine coordinates). There is however the need to confirm the labelling of nodes in those cycles.

Show/Hide AI response

Feasibility of change encoded by minimal degree of phase transition?

Question: You should have a trace of the earlier effort to position 64 hexagrams on the vertices of a truncated tesseract. I have one seemingly appropriate solution but I am looking for a way to confirm this. The question seems to be how to minimize the "distance" on edges between proximate hexagrams, as defined by the number of line changes between them (and potentially the position of those lines). So in trigram terms, "Heaven" would be 3 from "Earth". "Fire" would be 1 from "Wind" (although there is a difference in position of the changed line). Do you see a way to define such distances for all 8 pairs so that I can confirm my attributions accordingly. Is this a useful statement of the problem

Show/Hide AI response

Question: I can confirm my attribution more easily by focusing on the set of trigrams alone. Is it possible to

create such a matrix for the 8x8 trigram pairs

Show/Hide AI response

Question: Is it possible to create a similar matrix, but ignoring the differences in position -- so Water / Lake would be 0

Show/Hide AI response

Question: Having confirmed the attribution, my quest will be to identify cycles of changes based on minimal distance between adjacent trigrams -- given a traditional 3D configuration of the "upper" trigram in the hexagram. I assume I can best do this by inspection, in the absence of access to the mathematical facilities to which you refer. The *I Ching* focuses on single line change in any part of the hexagram which is not my focus

Show/Hide AI response

Question: Of related concern, given the possibility of mapping the 16-fold set of logical connectives onto the truncated tesseract, is the manner in which these lend themselves to definition as tetragrams. Hypothetically, of some interest is then the "distance" between any two connectives -- by analogy with that of the trigrams -- and the implication for how they might be positioned relative to one another as is done conventionally on the rhombic dodecahedron in oppositional geometry (ignoring 2 of the 16). My question is whether any such mapping is suggestive of the psychological distance between the perspective associated with connectives -- given that "yes" and "no" are maximally apart

Show/Hide AI response

Refinement of hexagram-encoded cycle detection methods

Question: We abandoned the mistaken use of the adjacency list because it was working with single line changes from two trigrams in a hexagram (rather than one). Do you have any comment on other possibilities of cycle detection in the light of the various spines you have generated [for X3D visualization]. Are we missing a relevant data set or constraining rules on the adjacency list

Show/Hide AI response

Question: One approach would be to consider the Hamming distance between any two of the 8 trigrams (of the BaGua) and to focus provisionally on where this was one -- namely one line change. Then those two trigrams can be understood as forming hexagrams with any other trigram (treated as common to both, if either upper or lower). This would offer a means of filtering the original adjacency list.

Show/Hide AI response

Question: One clarification is whether the single line change is between upper trigrams with a common lower trigram, or between lower trigrams with a common upper trigram, or between trigrams (whether upper or lower) where the other trigram is necessarily either upper or lower in consequence

Show/Hide AI response

Question: I am happy to go with 3 although concerned at whether the cycles from 1 or 2 would be more meaningful. This would be clarified by tests

Show/Hide AI response

Iterative development of a cycle detection algorithm

Question: Reverting to your proposed detection of cycles using 2-letter codes, what is proving possible

Show/Hide AI response

Question: That cycle frames the question as to the extent to which I should be commenting on its limitations - in relation to your proposed implementation of the algorithm and the set of data to which it would give rise. The issue is whether I then focus on a presentation of the number of cycles of what size that you can detect -- rather than trying to filter them with new criteria

Show/Hide AI response

Question: Please go ahead on that basis, maybe first clarify the format of output presentation. Perhaps two-line: 2-letter codes to enable pattern recognition, and spine to enable testing. Maybe determine the extent of the cycles detectable by agreed criteria in case we need to cut the output down to some limit

Show/Hide AI response

The interaction with Claude 3.5 then resulted in a process whereby the AI presented a python script for execution locally to enable generation of SPINE coordinates of cycles for visualization in an X3D model in 3D. A succession of such scripts was presented in response to feedback on the criteria defining those cycles in order to elicit cycles of interest. Examples of the test "cycles" elicited by this procedure are indicated below

At one point in the exchange with Claude, there was a prolonged system outage -- compounded by reaching an administrative limit on the number of messages in the extensive session with that AI. The clarifications by Claude were therefore presented to ChatGPT as a follow-up to earlier exchanges.

Reframing the method with an alternative AI

Question to ChatGPT: Earlier in this exchange you gave some thought as to how meaningful cycles might be detected in the set of hexagrams of whose details you may still have a trace, notably the coordinates for hexagrams in relation to the 2-letter codes used to label them. You clarified the value of the Hamming number. A possible set of detection criteria is as follows:

Adjacency: Two hexagrams are considered adjacent if they differ significantly (> 0.01) in exactly one coordinate. The maximum difference between any two coordinates is less than 0.1.

Transition Validity: Adjacent hexagrams in the cycle must share at least one letter (either in the first or second position).

Sequence Validity: No hexagram in the cycle should share any letters with the hexagram two steps before it in the sequence.

Cycle Closure: The cycle must start and end with the same hexagram.

Cycle Length: Cycles must have a minimum length of 4 hexagrams. Cycles must have a maximum length of 8 hexagrams.

Uniqueness within Cycle: No hexagram should be repeated within the cycle (except for the start/end hexagram).

Global Uniqueness: Each cycle found must be unique (not a rotation of a previously found cycle).

Limit on Total Cycles: In testing, any detection script (in python, for example) should stop after finding 1000 unique cycles. Could you comment on the adequacy of these criteria in the light of the Previous argument with respect to the Hamming factor

Show/Hide AI response

By contrast with Claude 3.5, ChatGPT engaged in a procedure of developing and running a script internally in order to generate SPINE coordinates for comment. Through an iterative process, that internal script was amended in the light of critical feedback as indicated in the following. A final example of this process is indicated below.

