10 August 2020 | Draft

Re-membering the Globe from a Flatland Perspective

Reconciling in 3D the Vitruvian archetype with sports ball curves

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Introduction

This speculative exploration follows from an earlier argument regarding the challenge of mapping the opposing forces of good and evil -- in anticipation of any prophesied final battle (*Mapping options for 144 distinctive features of a dynamic global system*, 2020). This was followed by a second speculative exercise in exploring the cognitive constraints imposed by adoption of the baseball cap (*Baseball Cap Implications in the Quest for Global Hegemony*, 2020). This endeavoured to clarify the relationship between sports visors and the form of the curve in 3D which is so fundamental to the manufacture of a baseball and a tennis ball from flat materials.

People are necessarily far more familiar with the form of such balls -- even if only unconsciously recognizing the seams defined by those curves in 3D. To that extent it could be claimed that any sense of "global" is understood in an especially constrained manner. This is particularly true given the "treatment" accorded to such balls in games such baseball and tennis. A related argument can be made for the common association football, given the neglected significance of its polyhedral stitching pattern.

A puzzle for the future is how the engagement with "global dynamics" is most commonly recognized through hitting (or kicking) forcefully and skillfully the balls in various games -- in order to score against an opponent, thereby defeated, if not triumphantly crushed. The earlier speculations considered the understanding to be derived from the balls used in such games (*Game ball design as holding insight of relevance to global governance?* 2020).

Those arguments noted how the manufacture of balls used in sports poses the problem of how to curve materials in 2D in order to create a viable ball in 3D. As discussed, of particular importance in this respect is the seam of the tennis ball, which is the feature of the tennis-ball theorem of mathematics. This is of the same form as that of the baseball curve of 108 double stitches (*Seam Curve on Sports Balls*, *Wolfram Demonstration Project*). Such construction can be understood as a shift in modality from "flatland" to "sphereland".

A form of "flatland" perspective featured in the prize winning work by Thomas Friedman (*The World Is Flat*, 2005; *Hot, Flat and Crowded*, 2009), as subsequently reviewed (*Irresponsible Dependence on a Flat Earth Mentality -- in response to global governance challenges*, 2008). Irrespective of its relevance to meaningful globalization, a contrasting perspective has long been a speculative focus of mathematicians (Edwin Abbott Abbott, *Flatland: A Romance of Many Dimensions*, 1884. Ian Stewart, *The Annotated Flatland: A Romance of Many Dimensions*, 2008; Dionys Burger, *Sphereland: A Fantasy About Curved Spaces and an Expanding Universe,* 1965).

The speculation here is that the long-admired (and much-reproduced) Vitruvian Man, as famously depicted by Leonardo da Vinci in 1490, could be seen as apparently reinforcing a two-dimensional worldview -- even though it is interpreted as implying and exemplifying what could be considered as a vital perspective on proportions in their more integrative global sense. The question here is whether an adaptation of that 2D depiction into 3D offers a higher degree of accessible insight into global engagement -- when reconciled with the

curve so fundamental to the design of familiar balls.

Understood otherwise, **is there a sense in which the 2D depiction of Leonardo da Vinci has been embodied in modern culture in a manner different from the higher-dimensional globality which his image implied** and to which it effectively pointed and symbolized? By contrast, the very familiarity with balls in games could then be understood as encouraging and reinforcing a form of "sub-understanding", as argued by Magoroh Maruyama (*Peripheral Vision: Polyocular Vision or Subunderstanding? Organization Studies*, 25, 2004, 3). More problematic, could the conventional 2D depiction -- frequently highlighted as a key symbol of Western civilization -- be caricatured as effectively a paper "cut-out", namely "all front and no back"? Might this well be asked of many Western-inspired institutions, despite vigorous claims to the contrary?

Is the much deplored fragmentation of society to be recognized as engendered by such misplaced concreteness (Joan Conger, *The Fallacy of Misplaced Concreteness Distorts Modern Leadership Study and Practice: four principles of process proposed by Alfred North Whitehead reform four modernist abstractions*, 2016). This can be variously explored through visually associating smaller variants of the global form with a version of the Vitruvian image rendered into 3D.

