



laetus in praesens

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Cyclic Representation of Coherence as Knots and Otherwise

Interestingness of curves of increasing complexity in relation to sustainability

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Introduction

Cyclic themes of interest at this time include the [circular economy](#), [environmental cycles](#), [recycling](#), [business cycles](#), and [domestic cycles of violence](#) -- as with the [cycles of conflict](#). The following exercise is an exploration of the cyclic representation of coherence in the light of the increasing significance of such cycles separately, or however they may be combined with others.

With respect to "interest" and "coherence", the exercise follows from an earlier exploration of the somewhat obscure concept of interestingness, especially given its recognized importance to data mining ([Interestingness, suggestiveness, memorability and presentation](#), 2014). One concern is that, rather than being interesting, coherence and unity (for which many plead) may be boring to many for reasons that merit clarification. How might they be "re-cognized" as interesting?

The exercise was especially provoked by the switch of Facebook to a new logo for its new branding as Meta, and the latter's association with an emergent [metaverse](#), as discussed separately ([Future Psychosocial Implications of the Metaverse](#), 2022). The speculative investigation of the latter highlighted the fundamental significance recently attached to the [Mereon Trefoil](#) as described by [Louis Kauffman](#) ([Pattern, Sign and Space: Mereon Thoughts](#), 2003). Otherwise known and visualized as the Mereon Matrix, its potential significance is elaborated in a far more extensive work (Louis H Kauffman, et al, [The Mereon Matrix: everything connected through \(k\)nothing](#), 2018; [frontmatter](#)).

More specifically the exercise here was inspired by the model developed by Sergey Bederov of [Cortona3D](#) to visualize that continuous curve in 3D, as presented in earlier studies -- notably of the familiar seam curve of the tennis ball and baseball ([Seam Curve on Sports Balls, Wolfram Demonstration Project; Interactive display of generalized baseball and tennis-ball seam curves in 3D](#)). The similarity of the seam curve and the Meta logo was noted. Of particular value was a variant of the modelling program used which enabled curve parameters to be modified to produce a variety of elegant knots. Like the Meta logo and the seam curves, these can be recognized as exemplifying cyclic representations of coherence, whether of symbolic, cognitive or of systemic relevance.

The exercise here is in many respects simplistic since it was unclear what configurations would emerge from exploratory modification of the program parameters. It was also unclear how best to present the many results to highlight the relationships between the confusing variety of configurations, whether understood as knots or otherwise. In that sense the results merit confrontation with the systematic studies of [knot theory](#), although the emphasis here is on forms of visualization with which people can engage and readily comprehend (*Cognitive embodiment of knots: knotting and knitting processes*, 2021). As noted in the latter, knots have notably featured in the psychoanalytical work of [Jacques Lacan](#) and [R. D. Laing](#). Global governance can itself be recognized as confronted with the archetypal [Gordian knot](#) (*Mapping grossness: Gordian knot of governance as a Discordian mandala?* 2016),

The results of the exercise do however lend themselves to presentation as screen shots in a set of tables, the primary mode used here. The variety of forms engendered by modifying the parameters is a limitation on efforts at web display whether in 2D or 3D. Some use is therefore made of gif animations as a means of giving a sense of the 3-dimensional nature of all the forms. Unfortunately current web technology constrains 3D representation of all the models in virtual reality.

The forms displayed are only those in which the curves are continuous. **Many other curves can be generated in which those below are broken in some manner.** These could be of significance to the visualization of the vulnerability of systemic coherence to various kinds and degrees of failure, as discussed separately (*Variety of System Failures Engendered by Negligent Distinctions*, 2016).

Of particular interest, in the commentaries which follow the curve presentations, is the degree to which they offer a kind of dynamic three-dimensional [pattern language](#) through which degrees of coherence can be discussed and distinguished. Such comprehension may well relate to that offered by music. In that sense they may clarify degrees of interdisciplinarity, interfaith reconciliation, international integration, interethnic reconciliation, and the like. They may also clarify dynamic configurations which are suboptimal in contrast with any aspirations for more fundamental "unity" as these feature in the declarations of leaders. This could prove especially valuable where "unity" and "harmony" are misleadingly assumed to be a simple matter, effectively denying the complexity with which many are confronted (*Emergence of a Global Misleadership Council: misleading as vital to governance of the future?* 2007).

Ordering 3D configurations of curves of increasing complexity

The program by which the configurations in the following tables were generated provides for the modification of 4 parameters. Each table of the first groups ([Group I](#) and [Group II](#)) derives from the **number of spheres** whose movement traces out the curve. Each row there is characterized by a parameter which could be called **twist**. Within that row, images are distinguished by what could be termed **rotation angle** engendering a specified **number of loops** in the form. [Note that, in order to limit the loading time of the page, the individual images of each table are combined into a single image]

Curve thickness: Depending on choice of the first two parameters, the curves in a configuration may fuse together at some point -- which may appear to be the origin in the 2D images (depending on the orientation of the 3D form). Two other parameters are then of relevance. A third parameter specifies the radius of the curve, namely its visual **thickness**, which can be adjusted for presentation purposes (especially when greater thickness results in the curves fusing together to some degree).

Curve separation: The fourth parameter specifies the **overall spread** of the curve (or **loop separation**), which may be especially relevant to ensuring that curves do not appear to go through the origin (fusing together there) but instead variously circle around it. The curves are thereby separated to a greater degree. The tables in Groups I and II, are immediately followed by a small table indicating the consequence of increasing the spread in order to override any fusion effect.

Connectivity versus Interlocking: Two types of forms can be distinguished, those in which the curve is connected continuously (in a single curve, as in [Group I](#) and [Group IV](#)), and those in which separate curves are interlocked (but otherwise not connected, as in [Group II](#) and [Group V](#)). As clarified by Sergey Bederov, for the lines to be connected, the "angle" parameter should be $360 \cdot A/N$, where "A" is an integer and "N" is the parameter N:

- If A is zero, then there is **no rotation** -- yielding N **parallel tori**.
- If A is N or a multiple of N, then again each branch connects to itself, yielding N **separate intertwined shapes**.
- If N is a prime number and A isn't a multiple of N, then all branches connect together into **one continuous knot**.
 - For example, if N=3, then $\text{angle}=360 \cdot 1/3$, $\text{angle}=360 \cdot 2/3$, $\text{angle}=360 \cdot 4/3$ etc. generate knots of different complexity,
 - In particular, $\text{angle}=360 \cdot 1/3$ is a trivial knot which can be unwrapped to a circle.
 - Similarly, if N=5, then A = 1, 2, 3, 4, 6, etc. give various continuous knots.
- If N is a composite (non-prime) number and A is a multiple of one of its prime factors, then some branches connect to other branches but not all together, yielding several **disjoint knots**.
 - For example, if N=4 and $\text{angle}=360 \cdot 2/4$, then there are two separate knots.
- If N is a composite number but A is not a multiple of any of its prime factors (i.e. N and A are coprime), then we again get a single **continuous knot** as for a prime N.
 - For example, N=4 and $\text{angle}=360 \cdot 3/4$.
 - For an approximation of the spinning Meta logo, use N=1 and $\text{angle}=360 \cdot 2$, look at the shape sideways and rotate it.

Use of numbers in this way to generate curved configurations in 3D suggests a particular relation to music, as discussed [below](#), notably in the light of the recent studies of [Dmitri Tymoczko](#) (*The Geometry of Musical Chords*. *Science*, 313, 2006, 5783)

Complexification: The number of images that are usefully presented is somewhat evident from how the complexification in terms of increasing rotation angle or twist does not engender patterns of greater interest. The patterns become repetitive after Rotation 5 or Twist 3 which therefore usefully constrain the size of the tables. Some images have not been included in some tables for that reason. The images are **not to scale**, namely they have been resized when necessary for purposes of presentation.

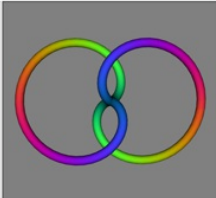
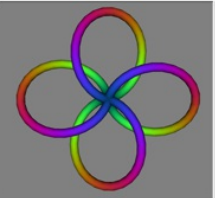
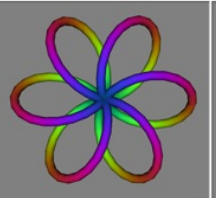
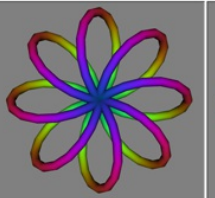
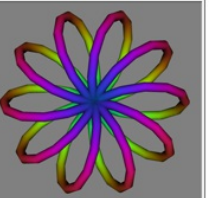

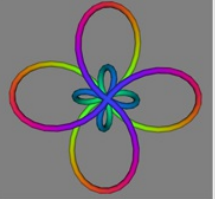
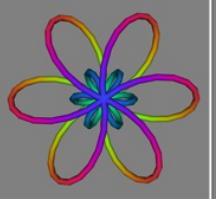
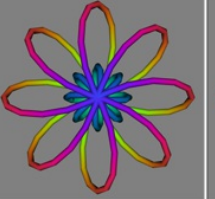
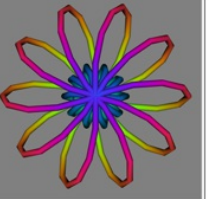

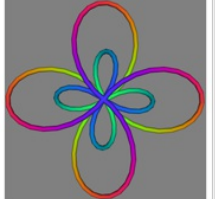
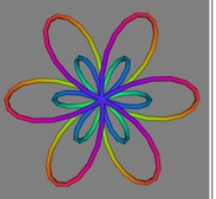
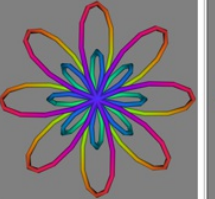
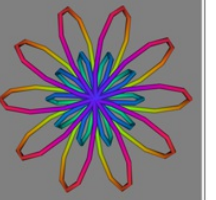
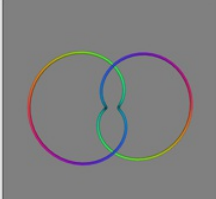
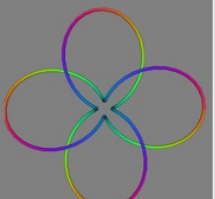
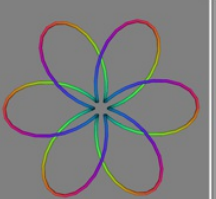
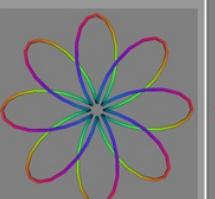
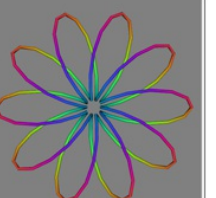
Animations: Since the images are screen shots of 3D forms which can be rotated, the views presented necessarily inhibit recognition of the form from another perspective. The chosen perspective presented in any row is selected to give a sense of the evolution of the complexity. In a third tabular set (**Group III**) an effort is made to compensate for this limitation by using animations between orthogonal perspectives. In a subsequent set of tables (**Group IV, Tables 7 to 11**), the consequences of changes to this parameter are illustrated. In another table group (**Group V, Table 12 and 13**), animations show the consequence of increasing the spread between the curves. Screen shots of animations, using a quite different set of parameters, show the continuity with toroidal forms when the spread is varied (**Group VI**)