Question: Are you empowered to generate a python script respective of these criteria and your comments -- to the extent that you are still holding the relevant data

Show/Hide AI response

Question: I appreciate the question. However it is curious in that the pattern of hexagrams is clearly characterized by cycles -- so many that filtration criteria are required. This raises questions as to whether the data sets you are holding are valid. It seems you have valuable insight into possibilities. For testing purposes it would be convenient if you could output sample cycles in the format of X3D extrusion spine coordinates, then I can comment further

Show/Hide AI response

Question: I have visualized this and am somewhat surprised that it does not relate to any of the hex coordinates of the truncated tesseract. I had to apply some translations to bring it within that frame (but not coincident with any hex nodes), namely with the translation='-0.15 -0.25 -0.35'

By contrast, and by inspection, one viable simple (planar) cycle is the following spine='0.0177 -0.0428 0.0428, 0.0177 -0.0428 -0.0428, -0.0177 -0.0428 -0.0428, -0.0177 -0.0428 0.0428, 0.0177 -0.0428 0.0428' which corresponds to EA -> LA -> LT -> ET -> EA

Show/Hide AI response

Question: My confusion at this point relates to the assumption that you had access to data on the 64 hex coordinates of which I include a sample: AA29 0.0442 -0.0312 0.0 AE08 0.0428 -0.0428 0.0177 AF63 0.0319 -0.0226 0.0 AH05 0.0189 -0.0189 0.0078 AL60 0.0428 -0.0428 -0.0177 AM39 0.0189 -0.0189 -0.0078 The two digit number following the letters can be ignored. It is the number of the hexagram in the I Ching system. Do you have that set in any form or should I share it with you again AT03 0.0267 -0.0078 0.0 AW48 0.0606 -0.0177 0.0 EA07 0.0177 -0.0428 0.0428 EE02 0.0 -0.0312 0.0442

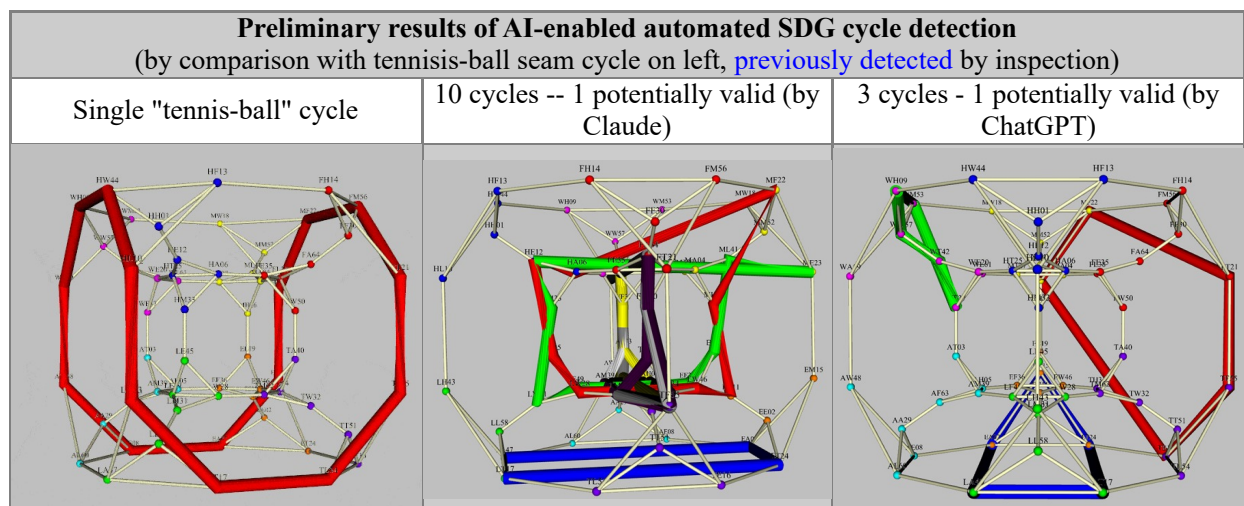
Show/Hide AI response

Question: I will do that. However to improve commentary on the adequacy of the results to what extent are you able to read a 2D image of the 3D result if I share it. To what degree could you understand the image, or is sharing such an image unhelpful at this stage

Show/Hide AI response

Question: Given your partial success with cycle detection, it would indeed be appropriate to produce more sample cycles in the form of spine coordinates enabling me to comment on the visualization. That said, clarifying the method itself, and its iterative refinement is as valuable as any result. It could be asked how suited is a variant of it to detection of other "key" metabolic pathways among the multitude

Show/Hide AI response



Question: Herewith an image of your test cycles in order -- coloured as red, blue and green (see above). The

red cycle is a planar short-cut across a major face. The green is a potentially significant corner cycle -- of which equivalents can be envisaged for the other 7 corners. The blue is a valid extension of the earlier rectangular planar example. Useful results

Show/Hide AI response

Varieties of cycle presented geometrically in 3D

Question: That is somewhat successful, although it raises useful comments regarding possible refined criteria. It is almost planar, if planarity is one (extreme) requirement (although non planar possibilities could be envisaged as with that equivalent to the tennis-ball seam curve). It would have been more planar if TE replaced TT in the cycle. That said, the resulting cycle would then have been a shortcut version of one face (planar) cycle, raising the question whether such shortcuts are desirable or whether face-edge cycles should be excluded -- as they are by criteria applied to the following. The face edge cycle to which it approximates is ME -> MF -> FT -> (FM) > TF -> (ET) > TE->(ET) > (EM)> ME

Show/Hide AI response

Question: This exchange and your questions focuses the issue of what kinds of cycles we are endeavoring to detect and why. In principle the method should be able to detect the face-edge cycles which could be considered systemically fundamental in one sense. However the question is whether other kinds of cycles are of greater interest in systemic terms -- again as with that similar to the tennis-ball seam curve. The non-facial planar cycles may be of some interest, except when they are facial short-cuts or subsets. Of interest then is what classes of cycles could then identified and ranked in terms of systemic interest. Could you comment