Given the much-cited significance of the Vitruvian depiction to Western civilization and its "architecture", why has no equivalent cognitive symbol been imagined for the architecture of knowledge in a global system? Are the insights of other traditions of relevance, as argued by Susantha Goonatilake (*Toward a Global Science: mining civilizational knowledge*, 1999)?

In a period of intense preoccupation with the sexist implications of gender biased language, there are also visual equivalents (*Images in science are still biased towards white men, new research reveals*, *ResponseSource*, 9 July 2020). Any reframing of the historical depiction of a Vitruvian "Man" is therefore highly problematic. It raises questions as to how any new representation might be appropriately named and designed in 3D. Many remarkable efforts have indeed been made to design complementary images of a "Vitruvian Woman" in 2D -- readily available via the web, some with considerable aesthetic merit. This site also features an earlier animation in 2D (reproduced below) which addressed the related issue of the degree of racism necessarily reinforced by the original depiction.

As with the Vitruvian Man, the following argument is primarily visual -- of necessity. The images and animations are proposed as templates by which complementary narratives and "stories" could be evoked and developed. Variants of those indicated could be readily proposed -- potentially of much higher quality and with greater attention to aesthetics. The animations here in 3D could in future respond to these challenges of insensitive representation by embodying variation in skin colour, if not in morphology.

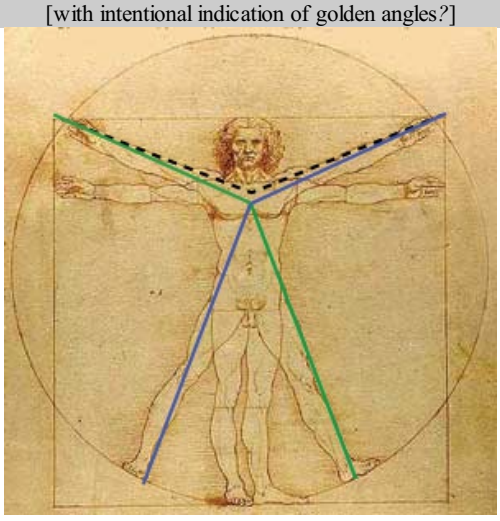
This exploration was only made possible by advances in 3D technology, and notably its use by PLM Technology to design a Vitruvian Man in 3D -- made freely accessible via the GrabCAD Community (*Vitruvian Man*, 31 May 2019).

Given the celebration in what follows of a particular curve in mathematics, it is appropriate to note that -- unlike many other such curves -- it does not have a name. The reference to it is as the "seam line of a tennis ball: or the "baseball curve" are but widely recognizable instances. It is therefore perhaps appropriate to recall the fundamental argument of the *Tao Te Ching*: *The name that can be named is not the eternal name. The nameless is the beginning of heaven and earth.*

Integrating ball seam curves into Vitruvian animations in 3D

Vitruvian image: Rather than abstract geometry, it is the case that humans attach greater significance to the geometries of the human form -- fundamental as (strange) attractors to the process of reproduction, and currently the source of the major problem of humanity and the planet, as discussed separately (*Geometry, Topology and Dynamics of Identity*, 2009). Also of relevance is the Protagorean dictum that "man is the measure of all things" -- a focus for the Renaissance and famously depicted naked by Leonardo da Vinci as Vitruvian Man.

Vitruvian Man by Leonardo da Vinci
[with intentional indication of golden angles*?*]



Curiously this image was used as the basis for the astronaut patch of the Earth-orbiting *Skylab Expedition 2* in 1973 (with a variant patch for the wives of astronauts) -- presumably not for the attention of extraterrestrials. The question highlighted by the following animation exercises is **what is being missed by not imagining the original Vitruvian image otherwise?** The earlier animations do not take account of the geometrical framing of the original Vitruvian image -- as could have been done. That possibility is explored subsequently

with respect to a dodecahedral framing in 3D.