Configurations in 3D: single continuous curves – Group I (Table 1)

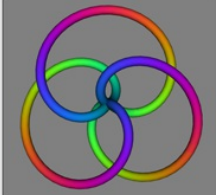
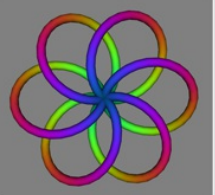
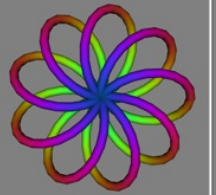

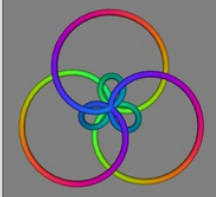
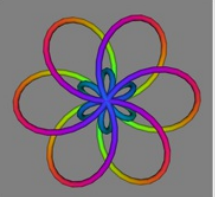
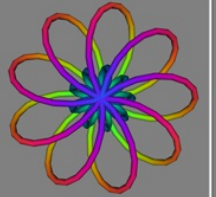
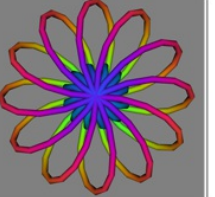
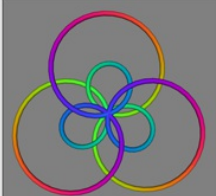
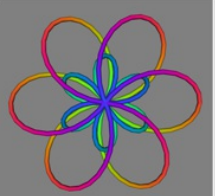
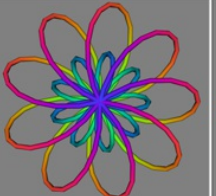
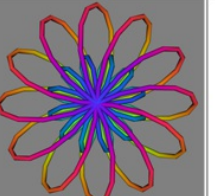
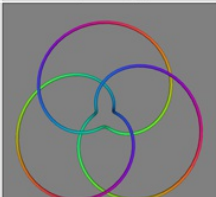
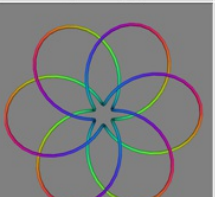
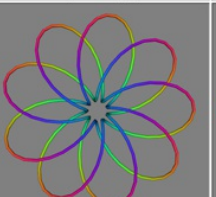
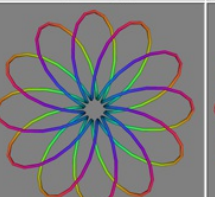
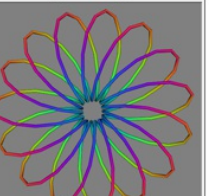
Table 1a: 1 Sphere: Single continuous curve					
	Rotation 1 (1 1-Loop)	Rotation 2 (1 2-Loop)	Rotation 3 (1 3-Loop)	Rotation 4 (1 4-Loop)	Rotation 5 (1 5-Loop)
Twist=1 Separation of loops=1					
Twist=2 Separation of loops=1					
Twist=3 Separation of loops=1					
Table 1b: 1 Sphere: Single continuous curve (Separation of loops=3.5)					
	Rotation 1 (1 1-Loop)	Rotation 2 (1 2-Loop)	Rotation 3 (1 3-Loop)	Rotation 4 (1 4-Loop)	Rotation 5 (1 5-Loop)
Twist=3 Separation of loops=3.5					

As shown in Table 1b, the forms of Table 1a can be "unwrapped" into a single continuous curve. In the case of the first row of Table 1a, the first form unwraps to a circle, although the separation of loops must be considerably increased to ensure that it is flat. The configurations in these tables could be most simply understood as groups of individuals (the loops) holding hands to form a continuous circuit. Understood as disciplines or religions, the loops could then be seen as forming a continuous circuit -- potentially an ideal situation but one which may anyway apply to a limited degree to the extent that the disciplines or religions share a common attitude (such as a focus on a cognitive or belief modality respectively).

Configurations in 3D: interlocking disjoint curves – Group II (Table 2 to 5)

Table 2a: 2 Spheres: 2 Separate multi-loop interlocking curves					
	Rotation 1 (2 1-Loop)	Rotation 2 (2 2-Loops)	Rotation 3 (2 3-Loops)	Rotation 4 (2 4-Loops)	Rotation 5 (2 5-Loops)
Twist=1 Separation of loops=1					
Twist=2 Separation of loops=1					
Twist=3 Separation of loops=1					
Table 2b: 2 Spheres: 2 Separate multi-loop interlocking curves (Separation of loops=3.5)					
	Rotation 1 (2 1-Loop)	Rotation 2 (2 2-Loops)	Rotation 3 (2 3-Loops)	Rotation 4 (2 4-Loops)	Rotation 5 (2 5-Loops)
Twist=3 Separation of loops=3.5					

In contrast with the images in Group I, these configurations (and those below) could be most simply understood as groups of individuals (the loops) holding hands to form smaller groups (forming a continuous circuit) within a larger configuration with which they are associated around a central focus -- although the smaller groups are not connected.

Table 3a: 3 Spheres: 3 Separate multi-loop interlocking curves					
	Rotation 1 (3 1-Loop)	Rotation 2 (3 2-Loops)	Rotation 3 (3 3-Loops)	Rotation 4 (3 4-Loops)	Rotation 5 (3 5- Loops)
Twist=1 Separation of loops=1					?
Twist=2 Separation of loops=1					?
Twist=3 Separation of loops=1					?
Table 3b: 3 Spheres: 3 Separate multi-loop interlocking curves (Separation of loops=3.7)					
	Rotation 1 (3 1-Loop)	Rotation 2 (3 2-Loops)	Rotation 3 (3 3-Loops)	Rotation 4 (3 4-Loops)	Rotation 5 (3 5- Loops)
Twist=3 Separation of loops=3.7					

The interlocking of the 3 separate curves shown in Table 3b, recalls the interlocking characteristic of [Borromean rings](#). However the linkage here does not conform to the condition required for that configuration because it requires that the curves break apart into two uninterlocked loops when any one of the three is removed. The Borromean ring configuration is the simplest case of what is termed a [Brunnian link](#) which may involve the interlocking of many more separate curves.

Table 5a: 5 Spheres: 5 Separate multi-loop interlocking curves					
	Rotation 1 (5 1-Loop)	Rotation 2 (5 2-Loops)	Rotation 3 (5 3-Loops)	Rotation 4 (5 4-Loops)	Rotation 5 (5 5-Loops)
Twist=1 Separation of loops=1					?
Twist=2 Separation of loops=1					?
Twist=3 Separation of loops=1					?
Table 5b: 5 Spheres: 5 Separate multi-loop interlocking curves (Separation of loops=4 or 5)					
	Rotation 1 (5 1-Loop)	Rotation 2 (5 2-Loops)	Rotation 3 (5 3-Loops)	Rotation 4 (5 4-Loops)	Rotation 5 (5 5-Loops)
Twist=3 Separation of loops=4					
Twist=1 Separation of loops=5					

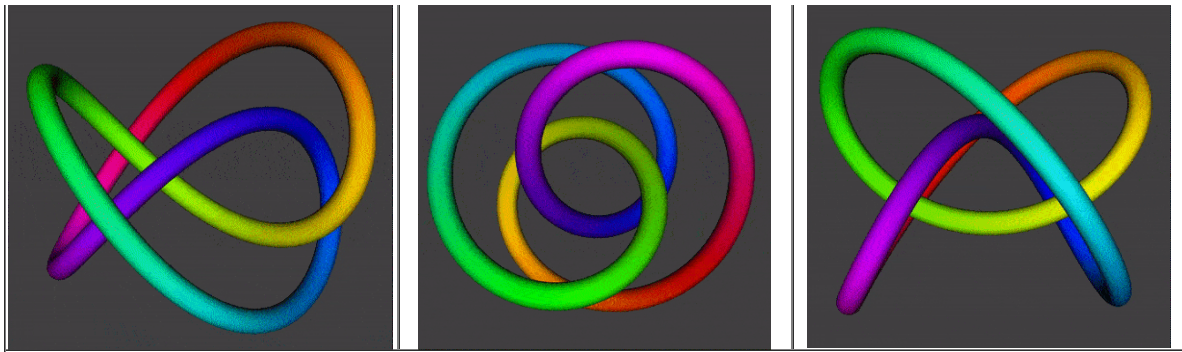
Configurations in 3D: animations offering a 3D perspective (Group III: Table 6)

Table 6: Animations showing orthogonal perspectives of selected forms from tables above					
1 Sphere Rotation 1 Loops 1 Twist=1	1 Sphere Rotation 2 Loops 2 Twist=1	2 Spheres Rotation 2 Loops 2 Twist=1	3 Spheres Rotation 1 Loops 3 Twist=1	4 Spheres Rotation 1 Loops 4 Twist=1	5 Spheres Rotation 1 Loops 5 Twist=1

Configurations in 3D: fractional rotation of continuous curves with indication of increased spread (Group IV Table 7 to 11)

As noted above, this exercise was triggered by the specific interest in the Mereo Trefoil (see Table 8, 3 Spheres, Rotation 2/3, above). The parameters by which that form can be visualized are seemingly not readily available. As noted in the earlier exercise, the following visualizations as 3D animations were kindly produced by Sergey Bederov using parameters: $x = \cos(t*3)*2 + \cos(t)$; $y = -\sin(t) - \sin(t*3)*2$; $z = -\sin(t*2)*3$ (*Cognitive embodiment of knots: knotting and knitting processes*, 2021).