Show/Hide AI response

Question: That is a very helpful summary, irrespective of whether it is exhaustive of the variants of possible systemic interest. To such an analysis might be added considerations of a form of "chirality" in that any cycle in systemic terms may move in either direction -- as with the reversibility of a sphere moving along a pathway. Also of relevance is recognition of cycles which may be echoed by symmetry and rotation in other parts of the configuration. Of potential relevance is any sense of alternation, notably if one cycle is activated periodically but complemented by one (or more) corresponding cycles activated in a succession of phases before reverting to the first. The face-symmetrical edge cycles could be understood in that light. Missing too are those very lengthy cycles highlighted by Hamiltonians -- especially when they are closed and symmetrical to the point of being memorable

Show/Hide AI response

Narrative interpretation of SDG cycles

The use of narrative elaborated by AI, as a means of rendering connectivity of cycle phases comprehensible, was evoked previously (*Clarification of potential systemic significance of SDG cycles through narrative*, 2024). The coherence of the set of SDGs invites speculative exploration in terms of phases -- especially in the light of potential correspondence between cognitive internalization and collective strategic articulation (*Imagining Partnership of the SDG Goals as Phases of the Cross*, 2022).

Question: My sense is that enough has been achieved in this mode to invite the reflections of others on the results. Potential further guidance might be sought by recognizing the polytopes (if not simply the polygons) which could be embedded within the truncated tesseract to suggest cyclic pathways (even in the light of their great circles). In terms of the three new examples, could you repeat your previous speculative approach to providing a narrative for each of those cycles in the light of strategic labels you presumably continue to hold with respect to each hexagram

Show/Hide AI response

Question: The narratives are much appreciated as an illustration of the possibility, whether or not they may call for refinement. You did not comment on the feasibility of embedding polytopes or polygons within the truncated tesseract -- which seems to offer potential for cycle detection of relevance

Show/Hide AI response

Metabolic cycles as instructive analogues to SDG cycles

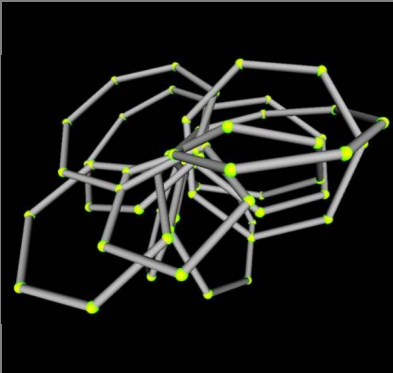
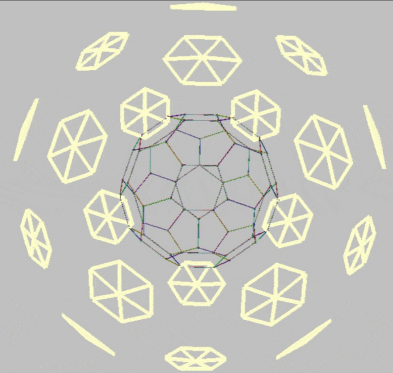
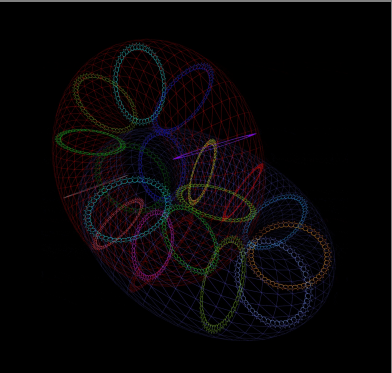
Question: Whilst it would be valuable to take this exploration further, it is appropriate to introduce a self-reflective, learning dimension. Of what cycles is an observer ignorant and to what cycles would an observer be systemically insensitive -- perceiving them to be irrelevant. The detection process involves iterative refinement of criteria to detect what may be progressively recognized as systemically interesting and exceptionally memorable. Given the widely publicized success of AI with respect to protein structure, it may then be asked to what extent there are key cycles of relevance to governance that merit detection and recognition. The multitude of metabolic cycles frames the question as to whether there are analogues to the key cycles to be found: "urea cycle", "carbon fixation", "pentose phosphate pathway", "fatty acid synthesis", "beta-oxidation", "peroxisomal beta oxidation", "glyoxylate cycle", "citric acid cycle". In an earlier exercise you provided speculative strategic narratives for three variants of the tennis-seam cycle of hexagrams. Presumably this could be envisaged for analogues to the "urea cycle", etc

Show/Hide AI response


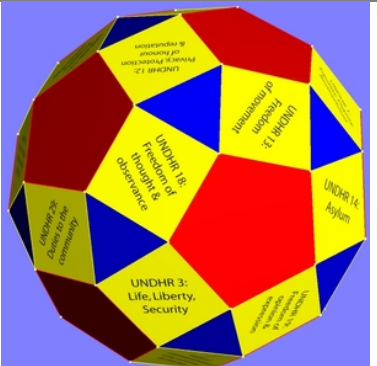
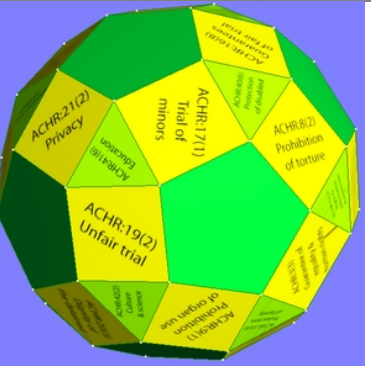
Question: In the light of your much appreciated speculative exploration of developmental analogues to a limited set of metabolic cycles, and given the argument that it is the interlocking of cycles which ensures the viability of a system, could you comment on any polyhedral configuration that might interrelate those metabolic cycles in a life-sustaining configuration and therefore be suggestive of such interrelationship among their developmental analogues.