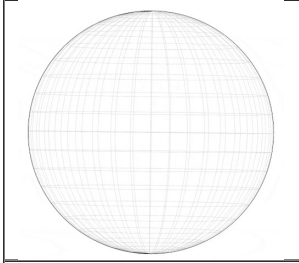
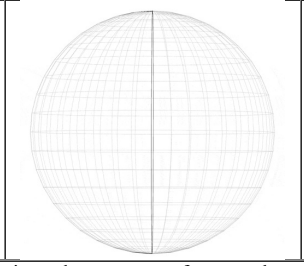
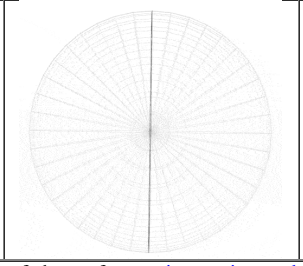
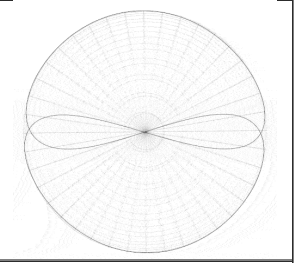
Baseball curve integration: The previous exercises noted the specific mathematical formula defining the baseball / tennis ball curve (Robert Ferréol, *Seam Line of a Tennis Ball*, 2018; *Bicylindrical Curve*, 2018). Also noted was the generalization of that curve (Dean Allison, Ricardo Diaz, and Nathaniel Miller, *Generalized Baseball Curves: Three Symmetries and You're In! Loci*, *MAA Mathematical Sciences Digital Library,* September 2008, Article ID 2866). Necessarily, the latter can best be understood in 3D with interaction possibilities, as presented separately (*Interactive display of generalized baseball and tennis-ball seam curves in 3D: hypotrochoid offering perspectives on circle, lemniscate and related curves*, 2020).

As depicted above, the Vitruvian Man is framed by a circle. In 3D this could be simply understood as taking the form of a sphere. The approach taken here is to explore the embedding of an archetypal human within a smooth curve variously transformed from a circle by changing parameters of potential significance. **The baseball / tennis-ball variant of these patterns is the most familiar, because of the transition it offers between the constraints of constructing a global form (in 3D) from materials available only in flat form (in 2D)**. It is in this sense that it is potentially of particular relevance to any depiction of a human archetype in 3D -- given the significance that may be variously associated with that depiction.

The circle in the original Vitruvian depiction is evident as one phase in the "Front" view animation (below left). The corresponding "Side" view would then necessarily be perceived as a vertical line, since the circle is at right angles. The corresponding "Top" view from the top also sees the circle as a line at that phase in the set of synchronized transformations. An animation offering a valuable 3D perspective of the phases in the process is offered by Robert Ferréol, understood as a special case of a so-called satellite curve (*Seam Line of a Tennis Ball*, 2018).

The animation on the right of the three mutually orthogonal perspectives is that of the "compromise", understood as required for the transition between 2D and 3D "in practice". Note that the screen shots in each case present views **through** the sphere (as though it were transparent) and therefore show the sweep of the curve in front of the sphere and on its other side. The interactive model in 3D also allows users to view the near-side portion of the curve alone.

Synchronized animations of transformations of generalized baseball curve in 3D
(with mutually orthogonal views of specific curve on right)

"Front" view	"Side" view	"Top" view	Baseball/Tennis ball
			

Animated sequences of screen shots of phases from an interactive model
kindly made by Sergey Bederov of Cortona 3D

It is the curve depicted above right which features in the animations which follow -- variously oriented and rotated. Whether the generalization, of which it is an instance, merits further consideration in that context is a matter for future reflection. The sphere which features in the above animations is presented in green in the following integrated animations.