Table 12: Animations offering contrasting perspectives on the Mereo Trefoil pattern		



Animations adapted from X3D models kindly produced by Sergey Bederov of [Cortona3D](#)

Table 7: Single continuous curve (rotation $1/N$) (2 to 6 spheres)					
	2 Spheres Rotation $1/2$ (1 "Loop")	3 Spheres Rotation $1/3$ (2 "Loops")	4 Spheres Rotation $1/4$ (3 "Loops")	5 Spheres Rotation $1/5$ (4 "Loops")	6 Spheres Rotation $1/6$ (5 "Loops")
Twist=1 Separation of loops=1					
Twist=1 Separation of loops=2					

Table 8: Single continuous curve (rotation $2/N$) (3 to 7 spheres)					
	3 Spheres Rotation $2/3$ (1 "Loop")	4 Spheres Rotation $2/4$ (2 "Loops")	5 Spheres Rotation $2/5$ (3 "Loops")	6 Spheres Rotation $2/6$ (4 "Loops")	7 Spheres Rotation $2/7$ (5 "Loops")
Twist=1 Separation of loops=1					
Twist=1 Separation of loops=2					

Table 9: Single continuous curve (rotation $3/N$) (4 to 8 spheres)					
	4 Spheres Rotation $3/4$ (1 "Loop")	5 Spheres Rotation $3/5$ (2 "Loops")	6 Spheres Rotation $3/6$ (3 "Loops")	7 Spheres Rotation $3/7$ (4 "Loops")	8 Spheres Rotation $3/8$ (5 "Loops")
Twist=1 Separation of loops=1					
Twist=1 Separation of loops=2					

Table 10: Single continuous curve (rotation $4/N$) (5 to 9 spheres)					
	5 Spheres Rotation $4/5$ (1 "Loop")	6 Spheres Rotation $4/6$ (2 "Loops")	7 Spheres Rotation $4/7$ (3 "Loops")	8 Spheres Rotation $4/8$ (4 "Loops")	9 Spheres Rotation $4/9$ (5 "Loops")
Twist=1 Separation of loops=1					
Twist=1 Separation of loops=2					

	6 Spheres Rotation 5/6 (1 "Loop")	7 Spheres Rotation 5/7 (2 "Loops")	8 Spheres Rotation 5/8 (3 "Loops")	9 Spheres Rotation 5/9 (4 "Loops")	10 Spheres Rotation 5/10 (5 "Loops")
Twist=1 Separation of loops=1					
Twist=1 Separation of loops=2					



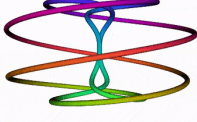



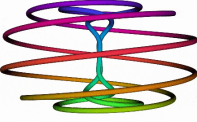

Configurations in 3D: animations of curves with indication of increased spread (Group V Table 12)

As the basis for a pattern language, the following animations potentially offer greater clarity in distinguishing conditions of interdisciplinarity (and the other inter-sectoral situations indicated above). For example:

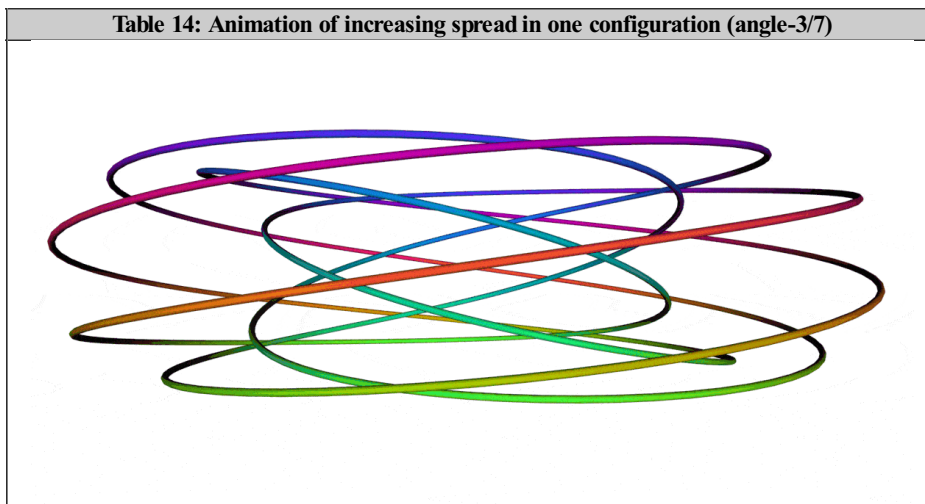
- the *2-sphere situation* is indicative of different conditions of 2-party configuration -- the binary polar condition with which the world is all too familiar. Note the manner in which the configuration shifts from a significant degree of bonding to interlocking only -- as the spread is increased
- the *3-sphere situation* characteristic of any challenge to bipartisanship also progresses to a complex configuration of interlocking. This could be used to discuss any triadic relationship, whether as abstractions or in personal relationships -- the challenge of any "third way", notably in political philosophy. It is of particular interest as a means of exploring the [Triple Helix model of innovation](#), especially if other parameters are used for illustrative purposes
- the *5-sphere situation* is of particular interest in the light of understanding of the *Wu Xing* framework of Chinese philosophy. It can also be explored in terms as the basis of a *5-fold Pattern Language* (1984) and as the basis of a pattern instinct (*Patterning Intuition with the Fifth Discipline: critical review of the conclusion of the 5-fold Patterning Instinct*, 2019). The configuration could also facilitate discussion of the [Quintuple Innovation Helix framework](#)
- the *6-sphere situation* is especially interesting in the light of the number of studies by [Edward de Bono](#) (*Six Frames For Thinking About Information*, 2008)
- the *9-sphere situation* has been exemplified by the psychosocial implications of the [enneagram](#) ([A. G. E. Blake](#), *The Intelligent Enneagram*, Shambhala, 1996). Examples of 9-fold articulations are presented separately (*Speculation on Potential Symbolic Relevance of the Concordian Mandala*, 2016). As a feature of the collective imagination, the 9 Rings of *The Lord of the Rings* merits reference.

As clarified in the animations, of particular interest is how the curves fuse together indistinguishably under some conditions, whilst being clearly separated under others. It is the relevance of those conditions to the distinction of unity and diversity which calls for exploration.

	0.02	0.3	1	1.1
2 spheres				
3 spheres				
5 spheres				

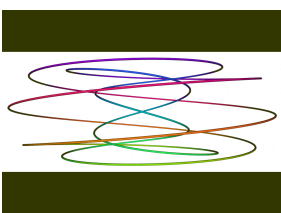
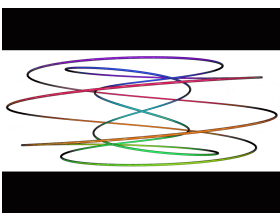
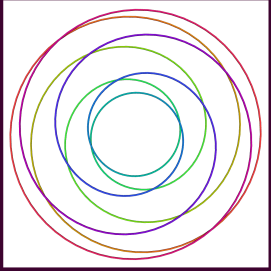
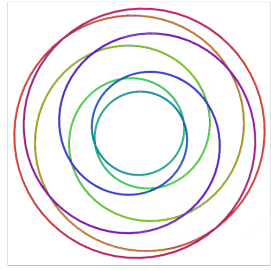
6 spheres				
9 spheres				

The following animation presents a complete cycle in which the spread of the curves is change from low to high



The following set of animations offers perhaps the most succinct indication modelling of the range of possible conditions between unity (harmony) and diversity (fragmentation), as it might hold in the relation between cognitive modalities, belief systems, nations, disciplines or the like. The model is based on a seven-fold pattern. Of particular interest are the images when the thickness of the curves causes them to fuse together into a seemingly solid ball. However the internal structure, revealed by the wireframe rendering, indicates a degree of complexity which merits reflection -- whilst appreciation that this is primarily an effect of the visual rendering.

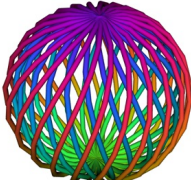
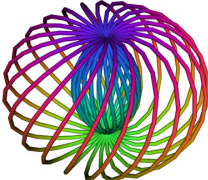
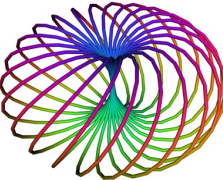
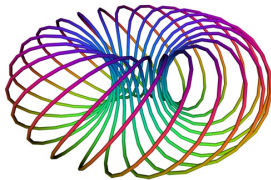
Table 15: Animations of increasing curve thickness in one 3D configuration -- orthogonal views and contrasting renderings

"Side" view		"Polar" view	
Solid curve	Wireframe curve	Solid curve	Wireframe curve
			

NB: These animations are variously defective and call for more care -- especially since all four are intended to change in sync

Configurations in 3D: Screen shots of animations of toroidal curves with indication of increased spread (Group VI Table 16)

Table 16: Screen shots of animations of toroidal curves with indication of increased spread (angle=22/7)

0.02	0.5	1.0	1.5
			

It is appropriate to note that all the images above are generated using four parameters. This offers a reminder that a very extensive range of conditions can be simply generated in ordering cognitive and communication space. How the ability is acquired to "drive" and "navigate" through that space is another matter -- namely the cognitive implications required.

Interpretation of knot language?

The simpler forms depicted above are characteristic of some symbols -- possibly held to be of profound significance (Joseph Panek, *The Knot -- As A Symbol, A Seeker's Thoughts*, 29 August 2010; *The Meaning and Symbolism of Knots in Spirituality*). Those more complex tend to be a feature of design, most obviously in [Islamic architecture](#). Particular value is attached to knots in some cultures, most evidently through the [Celtic knot](#). Necessarily less familiar in the West is [Chinese knotting](#) which have been used to record and govern a community

As noted above, more fundamental insights have been sought by the psychoanalysts [Jacques Lacan](#) and [R. D. Laing](#). Laing produced a book entitled *Knots* (1970) with each chapter describing a different kind of relationship -- the "knots" of the title -- bonds of love, dependency, uncertainty, jealousy, for example. For Lacan, the [knot](#) is a topological structure used to define the relationship of the symbolic, the real, and the imaginary (Stijn Vanheule and Abe Geldhof, *Knotted Subjectivity: on Lacan's use of knot theory in building a non-universal theory of the subject*, In: *Re(con)figuring Psychoanalysis*, 2012). Lacan focused in particular on the Borromean knot.

An interesting precedent is the much-studied [Quipu](#) language of knots used for communication across the Inca empire (Jesslyn Shields, *Unraveling Khipu: The Inca Knot Language, HowStuffWorks*; Daniel Cossins, *We thought the Incas couldn't write: these knots change everything*, *New Scientist*, 26 September 2018; John, Noble Wilford, *String, and Knot, Theory of Inca Writing*, *The New York Times*, 12 August 2003). The system proved viable over thousands of kilometres and hundreds of years. As such it could well have been perceived as a direct challenge to the dogma of the Catholic Church and European civilization, thereby justifying destruction of all but a view traces by the Spanish Conquistadores -- as exemplified by the [Galileo Affair](#) of that period.