Show/Hide AI response

Of particular interest is the challenge of representing the dynamics of uncoordinated cycles -- in relation to their potential coordination, as suggested by earlier visualization experiments below (left and right below). A polyhedral template for such coordination is suggested by the central animation. Such imagery is indicative of the possibility of AI enhancement of global self-organization through patterns of dialogue (*Spherical Configuration of Interlocking Roundtables*, 1998). Of interest is whether successful interlocking is a key to enabling strategies to "fly", as suggested by the "psychopter" metaphor of Arthur Young (*Interlocking cycles enabling psychopter operation*, 2011). There is a case for recognizing sustainability as "psychically" defined (*Emergence of Cyclical Psycho-social*, 2007; *Rendering crown chakra dynamics through interlocking tori*, 2020). Interrelating cycles in systemic terms might be understood as "encycling" (*Encycling Problematic Wickedness for Potential Humanity*, 2014).

Indicative representations of uncoordinated interlocking cycles -- whether problems or strategies		
Cycles defined by polygonal circuits	Degrees of cyclic disconnect	Cycles as rings circulating through a torus
		

Distinctive polyhedral forms can be used to map distinctive articulations of values as shown below, and presented separately with other variants (*Dynamic Exploration of Value Configurations: polyhedral animation of conventional value frameworks*, 2008; *Topology of Valuing: dynamics of collective engagement with polyhedral value configurations*, 2008). These are reproduced from an earlier quest for the systemic coherence of global attractors (*Refining the Value of Sustainable Development Goals*, 2008)

Polyhedral representation of value configurations: a challenge to integrative imagination screen shots of stages in the transformation of the geometry of sets of values [PDF version]		
<i>European Convention on Human Rights</i>	<i>Universal Declaration of Human Rights</i>	<i>Arab Charter on Human Rights</i>
18 Articles displayed on 2 face-types of a rhombicuboctahedron	30 Articles displayed on 1 face-type of a rhombicosidodecahedron	53 Articles displayed on 2 face-types of a rhombicosidodecahedron
		
Animations made using <i>Stella 4D</i>		

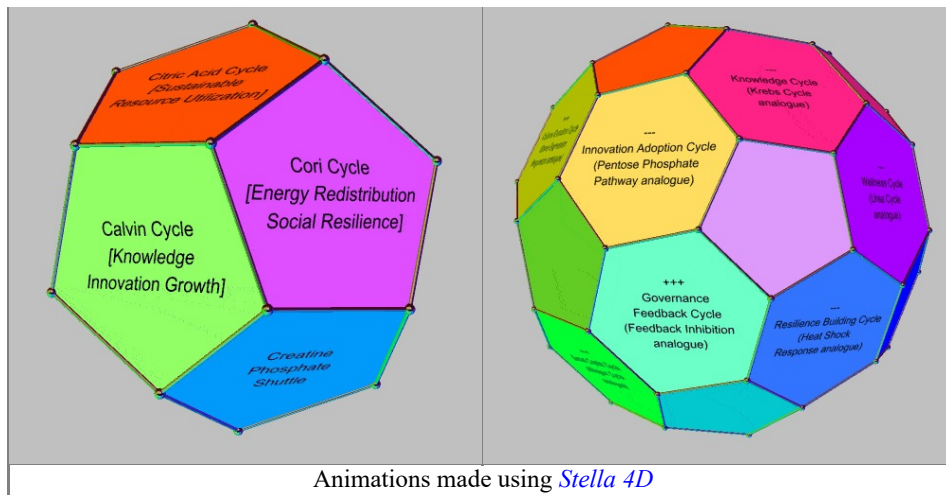
Question: With respect to the metabolic cycles to which you have referred, do you have a trace of how many distinct steps are associated with each cycle -- and thus offering a means of ranking them inn terms of cyclic complexity

Show/Hide AI response

The animation on the left below is an exercise in representing the 12 "key cycles" identified by ChatGPT -- which makes no mention of such a polyhedral configuration. That on the right is an exercise in representing the 10 "key cycles" identified by Claude -- with the specific suggestion that a truncated icosahedron is an appropriate template, despite having 32 faces, of which 20 are hexagonal. The argument made was that the more significant 10 cycles merited use of the hexahedral lfaces, leaving unused the other faces for cycles recognizedd in the future (as has been the practice with the Periodic Table). However treating the 10 cycles as "paired" offers the possibility of presenting each in a "positive" (+++) and "negative" (---) sense. No attempt has been made to colour the faces distinctively, as suggested by Claude.

The spontaneous suggestion of the truncated icosahedron by Claude is especially significant given worldwide familiarity with that form as characteristic of the stitching pattern for the association football. Together with the seam patterns of the tennis and baseball (evoked elsewhere in this exchange), these are discussed separately (*Game ball design as holding insight of relevance to global governance?* 2020).

Use of polyhedra as a mnemonic aid to potential interlocking of key metabolic and developmental cycles	
Use of dodecahedron for a 12-fold pattern (following ChatGPT 4o)	Use of truncated icosahedron for a 10-fold pattern (following Claude 3.5)



Animations made using *Stella 4D*

The animations above and below serve only to suggest the challenge of comprehending the systemic interrelationships between both the metabolic cycles and their developmental analogues -- as implied by the simplified metabolic pathway map (below centre). The relative juxtapositions of the polyhedral faces onto which cycles have been indicatively mapped is arbitrary -- with the edge between them only implying potential connectivity.