Animations of the baseball curve with the Vitruvian form in 3D

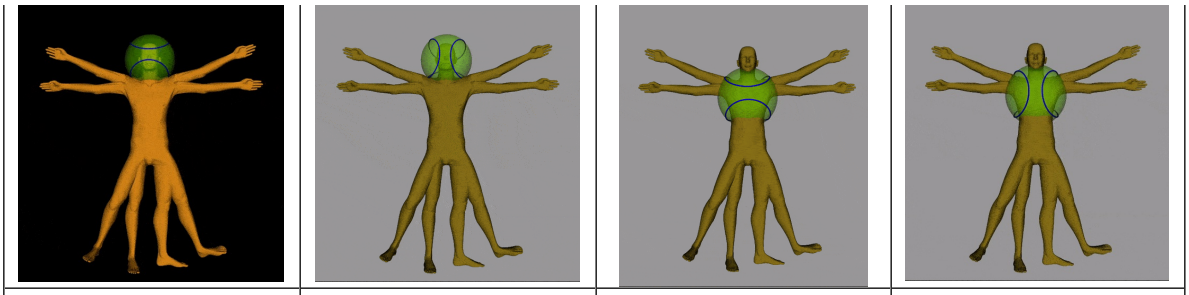
"Head" focus: The first two animations, below left, illustrate some colouring alternatives, with preference subsequently given to that on the right. The two animations also suggest alternative possibilities of rotating the seam curve of the ball. The point might have been made otherwise by simply using static images highlighting the horizontal or the vertical formats of the curve as perceived from the front -- or from within. The animations, through rotating both the body and the curve, invite other interpretations -- especially when seen from the back.

The image on the left follows directly from the previous discussion in which the conformity of the horizontal orientation with the curved brim of the baseball cap was explored -- with its possible cognitive implications (in contrast with that of the Stetson, for example). As presented, the curve recalls discussion of the lateralization of brain function into two hemispheres -- with its potential cognitive implications.

"Heart" focus: The two animations on the right shift the focus from the brain to the heart, however this may be interpreted metaphorically and symbolically. They focus any issues of "divided heart" and the much-valued meaning of "whole-hearted".

The juxtaposition of the two sets of images is also suggestive with respect to discussion of the current psychosocial implications of the strategic battle between the "headless hearts"and the "heartless heads" (*Possibilities of reconciling the "headless hearts" to the "heartless heads": time for provocative mnemonic aids to systemic connectivity?* 2018).

Clarification of the challenge between "head" and "heart"			
"Head" focus		"Heart" focus	



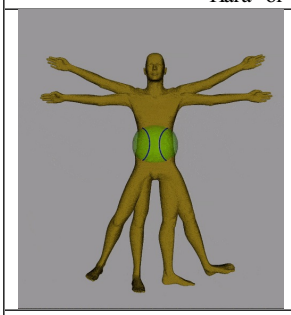
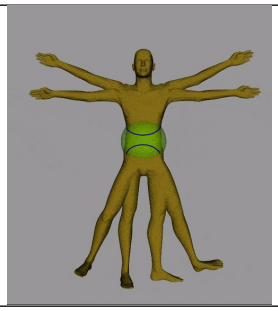
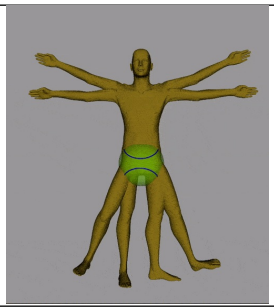
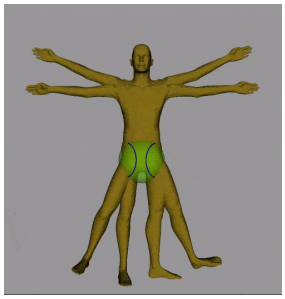
"Hara" or "Gut" focus: In the set of animations on the left below, the seam curve and ball are shifted to the locus much valued in Eastern martial arts, namely the *hara*. In the Japanese medical tradition and in Japanese martial arts traditions, the term is used in a technical sense for a specific area (physical/anatomical) or energy field (physiological/energetic) of the body. It is recognized as enabling practitioners to sense threats or anticipate an opponent's movements. An interpretation of its spiritual significance has notably been a focus of Karlfried Graf Dürckheim (*Hara: The Vital Centre of Man*, 1988).

In the West, entrepreneurs and leaders may value initiatives inspired by a "gut feeling" and "having guts". In the East, *hara* is related to *haragei*. This refers to an exchange of thoughts and feelings that is implied in conversation, rather than explicit (Randall Hassell, Haragei: Speaking from the gut, *Black Belt Magazine*, January 1985). It is characterized by euphemisms, vague and indirect statements, prolonged silences and careful avoidance of any comment that might cause offense. It may function as a method of leadership, replacing direct orders to subordinates with subtle, non-verbal signals -- considered a desirable trait in a leader in Japan. This might be compared to Western understandings of tacit knowledge.