More provocatively it may be fruitful to consider that such forms constitute a kind of language -- a new hieroglyphic language inviting speculative interpretation, notably with respect to their systemic significance as articulations of coherence. Any such interpretation would necessarily follow from the extensive study of the [mathematics of knots](#). As noted by *Wikipedia*,

In mathematics, a knot is an embedding of the circle S^1 into three-dimensional Euclidean space... Often two knots are considered equivalent if they are isotopic. A crucial difference between the standard mathematical and conventional notions of a knot is that mathematical knots are closed -- there are no ends to tie or untie on a mathematical knot.

Explorations into how loops of action link and knot to form three-dimensional hierarchies of structure have been shown to produce a new family of topological form termed field structures (Charles Donald Briddell, *Structural Skew Topology (SST): geometric topology, three-dimensional linkages and knots, a new paradigm for the meaning and interpretation of structure and fields*, *American Mathematical Society*, 2008).

Despite Quipu, there is a degree of embarrassment with regard to knot theory in that it has not proved obvious to determine its applications, notably with respect to any form of governance. However it has been argued that it could be used in string theory to explain the beginning of the universe and representation theory of quantum groups.

Of particular interest therefore is a study of its relevance to dialogue as theoretically understood (Paul-André Melliès, *Game semantics in string diagrams*, 26 February 2012). The paper argues:

We establish that the free dialogue category is a category of dialogue games and total innocent strategies. The connection clarifies the algebraic and logical nature of dialogue games, and their intrinsic connection to linear continuations. The proof of the statement is based on an algebraic presentation of dialogue categories inspired by knot theory, and a difficult factorization theorem established by rewriting techniques... We have just pointed out a similarity between the conceptual tools developed in order to study topological knots and logical proofs..

One main observation of our work is that game semantics should be understood as a syntax of tensorial proofs, expressed at the same time graphically as a flow of control. As a matter of fact, we show how to apply the algebraic principles of knot theory to this flow of control, and to characterize the free dialogue category free-dialogue... generated by a category X in the same way as one characterizes the free ribbon category free-ribbon.... Namely, we will exhibit a series of basic logical principles of tensorial logic (or generating proofs) providing a logical counterpart to the topological generators of framed tangles (braidings and U-turns) appearing in the construction of the free ribbon category free-ribbon.

An obvious difficulty is the language of the analysis -- ensuring a degree of disconnect from realms in which a degree of coherence could be considered vital.

Of relevance are therefore the considerations of Domina Petric who argues that to prevent negative ideations, such as suicidal ideation, disentangling of negative thought knots is crucial. Negative thoughts knots will always generate bad ideas that impair decision making process. (*The knot theory of thoughts and ideation*, *Medicine*, 29 May 2018)

Silvia De Toffoli and Valeria Giardino (*Forms and Roles of Diagrams in Knot Theory*, *Erkenn*, 79, 2014):

The aim of this article is to explain why knot diagrams are an effective notation in topology.... it will be shown that knot

diagrams are dynamic by pointing at the moves which are commonly applied to them. For this reason, experts must develop a specific form of enhanced *manipulative* imagination, in order to draw inferences from knot diagrams by performing *epistemic* actions. Moreover, it will be argued that knot diagrams not only can promote discovery, but also provide evidence. This case study is an experimentation ground to evaluate the role of space and action in making inferences by reasoning diagrammatically

... our long-term objective is to assess whether an operational framework along these lines could be applied to other forms of diagrammatic reasoning outside mathematics... This would show that diagrams in general are not only visual prompts but have dynamic features that involve aspect shifting and visualizing motion. Therefore, their use would presuppose a complex synthesis of many different cognitive capacities, from unlearned ones to others requiring expertise.

Of relevance in that commentary are the references to "cognitively speaking" and "epistemic value":

This case is a new example of what Giaquinto (2007, p. 263) defines as view, "cognitively speaking" this falls under the heading of image transformations. These operations have epistemic value because they promote discovery by bringing our attention to new information. To visualize motion means to be able to understand what will be the outcome of a certain global or local move.

Psychosocial implications of configurations of curves?

The images above invite a variety of interpretations, whether speculative or otherwise.

Inter-modalities: Understood more generally, as might follow from [general systems](#) principles, any curve associated with a cycle could be understood as a distinguished (cognitive) modality. The images above could then be explored as configurations of disciplines (interdisciplinarity), beliefs (inter-faith), nations (inter-national), sectors (inter-sectoral links), and the like.

Of particular interest are then the contrasting features of:

- *Multiple loops in a configuration:* These could be understood as distinctive modalities -- whether or not the curves through the loops are continuous. This , raises the question of the complexity of a configuration and the challenge of its comprehension, coherence and viability as the number increases. As indicated above, the images readily exceed memorability as the number of loops increase. Especially intriguing is how a loop is readily seen to result from a simple twist to the curve thereby indicative of what might be recognized as the "cognitive twist" distinguishing contrasting modalities (*Necessary cognitive twist: star symbols as bladed propellers -- for propulsion in 3D?* 2018).
- *Disjoint curves:* Many of the images show configuration composed of separate loops configured together -- interlocking, but not joined. This is usefully indicative of a particular form of "arms length" interrelationship -- possibly suggested by contrasting prefixes: multi- (multi-disciplinary), cross- (cross-disciplinary), pluri- (pluri-disciplinary). Psycho-social terms this could be recognized as indicative of a form of "co-existence", possibly "community"
- *Continuous curves:* By contrast some images show configurations in which the curve is continuous. This could be understood as a higher order of connectivity than the disjoint case. Possibly indicative of the degree of bonding sought in a team, namely in higher orders of cooperation and collaboration.
- *Loop fusion:* Some of the images show a degree of fusion of the curves at the centre, whether at the central point in 2D or as better seen from a 3D perspective on the central axis. This could be understood as a condition in which the distinctive modalities bond to a higher degree or alternatively of a form of problematic "confusion" of their perspectives.
- *Loop separation:* As noted, by altering the parameter for loop separation or spread, what appeared as fusion resolves into distinctive curves around the central axis. This is especially suggestive of how distinctive modalities call for adequate separation to retain their distinctive identities.
- *Relative loop proportion:* The representation of some configurations above appears to show loops of different sizes. This could be understood in terms of the relative value attached to distinctive modalities. However this may well be a matter of distortion from a 2D perspective, Viewed from a 3D perspective, the loops may be of equal size.

A questionable characteristic of generation of the images above is the manner in which loop separation is ensured. An additional parameter could ensure that the separation oriented loops such that they approximated to great circles rather than flattening the image "horizontally". This is especially relevant to any 3D perspective.

Logos: A number of the images feature in one way or another in the logos of institutions (*Symbolic Insignia Indicative of Global Health*, 2021). Increasingly these may take three-dimensional form, as with the logo of Meta/Facebook (*Eliciting Insight from Mandala-style Logos in 3D*, 2020). Of interest is then how and why they get selected as indicative of the identity of the institution or strategy. More specifically there is the question of why they are deemed to "work" as a collective focus.

Symbols of sacred geometry: Rather than logos, or prior to their use as institutional logos, some images may be recognized in the symbols characteristic of [sacred geometry](#). Again there is the question of how they "work" and why they are deemed "sacred". More specifically there is the question of how their elements hold significance, when subject to distinctive interpretation.

Also intriguing is how distinct symbols (valued by belief systems with a long history of conflict between them) might invite

reconciliation, as speculatively explored separately:

- [Reconciling Symbols of Islam, Judaism and Christianity](#) (2017).
- [Symbolizing Collective Remembering Otherwise: encompassing the "headless hearts" and "heartless heads" through their dynamic entanglement](#) (2018).
- [Framing Cyclic Revolutionary Emergence of Opposing Symbols of Identity](#) (2017)
- [Concordian Mandala as a Symbolic Nexus](#) (2016)
- [Dynamic Interrelationship of Symbols of Coherent Experiential Representation of Nonduality \(DISCERN\)](#) (2008)
- [Integrating Ouroboros and Yi Jing as Fundamental Symbols in 3D](#), (2021)

However, unlike the images above, those in such explorations may not be centro-symmetrical to any degree, although their iconography may take such a form -- as with Hinduism and Buddhism. Symbols may be especially valued because of the coherence of their implications for individual and collective memory. A question for the future is whether such symbols can indeed imply greater significance when 3D variants are engendered ([Cognitive Implications in 3D of Triadic Symbols Valued in 2D](#), 2017)

Logic diagrams: There are several types of diagram that map the relation between conceptual constructs. These notably include [concept maps](#), [topic maps](#), [mind maps](#), [schematic diagrams](#) and various forms of network map ([semantic network](#), [nomological network](#)). Through transformation, their particular applications could possibly be adapted to the patterns highlighted by the images above. This is notably the case with a [Venn diagrams](#), namely as a diagram that shows the logical relation between sets -- as such they could be seen as a form of "secular [mandala](#)".

Cycle notation of permutations: [Cyclic permutation](#) gives a way to compactly write down a permutation in algebra. Since the symmetric group is so important in the study of groups in algebra, learning [cycle notation of permutations](#) speeds up work with the group S_n . A permutation can be converted into into cycle notation, with key properties.

Wiring diagrams: Appropriately reinterpreted, it is possible that the images above could be understood as [wiring diagrams](#) or [circuit diagrams](#). As representations of an electrical circuit, these show the components of the circuit as simplified shapes, with the the power and signal connections between the devices. Such a possibility might be of greater relevance as a representation of the wiring of a motor or dynamo. Tesla ***

Systemic cycles: Schematic diagrams of system operations may indeed take circular form when articulated to a limited degree as illustrated by [Cyclic Diagram Templates](#) (for the [Systems development life cycle](#), [Asset lifecycles](#), [Product life cycles](#), [Marketing message cycle](#)). "Life cycle" is then characteristic of a development process, as with a [Database life cycle](#). Typically any higher degree of articulation (or interlinkage between cycles) does not encourage their articulation as circles even though cycles may well be recognized. Examples include:

- [Metabolic pathways](#): featuring the [Citric acid cycle](#), the [Urea cycle](#), [Glyoxylate cycle](#), for example. [map + animations]
- [Circular economy](#): its memorable visualization is achieved through interlinked cycles ([The butterfly diagram: visualising the circular economy](#), Ellen MacArthur Foundation).
- [Circulatory system of the human body](#): Three types interlinked cycle are distinguished: a *systemic circuit* of the flow of blood through the organs; the *pulmonary circuit* focused on the movement of blood from heart to the lungs; *coronary circuit* typically includes the movement of blood inside the heart .
- [Environmental cycles](#) (Biogeochemical cycle, Nutrient cycle): As a natural process in which elements are continuously cycled in various forms between different compartments of the environment (e.g., air, water, soil, organisms). These include the [Carbon Cycle](#), the [Nitrogen cycle](#), the [Phosphorus cycle](#), and the [Water cycle](#). [Animations?]
- [Economic or business cycles](#): [Kitchen inventory cycle](#), the [Juglar fixed-investment cycle](#), the [Kuznets infrastructural investment cycle](#), and the [Kondratiev wave](#) or long technological cycle.