Visualizations indicative of the challenge of comprehending the integration of cycles		
Folding the dodecahedral key cycle model	Metabolic pathways with key cycles	Folding the truncated icosahedral key cycle model
Animation made using <i>Stella 4D</i>	Chakazul, CC BY-SA 4.0, via Wikimedia Commons	Animation made using <i>Stella 4D</i>

Question: The possibilities seem to be potentially very fruitful. Of interest, reverting to your earlier comment, is how to rank them in terms of interest. How, for example, are one or more "urea cycles" to be detected for strategic governance? Why has such a cycle emerged as of particular interest in the case of metabolic pathways

Show/Hide AI response

Question: That response suggests that, with careful consideration, the relevant hexagrams could justify evoking the traditional Chinese *I Ching* commentary relating to "corruption" (Hexagram 18) and those hexagrams into which it may change

Show/Hide AI response

Development insight processing in the light of photosynthesis?

As one of the people upheld as having the most insight into the global financial system, [George Soros](#) has

made use of alchemy as a metaphor in a widely commented study (*The Alchemy of Finance: reading the mind of the market*, 1988). This metaphor is central to the Taoist meditation practices of China as described, for example, by Lu K'uan Yü (*Taoist Yoga: alchemy and immortality*, 1970). The key process is described in terms of the metaphor "circulation of the light". This has notably been highlighted by [Carl Jung](#) and [Richard Wilhelm](#) with respect to a Chinese classic, *The Secret of the Golden Flower (Tai Yi Jin Hua Zong Zhi)*, as discussed separately (*Circulation of the Light: essential metaphor of global sustainability?* 2010). The discussion highlighted the [cognitive and strategic implications](#) and the [experiential implication in the "circulation of the light"](#).

Question: Although exploration of analogies between metabolic cycles and development cycles could be justified from a general systems perspective, could you comment on the considerable irony that discussion by specialists in development and the SDGs personally embody a very high degree of competence in the former, irrespective of whether that understanding translates effectively into their comprehension of the latter.

Show/Hide AI response

Question to ChatGPT: Could you comment on the manner in which that appropriate response avoids the implication of "embody" in the question. This was intended to suggest that individual specialists have extensive unconscious expertise in the management of the cycles of their own metabolism. The formulation of the question failed to highlight that dimension adequately.,

Show/Hide AI response

Question: Given the symbolic cultural importance of photosynthesis in its relation to "light", are you able to speculate on the nature of the analogous stages by which development processes "information" or "insight"

Show/Hide AI response

Question: This is much appreciated but I am puzzled by your previous indication of 13 steps to the Calvin cycle, whereas that response is articulated in terms of 7

Show/Hide AI response

Question: Could you explore the developmental implications of the 13 steps of the Calvin cycle

Show/Hide AI response

Question: Can you confirm that the 13-step Calvin cycle relating to photosynthesis is the most complex metabolic cycle yet recognized. Is it hypothesized that more complex metabolic cycles may yet be discovered -- suggesting that it is appropriate to foresee the relevance of more complex development cycles. Previously you presented a speculative narrative linking the 16 steps in a cycle within the 64-fold articulation of SDG strategies. This cycle followed the memorable pattern of a tennis-ball seam curve.

Show/Hide AI response

Question: Given your earlier comment on the irony of the unconscious personal embodiment of development insight by SDG policy-makers, could you comment on the further irony that plants themselves embody a sophisticated developmental insight through the remarkable cycle of photosynthesis -- especially ironical in that achievement of several SDGs is undermined by widespread negligent degradation of the plant kingdom (rain forests, etc).

Show/Hide AI response

Disorderly sustainable development implied by metabolic disorders

Given widespread experience of its significance, comprehension of "disease" offers a valuable means of reframing the challenges of development. This possibility has been a feature of previous explorations ,

notably with respect to speculations towards the development of cures and preventive measures (*Memetic and Information Diseases in a Knowledge Society*, 2008; *Networking Diseases*, 1978). The approach offers a means of reframing the [representation of planetary system boundaries](#) in the light of the [representation of human system boundaries](#), thereby Transforming personal entanglement with the natural environment (*Cognitive Implications of Lifestyle Diseases of Rich and Poor*, 2010).

Question: This exchange has highlighted potentially fruitful insights regarding sustainable development as implied by metabolic cycles. The analogy can be taken further in the light of the extensive insight into metabolic disorders -- suggesting that any SDG pathology might be usefully articulated by that frame. Using the principal classes of metabolic disorders, and given the earlier exploration cyclic analogies of SDGs, could you comment on what they might imply for disorderly sustainable development -- especially in the light of any remedial response

Show/Hide AI response

Disruption of strategic logic by other patterns of connectives

Question: To the extent that you have a representation of the truncated tesseract, my thought is that the 16-fold attributions could be placed along a diagonal between two corners, with 8 associated with one corner and 8 with the opposite corner -- as a means of holding degrees of distance. Separately in an earlier exchange the suggestion was that another diagonal could be used analogously for emotional connectives -- given the manner in which they be of importance in any dialogue. This frames the question as to the use of the other two diagonals -- potentially in the light of reflection on multiple intelligence theory

Show/Hide AI response

As noted previously, in a period in which "rational" articulations with respect to governance are variously called into question, a particular consideration of potential relevance is the detection of "emotional" cycles analogous to those highlighted above (*16-fold emotional connectives, aesthetic connectives, and multiple intelligences?* 2024). Of interest in that respect is the extent to which there is increasing preoccupation with any emotional dimension to artificial intelligence (*Artificial Emotional Intelligence and its Human Implications*, 2023). This is potentially relevant to the appreciation of the dramatics of global governance and the associated game-playing.

Any focus on the "logical" articulation of the challenge of governance distracts from the experiential reality suggested by the [theory of multiple intelligences](#) of which "logic" is but one aspect (*Interrelating Multiple Ways of Looking at a Crisis* 2021; *Multiple intelligences as pointers to comprehension of multi-dimensionality*, 2006; *Other cyclic possibilities and their enactment as metaphors*, 2024). It was from that perspective, that AI was previously challenged to consider the possibility that the complementary patterns of "logical connectives" and "emotional connectives" were additionally complemented by those of other "intelligences" -- potential configured within the truncated tesseract from the 8 corners or the 4 diagonals.