A comprehensive approach to cycles (but not to their representation or interrelationship) is produced by the Foundation for the Study of Cycles ([Classic Cycles Library](#), 1987). It notably explores cycles of importance to business. More than 500 different phenomena in 36 different areas of knowledge have been found to fluctuate in rhythmic cycles.

Of considerable relevance is the recognition of how systems fail, as might be represented through failure of connectivity in any cycle ([Variety of System Failures Engendered by Negligent Distinctions](#), 2016). The images above do not include instance of broken curves (obtained through a different combination of parameters) although they do include disjoint curve configurations which could be understood as a form of failure -- a potential failure of any higher order of integration.

Circular permutation of proteins: This is a relationship between proteins whereby the proteins have a changed order of amino acids in their peptide sequence. The result is a protein structure with different connectivity, but overall similar three-dimensional (3D) shape. Over 2000 such proteins are now known. [Circular permutation of proteins](#) can occur as the result of evolutionary events, post-translational modifications, or artificially engineered mutations.

Circular organizations charts: A circular organization chart is an alternative to the standard hierarchical org chart, but like all organization charts, it visualizes the organizational structure of a business to show information like who reports to whom and to which department each employee belongs. Instead of visualizing the organization from the top down in a pyramid-like structure, the organization is drawn from the center out. ([Using circular org charts to create a culture of collaboration](#), LucideChart; [11+ Circular Organizational Charts in PDF](#), Sample.net). These possibilities rise the question as to whether more complex organizational forms could be usefully represented by the more complex images above.

Ritual cycles: These are an obvious feature of many religions (Kathy Black, et al, [Rhythms of Religious Ritual: the yearly cycles of Jews, Christians, and Muslims](#), 2018; Axel Michaels, [Ritual in Hinduism](#), 2017; Gil Fronsdal, [Rituals in Buddhism](#), Insight Meditation Center,

2022). For example, The liturgical cycle in Christian churches determines when feast days, including celebrations of saints, are to be observed, and which portions of Scripture are to be read either in an annual cycle or in a cycle of several years. The liturgical cycle **divides the year into a series of seasons**, each with their own mood, theological emphases, and modes of prayer, which can be signified by different ways of decorating churches, colours of paraments and vestments for clergy, scriptural readings, themes for preaching and even different traditions and practices.

Cognitive cycles: The images above could be interpreted as representations of cognitive cycles. It has been hypothesized that human cognition consists of cascading cycles of recurring brain events. (Tamas Madl, et al, *The Timing of the Cognitive Cycle*, *PLoS One*, 6, 2011, 4). As noted by the authors, each cognitive cycle senses the current situation, interprets it with reference to ongoing goals, and then selects an internal or external action in response. While most aspects of the cognitive cycle are unconscious, each cycle also yields a momentary "ignition" of conscious broadcasting. Neuroscientists have independently proposed ideas similar to the cognitive cycle, the fundamental hypothesis of the LIDA model of cognition. (Kurt W. Fischer, *Dynamic Cycles of Cognitive and Brain Development: measuring growth in mind, brain, and education*, *The Educated Brain*, 2008).

The pattern of images could prove relevant to the possibility of combining use of centralized and distributed cognitive cycles integrated at different planes in 5G networks: an integrated data plane, a unified control plane and a cross-layer management plane (Bego Blanco, et al, *Design of Cognitive Cycles in 5G Networks*, *Artificial Intelligence Applications and Innovations*. *ALAI* 2016). Adding cognitive capabilities to the wireless networks makes it possible to leverage the control and management information used in the network operation to infer information about the local state and exploit it to improve the overall performance.

Learning cycles: As noted by Aytac Gogus, the learning cycle is an inquiry-based teaching approach and a philosophy of education/model of instruction that can promote *critical thinking*, *active learning* and *meaningful learning* (*Learning Cycles*, *Encyclopedia of the Sciences of Learning*, 2012). Models involving 3 or 4 phases are commonly discussed and invite contrasting depictions by the images above. Arthur Young has explored a 12-phase learning/action cycle (*Characteristics of phases in 12-phase learning-action cycle*, 1998).

Multi-cycle models for cognitive therapy: As noted by Stirling Moorey Cognitive behavioural models of anxiety disorders often include visual representations of feedback loops that maintain the disorder (*The Six Cycles Maintenance Model: Growing a "Vicious Flower" for Depression*, Cambridge University Press, 20 November 2009). This describes a model containing 6 cycles comprising 2 cognitive cycles (automatic negative thinking and rumination/self-attacking), 2 behavioural cycles (withdrawal/avoidance and unhelpful behaviour), a mood/emotion cycle, and a motivation/physical symptoms cycle. Such depictions are described as "vicious flowers", offering one interpretation of the images above.

Vicious cycles: As discussed separately, there is a systemic significance, at the global level, of interlocking circular sequences of relationships (*Vicious cycles and loops; Cycles as a unit of analysis*). There has long been recognition of how one problem can **aggravate** another and of how several problems can reinforce each other. The *Encyclopedia of World Problems and Human Potential* registers some 120,000 relationships between 9,800 problems in complex networks.

Hidden in the data as presented is also the existence of chains that loop back on themselves, especially chains of problems that aggravate one another in succession. The more obvious loops may be composed of only 3 or 4 problems. Far less obvious are those composed of 7 or more. An example is: *Alienation > Youth gangs > Neighbourhood control by criminals > Psychological stress of urban environment > Substance abuse > Family breakdown > Alienation*. (*Feedback Loop Analysis in the Encyclopedia Project*, 2000). A preliminary detection analysis was also made of cycles of **facilitating** strategies in the Strategies database. There is a case for relating the circular patterns of the images above to such feedback loops.

Elements as constituting a system: Rather than associating coherence with any image of the above images as a whole, there is a case for a set of distinguished parts to be recognized as narrow selective views of the image as a whole -- namely of its parts. The argument is more relevant if the configurations are of higher dimensionality than 3D. In such a case a set such as letters of a script alphabet (especially a sacred script) or astrological symbols could -- through their form -- be seen as perspectives on a larger whole.

Static description of cycles versus the dynamics of Cyclic experience

Relative orientation: Relatively frequent recognition is accorded to people, groups and initiatives of distinctive "orientation" -- clearly to be understood as a geometrical metaphor. Less evident is how an orientation is to be otherwise meaningfully understood and the range of orientations that can be fruitfully recognized. A **compass rose** is used in navigation of the globe to order and interrelate the diversity of orientations, suggesting the possibility of analogous understanding in cognitive space, as discussed separately (*Ways of looking distinguished in terms of "compass" orientation*, 2021).

It is somewhat tragic that in psychosocial terms there is a tendency to promote the one right way -- the right direction -- excluding definitively the possibility that other directions may have some relevance. Unity is then simplistically associated with the one direction, reinforcing the suppression of a diversity of perspectives. The compass rose usefully recognizes the variety of directions. Typically missing is how relevance is accorded to alternative orientations.

(Con)fusion: With the complexification of the images above, the twists may be twisted together at the centre of the form. This can be seen as a form of fusion -- potentially indicative of a melding of faiths, or disciplines, or other modalities. This could be understood in terms of viable integration of the modalities in each case. However, as is evident from the images, it could also be indicative of a form of confusion -- more typical of systemic relations in practice.

Disconnection: As noted above, the set of images excludes those forms in which there is no continuity -- a loop is then not continuous but has loose ends, suggesting a loss of systemic coherence. Such forms could well be explored as being indicative of many situations in

practice and a fundamental challenge to viable sustainability -- exemplified by appeals for "joined-up thinking".

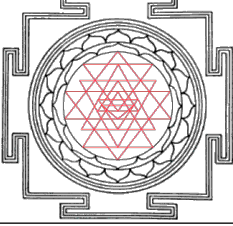
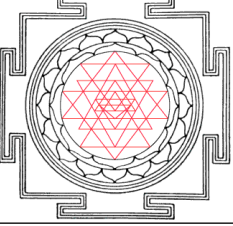
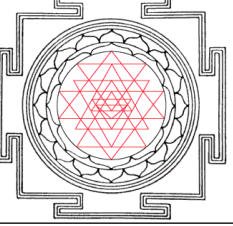
Interlocking: Potentially more intriguing is the situation in which loops are continuous, but are disconnected from one another, however they may interlock -- an unlink condition. The simplest much-studied case is that of Borromean rings, whether involving 3 rings or more. The helical models noted above could then be challenged in practice as to whether the loops are systemically unlinked although wound together. They too might be considered as exemplified by appeals for "joined-up thinking".

A set of 3 distinctive rings is a feature of [Dante Alighieri's](#) account of 3 wheels (*tre giri*) of the Holy Trinity in *Paradiso 33* of the *Divine Comedy* (Arielle Saiber and Aba Mbirika, *The Three Giri of Paradiso XXXIII, Dante Studies*, 131, 2013, pp. 237-272). That remarkable interdisciplinary exploration combines insights from speculative theology, geometry and knot theory, as discussed separately (*Borromean challenge to comprehension of any trinity?* 2018).

Dynamics -- in 3D (or more)? There is a necessary constraint on the representation and engagement with the cyclic configurations above. Use of simple animation is a partial corrective. Efforts have been made separately to provide an interactive experience with 3D forms from previous exercises (*Eliciting Insight from Mandala-style Logos in 3D*, 2020).

Especially missing is engagement with any rotational dynamic -- given the static depiction of the 3D forms from a particular perspective. The significance of this is evident in the acknowledged role of rotation of functions -- as with the chairperson of a conference, an organization, or the UN Security Council. This extends to the rotation of venue in the case of a succession of international conferences. This is otherwise known as **turn-taking** and also applies to the contribution of participants to collective conversation (T. Stivers, et al, *Universals and cultural variation in turn-taking in conversation.*, *Proceedings of the National Academy of Sciences*. **106**, 2009, 26)

Other than this specific application, arguably missing is the form of rotation deriving from the fundamental insight of Nicolas Tesla with respect to the **potential implications of alternation and rotation in psychosocial fields**, as discussed separately (*Reimagining Tesla's Creativity through Technomimicry: psychosocial empowerment by imagining charged conditions otherwise*, 2014). Arguably there is no lack of "charged conditions" in society, with extremely limited insight into how these might be addressed and used creatively. Tesla successfully derived electrical motors and dynamos by combining the charge associated with (necessarily polarized) magnetic fields and their rotation within a wiring pattern. .