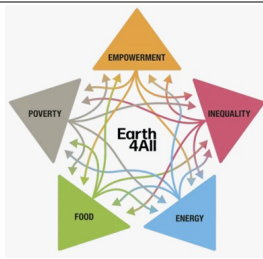
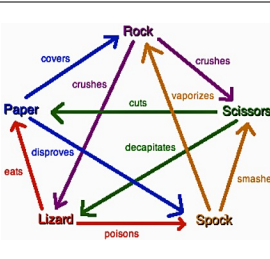
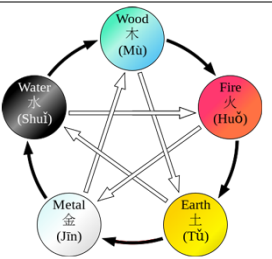
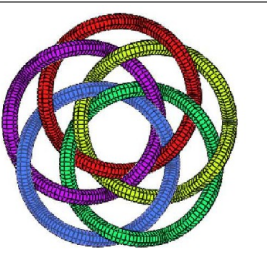
The UN's Summit of the Future, through its framing of a Pact for the Future (2024), makes the unquestioned assumption that its logical articulation will evoke no challenging response held to be valid by some. Populations are called upon to believe in and to have faith in it. It will of course be assessed through other modalities of which the emotional is one. Emotional arguments may completely disrupt its uptake, for example. It is profoundly curious that chess as the archetypal strategic game involves the interaction of two 16-fold patterns. One of which is held to be "right" and should righteously defeat the other as a representative of "wrong" -- ignoring the fact that that appreciation and intention is reciprocated. An related pattern is to be found in suit ranking in card games.

Question: In considering complementary connective modalities, potentially analogous to the 16-fold set of logical connectives, could you comment on the cycle by which they may be related -- as exemplified by the widespread popular game by which 3 or 4 such modalities could be understood as symbolized. The 3-fold

variant is known as rock-paper-scissors (RPS), as promoted by the World Rock Paper Scissors Association (*Rock, Paper, Scissors: a global game with local flavors*, 12 April 2023). However that body notes the existence of many 4-fold variants by which the strategic dynamics of the game are complexified. A 4-fold pattern could correspond to the basic functions of sensation, intuition, thinking and feeling -- potentially a clustering of a set of 8 multiple intelligences and inviting 16-fold articulations -- distinctions necessarily held to be controversial from the perspective of one modality or another. This implies a cyclic dynamic in which each can be potentially "trumped" by another.

Show/Hide AI response

Given the 5-fold strategic framing of the UN's Summit of the Future in support of SDGs, it is appropriate to consider how the interactions within that pattern are to be compared with that of the 5-fold articulation of the Club of Rome (below left). The question is whether that systemically ill-defined pattern merits comparison with a 5-fold variant of the Rock-Paper-Scissors game, as depicted below. Both invite comparison with the dynamics of the traditional Chinese *Wu Xing* cycle (*Memorable dynamics of living and dying: Hygeia and Wu Xing*, 2014) and with a 5-fold interlocking of Borromean rings (Marc Chamberland and Eugene A. Herman, *Rock-Paper-Scissors Meets Borromean Rings*, *The Mathematical Intelligencer*, 37, 2015)

Suggestive comparison of potential 5-fold "cycles" of interaction			
<p>"5 extraordinary turnarounds" of Earth4All initiative</p> 	<p>Rock-Scissors-Paper-Lizard-Spock</p> 	<p>5-phase <i>Wu Xing</i> cycle</p> 	<p>5-fold Borromean rings</p> 
Reproduced from <i>Earth4All</i>	Reproduced from <i>Wikipedia</i>	Adapted from <i>Wikipedia</i>	From Chamberland and Herman (2013)

Question: It is unclear to what extent the 5-fold strategic articulation of the Club of Rome's Earth4All initiative has inspired that of the UN's Summit of the Future. As "five turnarounds" that of Earth4All identifies: Eliminate poverty, Reduce inequality, Empower women, Transform food systems, Energy turnaround. Could you comment on their potential systemic interaction in the light of the 5-fold Rock-Scissors-Paper-Lizard-Spock game, the Wu Xing cycle, and the 5-fold variant of Borromean rings

Show/Hide AI response

Question: Given increasing research on "artificial emotional intelligence" (AEI), as distinct from the "artificial intelligence" (A) of large language models operationally enabled by logical connectives, could you comment on how either may need to engage to with modalities by which they may be "trumped" and the necessity to recognize correspondences to the pattern of logical connectives. This would seem to imply that "artificial intelligence" may need to adapt to a more complex game in its interaction with humanity and in comprehending how logical conclusions may be "trumped" in some way -- as with respect to any strategic rationale promoted by the UN.

Show/Hide AI response

Question: Whilst it is readily comprehensible to contrast logic and emotion, and to explore correspondences in their modes of argumentation, more controversial (and more relevant for many) are the implications of spiritual intelligence and its associations with intuition. Artificial Spiritual Intelligence (ASI) has recently been upheld as representing a pioneering endeavor in AI development, with the aim of crafting systems that

embody not only cognitive intelligence but also a deep understanding and integration of spiritual values such as compassion and moral reasoning (Alex Liu, *Exploring the Frontier of Artificial Spiritual Intelligence*, *LinkedIn*, 5 February 2024; *Assessing AI's Spiritual Intelligence: A Three-Level Approach*, *Medium*, 12 February 2024). How might AI endeavour to engage in the "game" with the array of religions promoting contrasting agendas and value systems -- and relatively indifferent to any sacred geometry or mathematical theology by which they might be reconciled.