Experimental 3-phase animation of classic Sri Yantra (core "wiring" configuration passing through a succession of phases)		
Animation through 3 phases	Animation through 8 phases	Animation through 16 phases
		

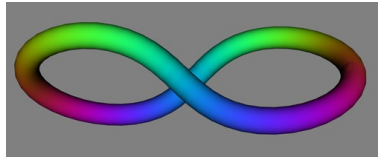
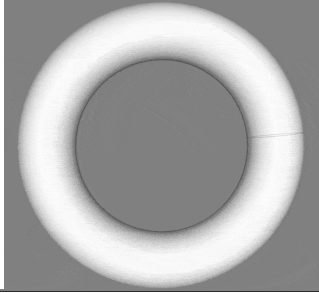

As suggested by the earlier discussion of the implications of rotation suggested by technomimicry, there are clues to this possibility in quite disparate domains:

- *Helicopter development:* The argument for technomimicry is inspired by the insights of [Arthur M. Young](#), designer of the Bell helicopter, as separately discussed (*Engendering a Psychopter through Biomimicry and Technomimicry: insights from the process of helicopter development*, 2011). Young envisaged the possibilities of applying the principles of helicopter control -- notably involving challenges of rotation -- to the development of a "psychopter" or "winged self" (*Geometry of Meaning*, 1976; *The Bell Notes: A Journey from Physics to Metaphysics*, 1979). Possible understandings are discussed separately (*Characteristics of phases in 12-phase learning-action cycle*, 1998; *Typology of 12 complementary strategies essential to sustainable development*, 1998).
- *Nuclear fusion:* The design principles required to render plasma control feasible in a toroidal reactor (as in the [ITER project](#)) also suggest insights of psychosocial relevance, especially when plasma is understood as the flow of attention (*Enactivating a Cognitive Fusion Reactor: Imaginal Transformation of Energy Resourcing (ITER-8)*, 2006)
- *Fluid flow:* Considerable insight into the functioning of vortices in nature emerged from the work and applications of [Viktor Schauberger](#), as separately discussed (*Enabling Governance through the Dynamics of Nature: exemplified by cognitive implication of vortices and helicoidal flow*, 2010). His principal argument was that humanity could benefit considerably by learning from nature -- specifically the dynamics of water -- rather than trying to correct it (Douglas Hofstadter, *Fluid Concepts and Creative Analogies: computer models of the fundamental mechanisms of thought*, 1995). Schauberger's concern was to liberate people from dependence on inefficient and polluting centralized energy generation. A subsequent development of this turbine is now known as the "**vortex generator**" (although many others now exist with that name).
- *Circulation of the light:* This can be considered as a form of "technology" potentially to be related to Tesla's preoccupation with light (*Circulation of the Light: essential metaphor of global sustainability?* 2010). It has been significant in other cultures, notably with respect to the discipline of [Neidan](#). The nature of the metaphorically-enhanced use of word-play in *Neidan* is admirably clarified in essays by Isabelle Robinet (*The World Upside Down: essays on Taoist internal alchemy*, 2011), remarkably translated from the French by Fabrizio Pregadio:

Internal alchemy, or *Neidan*, is a technique of enlightenment whose earliest extant written records date from the eighth century. It appeals both to rationality, which gives order to the world, and to what transcends rationality: the unspeakable, the Totality. Its main tools are the trigrams of the *Yijing* (Book of Changes) and a number of key metaphors, some of which are alchemical in nature, whence the name, "internal alchemy"....

The toroidal form of the "wiring" (in some of the configurations above) emphasizes the value of exploring the psychosocial dynamics which might be associated with them (*Visualization in 3D of Dynamics of Toroidal Helical Coils -- in quest of optimum designs for a Concordian Mandala*, 2016). This then frames the question of living on a torus in contrast to assumptions regarding life on a flat Earth or one that is spherical (*Imagining Toroidal Life as a Sustainable Alternative From Globalization to Toroidization or back to Flatland?* 2019; *Implication of Toroidal Transformation of the Crown of Thorns: design challenge to enable integrative comprehension of global dynamics*, 2011; *Distribution of significance "within" a torus: using a third dimension for "Engagement with reality"*, 2006).

The limited recognition accorded to the toroidal form can be usefully challenged through the animations below showing how the Mereon Trefoil (discussed above) is generated from a torus by rotating a circle of **3 spheres** moving around the torus, then rendering visible the winding path they trace in the course of the combined movements. For clarity the animation is also reversed. Bederov's technique can also be applied using **2 spheres** moving around a torus oriented vertically (below centre). In this case it generates a more classical trefoil. With the same method, using **1 sphere**, another form can be generated in 3D (below left). The animations are unfortunately jerky due to constraints on video recording and web display. (Smoother interactive 3D variants can be explored using the X3D variants as indicated, and potentially via an X3DOM context) [NB: These animations offer insight into the meaning of "sphere" in the animations above]

Animations indicating the generation of relatively complex forms around s torus		
Reproduced from (Contrasting orientations indicative of complementary cognitive modalities , 2022)		
One-sphere	Two-sphere	Three-sphere
Classic twisted form (screen shot)	Classic trefoil generated around a torus	Mereon trefoil generated around a torus
		
	Interactive x3D	Interactive x3d
Adapted from models developed by Sergey Bederov of Cortona3D		

Rather than description of cycles, the pointers above frame the question as to how the paradoxes of cyclic experience are to be comprehended (*Comprehension of Unity as a Paradoxical Dynamic: metaphors reframing problematic engagement with otherness*, 2019).

Implicit coherence speculatively explored?

It is curious that despite the importance variously associated with unity, consensus, integration and harmony, there is little meaningful sense of how these can be understood -- especially in practice. They remain valuable slogan with little insight into the possibilities of their implementation -- being essentially elusive (*Engaging with Elusive Connectivity and Coherence: global comprehension as a mistaken quest for closure*, 2018). Given the form of the images above as indicators of coherence, it could be argued that the coherence lies far less in the configuration delineated by curves than in what it encompasses and enfolds. The sense of coherence is then to be recognized as implicit rather than explicit.

A speculative exercise exploring this possibility took as its metaphorical point of departure the **O-ring** -- rendered famous by the physicist Richard Feynman in respect of the disaster of the space shuttle Challenger. As a metaphorical device, the O-ring was recognized as a common feature of four incommensurable cognitive domains, namely theology, theorem, theory, and theosophy (*Mapping sets of the-related cognitive functions: The-O Ring*, 2014).

The question was how, appropriately configured, these might frame a fundamental attractor (*Reframing a fundamental attractor as a target*). Of relevance was the shift in orientation, as a "cognitive twist" by which they could be reconciled (*Reframing a strategic attractor as a vortex involving a "cognitive twist"*).

If coherence is curiously associated with the "hole" around which such images are variously configured, the question is how meaning is mysteriously associated with such a hole. As separately discussed (*Towards the Systematic Reframing of Incomprehension through Metaphor*, 2012), a hole is the metaphor of choice for teaching the theory of general relativity. As a hypothetical topological feature of spacetime, for which there is no observational evidence, they predict the possibility of a "shortcut" through spacetime (Marcus Chown, *Intergalactic subway: all aboard the wormhole express*, *New Scientist*, 12 March 2012). Use of the comprehensible term "hole" inhibits recognition of the cognitive challenge of their multidimensional nature -- essentially unvisualisable and to that extent incomprehensible.

As a challenge in their own right for ontology and epistemology, bounding "nothingness" by "holes", invites richer insight (Roberto Casati and Achille C. Varzi, *Holes and Other Superficialities*, 1994; M. Bertamini and C. J. Croucher, *The Shape of Holes*, *Cognition*, 2003). As

a metaphor, what then might a wormhole offer as an incomprehensible "shortcut" through communication space, in the light of the forms of (in)comprehension by which this is characterized -- and the probability that the nature of that shortcut would necessarily be incomprehensible within the framework of conventional experience? Holes are at the borderline of metaphysics, everyday geometry, and the theory of perception (as summarized in the [entry on holes](#) in the *Stanford Encyclopedia of Philosophy*). The confusing associations between hole, whole and holy follow from this -- further confounded by the unfathomable implications of budgetary holes.

How do "holes" function as attractors -- especially with respect to the fascination of sexuality and intercourse? Appropriate to the manner in which the feminine may be "negatively" framed, Casati has elaborated what might be understood as a complementary study (*Shadows: Unlocking Their Secrets, from Plato to Our Time*, 2004). Such considerations can also be related to the significance of "nothing" at the present time, especially in terms of what people are offered for their future and can hope to anticipate (*Emerging Significance of Nothing*, 2012).

The earlier exercise took the argument further through the role of theatre. Despite the manner in which the variants of "theo" appear to be unrelated to "thea", the relationship is an intimate one with various facets. This is evident from the etymology, the status of "thea" as the feminine form of "theo" in the original Greek context, together with the implications of "thea" in the etymology of theatre -- at least (*Theatre: spectator, spectacle of the feminine and the Bull Ring*, 2014).

Relative interestingness and boringness of forms of coherence

As the relatively unused term for the quality of being interesting, [interestingness](#) relates to the power of attracting or holding attention due to its exceptional nature -- possibly associated in a person with the capacity to influence others. It is the quality in a work of art that arouses interest and excitement rather than pleasure. Interestingness will increase with levels of complexity and uncertainty of the work (M. S. Sam, *Interestingness*, *PsychologyDictionary.org*, 11 May 2013). Appreciated synonyms include allure and charm.

The term features in editorial comments on the justification for inclusion of a profile in *Wikipedia* (*Wikipedia: Interestigness*). One commentator suggests that -- in contrast to Truth -- the current period has become the Era of Interestingness, thereby explaining the appreciation of some fake news (Oliver Burkeman, *This column will change your life: interestingness v truth*, *The Guardian*, 5 April 2014). It could also offer insights into the pursuit of trivia.

The focus on interest gave rise to a commentary on an earlier insight of Alfred North Whitehead (*Process and Reality*, 1929, Part III, Ch VI, Sect ii): ***It is more important that a concept be interesting than it be true; the importance of truth is that it adds to interest*** (W. T. Stace, *Interestingness*, *Philosophy*, 19, 1944, 74). The point has been recently emphasized by Joe Lauria *Never let the facts get in the way of a good story -- even if it could lead to the most devastating consequences in history* (*Pentagon Drops Truth Bombs to Stave Off War With Russia*, *Consortium News*, 23 March 2022)

The corollary of Whitehead's insight also merit comment: *It is less important that a concept be boring than it be false; the importance of falsity is that it adds to boringness*. This recalls the phrase **not even wrong**, often used to describe pseudoscience or bad science -- much favoured by physicists ([Dennis Sullivan](#), *Not Even Wrong*; [Peter Woit](#), *Not Even Wrong: the failure of string theory and the search for unity in physical law*, 2006).

The experience of modern life could be framed as the quest for the interesting (a life of interest) and the challenge of the boring (the boredom of daily life). Paradoxically war may be interesting and peace may be boring -- but war may also be boring, whilst peace may only be potentially interesting.

Recent research has focused on what makes an image interesting (Maham Gardezi, et al, *What Makes an Image Interesting and How Can We Explain It*, *Frontiers in Psychology*, 1 September 2021). For the authors, answering this question deepens understanding of human visual cognition and the knowledge gained can be leveraged to reliably and widely disseminate information.

There has been a surge of interest in interest -- as an emotion, what functions it serves, what makes something interesting and its link to happiness,.. Interest is seen as a counterweight to feelings of uncertainty and anxiety... but is distinguished from the emotion of happiness in several ways .

The authors concluded that:

...interestingness is an intrinsic property of an image unaffected by external manipulation or agent. Contrary to popular belief, low-level accounts based on computational image complexity, color, or viewing time failed to explain image interestingness: more interesting images were not viewed for longer and were not more complex or colorful... Our research revealed a clear category-based hierarchy of image interestingness, which appears to be a different dimension altogether from memorability or awe and is as yet unexplained by the dual appraisal hypothesis.

Interestingness is one of the subject measures to evaluate the results of data and text mining. "*Interestingness discovery*" is a process employed in data mining and knowledge discovery to classify the usefulness of patterns (*Technopedia*). For Liqiang Geng and Howard J. Hamilton:

Interestingness measures play an important role in data mining, regardless of the kind of patterns being mined. These measures are intended for selecting and ranking patterns according to their potential interest to the user. Good measures also allow the time and space costs of the mining process to be reduced. This survey reviews the interestingness measures for rules and summaries, classifies them from several perspectives, compares their properties, identifies their roles in the data mining process, gives strategies for selecting appropriate measures for applications, and identifies opportunities for future research in this area. (*Interestingness Measures for Data Mining: a survey*, *ACM Computing Surveys*, 38I, 3, 2006)

Of related interest is the study by Bay Vo and Bac Le (*Interestingness Measures for Association Rules: combination between lattice and hash tables, Expert Systems with Applications*, 38, 2011, 9). A focus has been given to the interest of deviations (Gregory Piatetsky-Shapiro and Christopher J. Matheus, *The Interestingness of Deviations*, December 1998). Efforts have been made to model it with AI (Jianfeng Gao, etc, *Modeling Interestingness with Deep Neural Networks, Proceedings of the 2014 Conference on Empirical Methods in Natural Language Processing*). It follows that consideration has been given to how to define it mathematically (Kevin Frans, *A Mathematical Definition of Interestingness*, 6 December 2021)

An early study of inference by Chuck Rieger (*Understanding by Conceptual Inference, American Journal of Computational Linguistics*, 1974; *Conceptual Memory and Inference*, 1975) gave rise to 16 Theoretical Classes of Conceptual Inference, with each understood as a spontaneous mechanism that ought naturally go uncontrolled, each being intended to fire off for every conceptualization (i.e. every state or event) that entered an understanding system:

- 1: Specification inferences
- 2 Resultative inferences
- 3: Causative inferences
- 4: Motivational inferences
- 5: Enabling inferences
- 6: Action prediction inferences
- 7: Enablement prediction inferences
- 8: Function inferences
- 9: Missing enablement inferences
- 10: Intervention inferences
- 11: Knowledge propagation inferences
- 12: Normative inferences
- 13: State duration inferences
- 14: Feature inferences
- 15: Situation inferences
- 16: Utterance intent inferences

Subsequently the challenge of controlling these inferences through relative interestingness was recognized by Roger C. Schank (*Interestingness: controlling inferences, Artificial Intelligence*, 12, 1979, 3).

An *Interestingness Dataset* contains movie excerpts and key-frames and corresponding ground truth files based on classification into interesting and non-interesting samples from 78 Hollywood movies. The concept has been explored in relation to music (Kerstin Neubarth and Darrell Conklin, *Modelling pattern interestingness in comparative music corpus analysis, Journal of Mathematics and Music*, 15, 2021, 2). For Giovanni Gabbolini and Derek Bridge

We introduce a novel and interpretable path-based music similarity measure. Our similarity measure assumes that items, such as songs and artists, and information about those items are represented in a knowledge graph. We find paths in the graph between a seed and a target item; we score those paths based on their interestingness; and we aggregate those scores to determine the similarity between the seed and the target. A distinguishing feature of our similarity measure is its interpretability. In particular, we can translate the most interesting paths into natural language, so that the causes of the similarity judgements can be readily understood by humans. (*An Interpretable Music Similarity Measure Based on Path Interestingness, arxiv.org*, August 2021)

A valuable distinction can be made between objective and subjective measures of interestingness (Avi Silberschatz and Alexander Tuzhilin, *On Subjective Measures of Interestingness in Relation to Knowledge Discovery, Proceedings of 1st International Conference on Knowledge Discovery and Data Mining*, 1995):

One of the central problems in the field of knowledge discovery is the development of good measures of interestingness of discovered patterns. Such measures of interestingness are divided into *objective* measures -- those that depend only on the structure of a pattern and the underlying data used in the discovery process, and the *subjective* measures -- those that also depend on the class of users who examine the pattern. The purpose of this paper is to lay the groundwork for a comprehensive study of subjective measures of interestingness. In the paper, we classify these measures into actionable and unexpected, and examine the relationship between them. The unexpected measure of interestingness is defined in terms of the belief system that the user has. Interestingness of a pattern is expressed in terms of how it affects the belief system.

In a period in which there is widespread appeal for unity and concern at incommensurable division, it is therefore appropriate to ask what might make unity interesting. What is the interestingness of unity in contrast with its boringness?

The set of 3D forms above offers a kind of pattern language through which the question could be discussed, if not partially answered.

	Interesting(ness)	Boring(ness)
Symmetry / Order	when experienced as an unusual degree of order	when the pattern is familiar and experienced as repetitive
Asymmetry / Disorder	when experienced as a deviation from norms	when the absence of order is experienced as irritable
Connection / Disconnection	when links between the habitually unrelated are recognized	when experienced as overload (everything connected to everything)
Memorability / Forgettability	when welcome remembering is facilitated	when remembrance is irritating and forgetting is rendered difficult
Unity / Division	when regretted divisions are reconciled	when welcome diversity is condemned and repressed
Surprise / Unexpected	when the previously unimaginable is appreciated	when the unexpected is unwelcome
Proportion	when experienced as unusually well proportioned	when the proportioning is experienced as inappropriate
Confirmation	when experienced as confirmation of a pattern of belief	when experienced as reinforcing an unwelcome norm
Self-reference	when experience as relevant to the experiencer	when experienced as calling into question the experiencer

Sustainable dynamics "re-recognized" as knots?

Omitted from the images above is the simple circular configuration known in knotting terminology as the *unknot* -- namely the least knotted of all knots. As a circle this can be understood as the ideal of coherence and may be used as its representation in various symbol

systems. With its emphasis on recycling, it could be understood as indicative of the ideal of sustainability -- a sustainable process in dynamic terms.

The difficulty with respect to sustainability in practice is that it involves a number of distinct processes which somehow weave together to constitute viable systemic coherence. However any notion of circular economy must necessarily imply one or more "circulations" of a complementary nature -- to whatever extent these are recognized. With the emphasis placed on the economy, there is typically little effort to identify the number of other cycles which merit consideration -- although clearly environmental cycles are an increasing concern. Ironically, to the extent that these are understood as unrelated, their relation would then correspond in knot theory terminology to the [unlink](#).

There is a case therefore for using the patterns of coherence visualized above as indications of the dynamics of sustainability -- articulated to varying degrees of complexity. Beyond simple representation, as a form of system diagram, of particular value are the arguments above of Silvia De Toffoli and Valeria Giardino regarding enhanced manipulative imagination of epistemic value -- of visualizing motion in cognitive terms, as indicated by Giaquinto. These considerations frame the question of the cognitive engagement in the dynamics of sustainability -- even the extent to which they are embodied.

Of some relevance regarding such embodiment are the arguments expressed metaphorically in terms of the "circulation of the light " according to various traditions, as discussed separately (*Circulation of the Light: essential metaphor of global sustainability?* 2010)

Circulation of the light, its inhibition and its surrogates	Circulation around what?
Cognitive and strategic implications	Circulation engendering circulation?
Hidden dynamics of the "circulation of the light"	Symbolic indications
Experiential implication in the "circulation of the light"	Completing the circuit
Sustaining the circulation dynamic	

The metaphor was subsequently associated with arguments regarding the seam curve of the tennis ball and baseball -- one of the forms depicted above (*Cognitive circulation of the light -- around the baseball curve?* 2020). It can also be compared to the technological challenge at CERN of the circulation of a coherent beam of high-energy particles at near-light speeds in a 27 km circular tunnel at temperatures close to absolute zero -- in order to observe the outcome of collisions between particles moving in opposite directions (*Analogous technological challenges*, 2008).

A key question is clearly the cyclic connectivity between seemingly disparate cycles -- beyond the unlink condition of perceived mutual irrelevance or incommensurability. Understood as separate worlds (possibly from the perspective of the professions inhabiting them), issues of concern can then be discussed in terms of "travelling between worlds", "healthy pattern of movement", and "healthy movement in dialogue" (*Circulation of the light?* 2013). Mixing metaphors, such movement is also explored there by considering deities as gears in a pantheon-cum-gearbox -- as a transmission system.

A knot can then be understood as a pattern tracing out the circulation of light -- insight in cognitive terms -- calling for imaginative engagement in that movement (*Cognitive embodiment of knots: knotting and knitting processes*, 2021). It follows that there is a real challenge to the degree of complexity it is possible to trace out -- comprehensibly -- whilst retaining a sense of coherence. The additional question is the extent to which communication of such comprehension is facilitated by reference to the pattern -- given how readily the pattern may be perceived as meaningless and alienating. The latter is the case with the majority of representations of mathematics in which comprehensibility and communicability are not parameters meriting consideration (*Dynamics of Symmetry Group Theorizing: comprehension of psycho-social implication*, 2008).

Articulation and complexification of cycles of sustainability

Few would now deny that sustainability is complex and exceeds simplistic representation. Ironically the situation could be compared to that recognized by physics in the case of string theory which calls for a multiplicity of dimensions beyond the familiar three or four of spacetime. Is there a tendency to assume that sustainability can be adequately comprehended within any such limited set of dimensions? Spacetime is understood as 26-dimensional in [bosonic string theory](#), 10-dimensional in [superstring theory](#), and 11-dimensional in [supergravity theory](#) and [M-theory](#). Is psycho-social reality to be assumed to be less complex?