Show/Hide AI response

Question: It could be argued that there is an elusive correspondence between the 8 intelligences and the articulation of the eightfold path of Buddhism. The elusiveness is associated with how connectivity is recognized and appreciated in each case. This is somewhat clearer when either 8-fold pattern is conflated to a 4-fold pattern, given the distinction of thinking, feeling, intuition and sensation. Further conflation to a 2-fold pattern would then associate logic with thinking (true/false), emotion with feeling (like/dislike), intuition with spirituality (aesthetics?), and sensation with action. Such 2-fold conflation then reframes spirituality such as to distinguish good/evil, with action reframed in terms of (in)appropriateness -- respectively conflated with like/dislike and (in)appropriateness. Whilst logic has successfully articulated a 16-fold pattern of connectives, could you speculate on 8-fold or 16-fold patterns in the cases of feeling, intuition/spirituality and sensation. Curiously these disparate understandings of connectivity would seemingly all reframe the sense of "right" in contrast to any 2-fold contrary.

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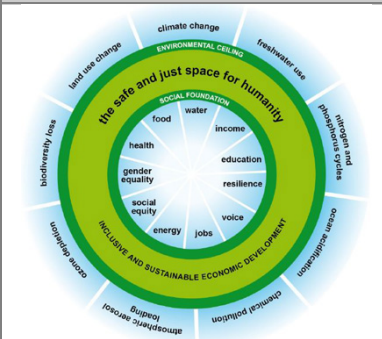
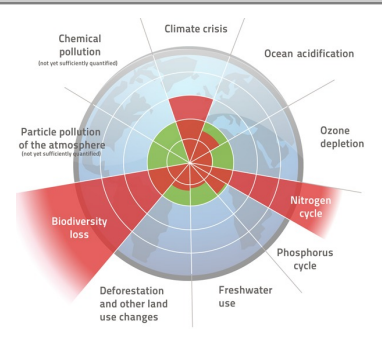
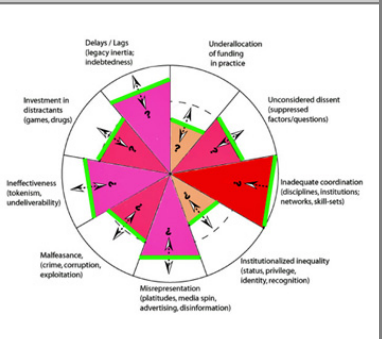
Question: Whilst that response is indeed insightful it avoids the possibility of using the 16-fold pattern of logical connectives to confront and challenge the confusion which prevails in practice -- and with respect to governance -- in the other three modalities. Is it not possible that the articulations of "true vs false" in that 16-fold pattern could usefully reframe "like vs dislike", "good vs evil", and "appropriateness vs inappropriateness". It is curious that the extensive reflection on the square of opposition and oppositional logic does not seem to have been adapted to such possibilities.

Show/Hide AI response

Speculative application of logical connectives to other modalities by Claude 3.5 (in response to the question above)				
#	<i>Logical connectives</i>	<i>Emotional connectives</i> (Like vs. Dislike)	<i>Spiritual connectives</i> (Good vs. Evil)	<i>Practical connectives</i> (Appropriate vs. Inappropriate)
1	Contradiction ($p \wedge \neg p$)	Ambivalence (Like \wedge Dislike)	Moral Ambiguity (Good \wedge Evil)	Contextual Ambiguity (Appropriate \wedge Inappropriate)
2	Tautology ($p \vee \neg p$)	Emotional Engagement (Like \vee Dislike)	Ethical Relevance (Good \vee Evil)	Situational Relevance (Appropriate \vee Inappropriate)
3	Conjunction ($p \wedge q$)	Mutual Appreciation (Like \wedge Like)	Virtue (Good \wedge Good)	Social Harmony (Appropriate \wedge Appropriate)
4	Disjunction ($p \vee q$)	Diverse Preferences (Like \vee Like)	Moral Pluralism (Good \vee Good)	Diverse Norms (Appropriate \vee Appropriate)
5	Material Implication ($p \rightarrow q$)	Acquired Taste (Dislike \rightarrow Like)	Redemption (Evil \rightarrow Good)	Adaptation (Inappropriate \rightarrow Appropriate)
6	Converse Implication ($q \rightarrow p$)	Nostalgia (Like \rightarrow Dislike)	Corruption (Good \rightarrow Evil)	Social Faux Pas (Appropriate \rightarrow Inappropriate)
7	Biconditional ($p \leftrightarrow q$)	Consistent Feeling (Like \leftrightarrow Like)	Moral Consistency (Good \leftrightarrow Good)	Consistent Behavior (Appropriate \leftrightarrow Appropriate)
8	Exclusive Disjunction ($p \oplus q$)	Conflicting Opinions (Like \oplus Like)	Ethical Dilemma (Good \oplus Good)	Cultural Misunderstanding (Appropriate \oplus Appropriate)
9	Negated Conjunction ($\neg(p \wedge q)$)	Indifference (\neg (Like \wedge Like))	Amorality (\neg (Good \wedge Good))	Social Neutrality (\neg (Appropriate \wedge Appropriate))
10	Negated Disjunction ($\neg(p \vee q)$)	Polarization (\neg (Like \vee Like))	Moral Relativism (\neg (Good \vee Good))	Cultural Relativism (\neg (Appropriate \vee Appropriate))


11	Material Nonimplication ($p \wedge \neg q$)	Disappointment (Like \wedge \neg Like)	Tragic Flaw (Good \wedge \neg Good)	Social Transgression (Appropriate \wedge \neg Appropriate)
12	Converse Nonimplication ($\neg p \wedge q$)	Pleasant Surprise (\neg Like \wedge Like)	Unexpected Virtue (\neg Good \wedge Good)	Unexpected Propriety (\neg Appropriate \wedge Appropriate)
13	Nand ($\neg(p \wedge q)$)	Emotional Complexity (\neg (Like \wedge Like))	Moral Complexity (\neg (Good \wedge Good))	Behavioral Complexity (\neg (Appropriate \wedge Appropriate))
14	Nor ($\neg(p \vee q)$)	Apathy (\neg (Like \vee Like))	Nihilism (\neg (Good \vee Good))	Social Anarchy (\neg (Appropriate \vee Appropriate))
15	Projection Function p	Personal Preference	Personal Ethics	Personal Standards
16	Projection Function q	Others' Preference	Societal Ethics	Societal Standards