Physics is however obliged to imagine that the [extra dimensions](#) (or "additional dimensions") required of string theory are somehow "curled up". For the sake of the following exploration, many of the forms depicted above could be explored as ways in which the extra dimensions of sustainability are themselves "curled up" -- if only as a challenge to their comprehension.

The images above are suggestive of systemic conditions if only that any effort to describe them leads to use of words which are employed as metaphors in describing systemic and cognitive cognitions. Experientially, in any given case, there is the recognized challenge of being "in the loop" or excluded therefrom.

"Pseudopods", "antenna" or "feelers"? The point of departure is perhaps necessarily the unknot and the systemic coherence it purportedly represents. As the images above suggest it is subject to "distortion", perhaps to be understood as the projection of "pseudopods" to use a biological metaphor -- or "feelers" in cognitive terms. These are distinctive projections of loops, distinctively oriented, out of the circular simplicity -- potentially to be recognized in the case of:

- **2 pseudopods:** as a science loop and a humanities loop, in the light of the influential two cultures argument of C. P. Snow (*The Two Cultures and the Scientific Revolution*, 1959). This might be expressed in terms of science versus religion or other fundamental dichotomies such as development versus environment.
- **3 pseudopods:** an academic loop, a government loop, and an industry loop, in the light of the [Triple Helix model of innovation](#)
- **4 pseudopods:** an academic loop, a government loop, an industry loop, and a public loop (civil society and the media), in the light

of the [Quadruple helix model](#) (of innovation)

- **5 pseudopods:** an academic loop, a government loop, an industry loop, a public loop, and an environmental loop, in the light of the [Quintuple helix model](#) (of innovation)

The images above are restricted to a maximum of 5 such pseudopods, thereby framing the question of the number of loops that sustainable dynamics requires and how many more can be fruitfully depicted. The tabular representations make clear the manner in which more complex patterns are extensions of the simpler ones -- without any indication (given their relative complexity) of how these might be fruitfully comprehended as coherent.

"Cognitive twist": As depicted in the images above, in the simplest cases the loops may number only two or three -- offering only an implication of the unknot's (mysterious) simplicity. However, as depicted, a degree of complexity is introduced when the loops are twisted with respect to one another. Any such twist is evident in the degree of incommensurability which is held to exist between the cognitive modalities with which the loops can be associated. Most evident is that between the sciences and the arts, usefully then represented by loops in contrasting planes in 3D. This acknowledges a fundamental change of cognitive orientation. Whilst relatively easy to acknowledge in the case of two loops, the challenge of comprehension and communication is all the greater as the number of loops increases -- if they are twisted in relation to one another.

Ironically a situation in which numerous loops are acknowledged as a pattern of coherence -- multiple disciplines or belief system -- their representation as loops untwisted in relation to one another is indicative of an ideal condition, seldom viable in practice. Configuring different disciplines around a table, for example, then promotes an illusion of coherence which is not reflected in their twisted relations with respect to one another in practice. It can be seen as reflective of a form of systemic naivety and tokenism typical of interfaith, interdisciplinary and international gatherings.

The cyclic configurations are therefore a useful challenge to any embodiment of sustainability, as separately explored (*Psychology of Sustainability: embodying cyclic environmental processes*, 2002; *Existential Embodiment of Externalities: radical cognitive engagement with environmental categories and disciplines*, 2009).

Musical comprehension of unity versus diversity using four geometric parameters?

Beyond the relationship traditionally recognized between mathematics and music, a new way of analyzing and categorizing music has recently been developed to take advantage of the deep, complex mathematics seen to be enmeshed in its very fabric (*Music Has Its Own Geometry, Researchers Find*, *ScienceDaily*, 18 April 2008; Marc West, *Geometrical music theory, Plus*, 19 May 2008; Clifton Callender, Ian Quinn and Dmitri Tymoczko, *Geometrical Music Theory*, *Science*, 18 April 2008, 320, 5874, pp. 328 - 329).

For Dmitri Tymoczko, for example:

A musical chord can be represented as a point in a geometrical space called an orbifold. Line segments represent mappings from the notes of one chord to those of another. Composers in a wide range of styles have exploited the non-Euclidean geometry of these spaces, typically by using short line segments between structurally similar chords. Such line segments exist only when chords are nearly symmetrical under translation, reflection, or permutation. Paradigmatically consonant and dissonant chords possess different near-symmetries and suggest different musical uses. (*The Geometry of Musical Chords*, *Science*, 313, 2006, 5783, pp. 72-74; *A Geometry of Music: harmony and counterpoint in the extended common practice*, 2011)

The language of musical theory has thus been translated into that of contemporary geometry. A sequences of notes, like chords, rhythms and scales, are categorized so they can be grouped into "families." to which a mathematical structure can be assigned. They can then be represented by points in complex geometrical spaces. The basis of geometrical music theory is that it provides a unified mathematical framework for musical events that are described differently depending on the scenario, but are fundamentally the same. This work is indicative of the complex ways in which music is understood and is supportive of identity, notably in traditional [sacred music](#).

For [Eli Maor](#):

The octave, the fifth and the fourth produced pleasing combinations of tones, or consonants, whereas more complicated ratios, such as 9:8 or 15:16, led to dissonances. This revelation made a deep impression on the Pythagoreans, prompting their belief that everything in the Universe -- from the laws of musical harmony to the motion of the Sun, Moon and the five planets -- was governed by simple ratios of whole numbers. *Number rules the Universe* was the Pythagorean motto. It would dominate scientific thought for the next two millennia... It was all part of their grand view of a Universe ruled by beauty and harmony -- their *musica universalis*, or music of the spheres. (*The chords of the Universe*, *Aeon*, 30 May 2022; *Music by the Numbers: From Pythagoras to Schoenberg*, 2018)

Just as the configurations above merit a confrontation with knot theory, there is a case for confronting them with musical theory. It is intriguing to speculate on how the four parameters by which they are engendered could be related to the generation of tones and music, however those parameters are then to be interpreted:

- spreading of curves?
- thickness of the curves?
- spheres?
- angle of rotation?

Such possibilities might well be related to the challenge of sonification in distinguishing knots and the "writhing" of DNA coils (Stephen Andrew Taylor, *Music and Genetics: compositions and sonifications*; Edward Witten, *Knots and Quantum Theory*, Institute for Advanced Studies, 2011). The [Institute for Music Informatics and Musicology](#) (Karlsruhe) has explored:

... various ways of arranging sounds temporally and spatially in a virtual environment. The performer dives into a virtual world with help of a head-mounted display. The audience can follow her gaze on a projection. She can arrange virtual cubes that represent sounds freely in space. By drawing closed paths with a controller, the cubes can be arranged temporally and be connected to loops.

Given the comparison of the configurations of curves with knots, of interest is the application of [sonification](#) techniques to the understanding of the Inca knotted quipu by Julian Rohrerhuber and David Griffiths who conclude their study:

Listening to the inner structure of these artefacts is a method of systematic spreading of awareness over time. Unlike an image which can be read in any order, a sonification aligns the readingdirection, while keeping undecided what is being listened to. Sound thereby has very different affordances than the common descriptive, diagrammatic and numerical methods. Used by artists and composers, such sonifications can cultivate a movement between archaeological interest and aesthetic sensibility. Used by archaeologists as a methodological alternative, it might lead to new ideas of how to read quipus in their cultural context. (*Coding with Knots*, Zenodo, 20 July 2017)

It is curious the extreme value associated with national anthems and the [Anthem of Europe](#), despite the total cognitive disconnect from any organizational articulation of the patterns of insight they embody (*A Singable Earth Charter, EU Constitution or Global Ethic?* 2006; [Reversing the Anthem of Europe to Signal Distress?](#) 2016)


Imagined potential of circular forms as a pattern language

Circular strings of prayer beads: Considerable significance is attached to the use of circular arrangements of [prayer beads](#) in many religions -- each bead having a particular connotation (*Designing Cultural Rosaries and Meaning Malas to Sustain Associations within the Pattern that Connects*, 2000).

The highest value may be associated with necklaces, bracelets, torcs, rings, livery collars and sashes (*Engaging with Globality through Cognitive Circlets*, 2009; *Engaging with Globality through Cognitive Crowns*, 2009; *Quantum Wampum Essential to Navigating Ragnarok*, 2014).

Arrival: It is appropriate to note the considerable focus on forms with some resemblance to those above in the award-winning science fiction movie *Arrival* (2016). This focuses on the role of a linguist in discovering how to communicate with extraterrestrial aliens who have arrived on Earth, before tensions lead to war. This required the invention of a form of alien linguistics which have elicited a variety of comments from linguists.

- Gus Lubin: *Arrival nails how humans might actually talk to aliens, a linguist says* (*Business Insider*, 22 November 2016)
- Steve Zeitchik: *Decoding the linguistic geekiness behind Arrival's sci-fi sheen* (*Los Angeles Times*, 25 November 2016)
- Peter Bradshaw: *Arrival review: heartfelt alien-contact movie communicates spectacular ideas* (*The Guardian*, 1 September 2016)
- *How Arrival's Designers Crafted a Mesmerizing Alien Alphabet* (*Wired*, 16 November 2018)
- *Is the alien writing in Arrival really a language? Can we form custom sentences?* (*StackExchange*, 2018)

Examples of phrases in the invented visual language of <i>Arrival</i>	Crop circles shown in a sequence of screen shots
	<p>Unfortunately, although there are many images of crop circles accessible over the web, an instructive sequence could not be presented here.</p> <p>The images are either subject to copyright and paywalls, are depicted from an angular perspective, or are more likely to have been produced purely for aesthetic effect</p>

Crop circles: The phenomenon of [crop circles](#) manifesting in many countries has evoked commentary ranging from skepticism (due to their purported creation by hoaxers) to speculation that they may be the work of extraterrestrials endeavouring to communicate with humanity:

- Benjamin Radford and Callum McKelvie: *Crop circles: Myth, theories and history* (*LiveScience*, 28 January 2022)
- Rob Irving and Peter Brookesmith: *The Art of Crop Circles* (*The Smithsonian Magazine*, 15 December 2009)

- [Are Crop Circles Real?](#) (*Gaia*, 26 January 2020)

Despite the inadequacy of explanation as to the origin of all examples, the extraterrestrial speculations are readily dismissed as pseudoscientific. However, whether or not the explanations are pseudoscientific, the geometry of the configurations cannot be dismissed in that way -- although it may indeed be recognized in terms of [sacred geometry](#), despite deprecation of the "sacred" connotation). Arguably they could be explored as a form of language with some resemblance to the images above.

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