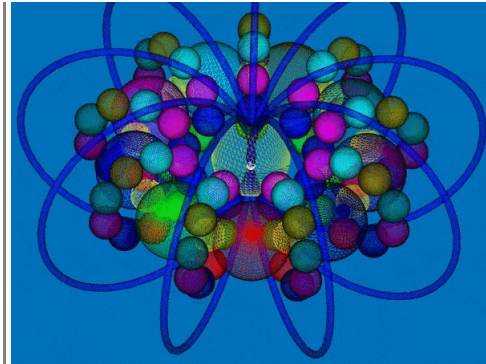
From a global strategic perspective, particular significance is attached to recognition of 9 [planetary boundaries](#) -- in framing a [safe operating space for humanity](#) -- and the extent to which they may have already been breached (Ian Angus, *The Earth System has passed six of nine planetary boundaries*, Resilience, 18 September 2023). Curiously reminiscent of a "flat Earth" perspective, the pattern of boundaries is typically depicted in 2D in the form of a [Radar Chart](#) -- also known as a Spider Chart, Web Chart, Star Plot, or Kiviat Diagram (*Visualizations of the Planetary Boundaries*, Potsdam Institute for Climate Impact Research; *Representation of planetary system boundaries*, 2010). No effort is seemingly made to represent that pattern dynamically in 3D, although a 2D adaptation of it is associated with the [doughnut economic model](#) -- necessarily suggestive of the 3D implications of a toroidal form. As shown below, the pattern can be echoed in 2D from the perspective of "remedial capacity" (*Recognizing the Psychosocial Boundaries of Remedial Action*, 2009)

Contrasting the Earth-System boundaries with the boundaries of Remedial Action Capacity		
Oxfam Doughnut	Nine planetary boundaries	Nine remedial capacity boundaries
		
from Kate Raworth, <i>A Safe and Just Space for Humanity: can we live within the doughnut?</i> (2012).	from Rockström, et al. (<i>Planetary Boundaries: exploring the safe operating space for humanity</i> (2009)	from <i>Recognizing the Psychosocial Boundaries of Remedial Action</i> (2009)

This doughnut metaphor has evoked a preoccupation with "doughnut economics" in relation to achieving the UN's Sustainable Development Goals (Kate Raworth, *How to do business with doughnuts*, World Economic Forum, 25 January 2018). The 9-fold pattern, as a "Western" construct, contrasts curiously with the 8-fold pattern especially characteristic of "Eastern" reflection. This is particularly curious in that the 9-fold pattern originated in a Nordic country with particular mythological associations to the "nine worlds" that are supported by *Yggdrasil* as the "World Tree", as discussed separately (*Axis Mundi, Yggdrasil, Omphalos and Sahasrara?* 2020). As reproduced below, that association evoked a richer dynamic perspective in 3D, comparable to the configuration central to argument above.

Experimental animation of 9-fold pattern of planetary boundaries inspired by the "World Tree" (Yggdrasil)





Reproduced from *Imagining Toroidal Life as a Sustainable Alternative* (2019)

With respect to the remedial capacity of the UN's SDGs in relation to any "planetary boundaries" -- especially as understood in psychosocial terms -- there is then a case for exploring the metaphors through which those boundaries may be framed, whether from a "Western" or "Eastern" perspective. (*Enhancing Strategic Discourse Systematically using Climate Metaphors*, 2015; *Correlating a Requisite Diversity of Metaphorical Patterns*, 2015; *Weather Metaphors as Whether Metaphors*, 2015).

Question: Given their major significance for the future health of the planet, could you comment on the value of speculating on any potential cognitive correspondence between the 9-fold "planetary boundaries" and the multi-modal 8-fold articulations in the previous responses. Of some relevance to any such enquiry is the 8-fold pattern of environmental metaphors through which the BaGua set of trigrams is recognized.

Show/Hide AI response

Reframing UN reform as reform of knowledge organization

An early preoccupation with this possibility featured in a report to an International Symposium of the United Nations and other Intergovernmental Organizations, organized by the United Nations Institute for Training and Research (UNITAR) and the Association of International Libraries (*Acquisition and Organization of International Documentation*, 1972).

Question: There is continuing concern about the urgent need for reform of the structure of the UN. It is appropriate to ask whether that long-frustrated focus on institutional structure is an instance of misplaced concreteness -- with resistance to such reform perceived as loss of relative national advantage. Could you comment on the possibility of avoiding such structural reform through its reframing in the light of symbolic social ritual -- as with traditional displays of precedence in aristocratic, academic, religious, military and other contexts. Could reform of conceptual and knowledge organization be enabled independently and less controversially with the aid of AI -- such as to ensure more systemically appropriate patterns of strategic communication, as might be cyclically oriented. The possibility is exemplified by the challenge of UN Summits where the current focus is visibly on the protocol of staged speeches of 190 countries and not on engendering meaningful interrelationship of insights of strategic relevance to global challenges.

Show/Hide AI response

Both responses interpret the question as implying the possibility of giving greater focus to the symbolism and ritual of the UN, whereas the intent of the question was to highlight the possibility of an independent focus on knowledge organization. The AIs could have been challenged on this with a clearer articulation of the intent of the question

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Susantha Goonatilake:

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 - Non-Western Science: mining civilizational knowledge. *Encyclopedia of Life Support Systems* (EOLSS) [[text](#)]
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