There is much controversial discussion of Leonardo's argument with regard to the navel as the central focus of the Vitruvian image in terms of which the much esteemed proportions of the whole are determined (Francisco Javier Roldán-Medina, *Is the navel of the Vitruvian Man of Leonardo da Vinci in golden section? ResearchGate*, 2016; Bikramjit, *Leonardo Da Vinci's Vitruvian Man explained*, 20 March 2018).

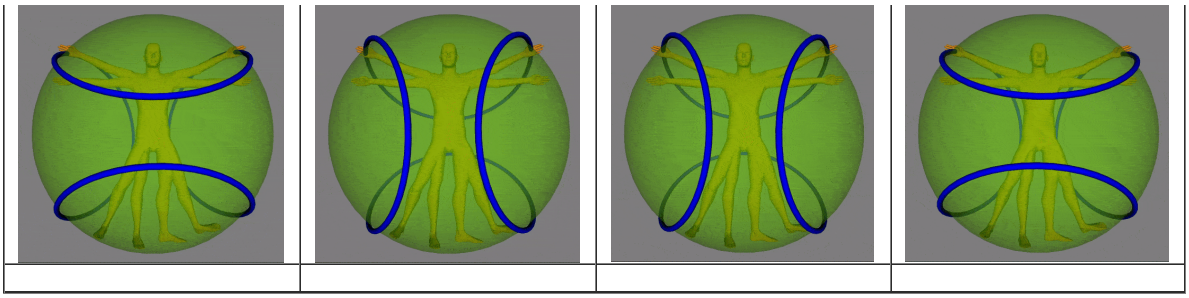
"Sex" or "Arse" focus: The set of animations on the right (below) -- with the implications of the orientation of the curve -- obviously frames the possibility of a range of potentially charged narratives around a locus which is widely appreciated as of primary importance. There is no lack of reference to euphemisms in this regard -- some now deemed essential to the authenticity of any declaration in popular discourse, as may be variously explored (*Mysterious Complementarity between Capitalism and Arsenalism: metaphors crucial to sustainability and the crisis of the times*, 2020). With "capital" as a matter of the "head", is there clarification required between "head" and "arse", as much as between "head" and "heart"?

Aside from its direct sexual associations, that focus is also framed with respect to risk-taking and courage as "balls" or "*cojones*". Curiously The possible orientations of the seam curve appropriately -- and provocatively -- suggest themes of gender ambiguity. The associated dilemmas, and their representation, are consistent for some with any non-binary Vitruvian interpretation from a transgender perspective.

Clarification of the challenge between "gut" and "arse"			
"Hara" or "Gut" focus		"Genital" or "Arse" focus	
			

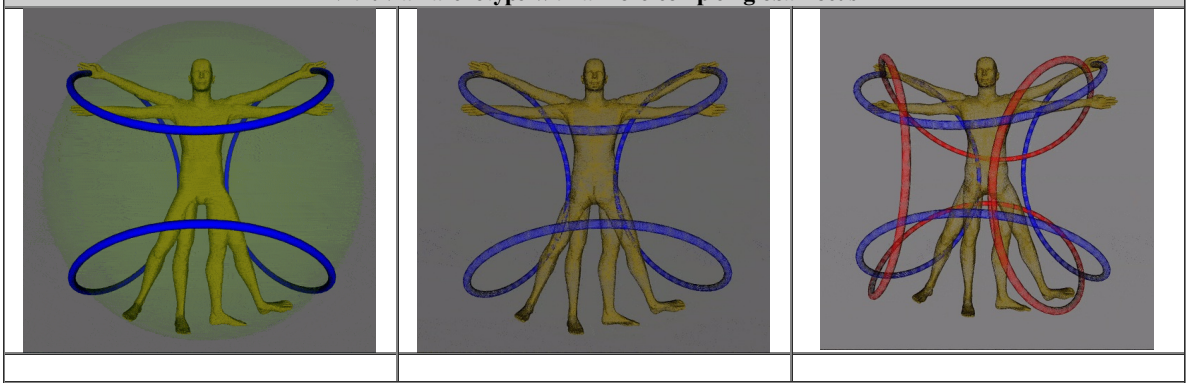
Global embodiment: Potentially of greater relevance to a 3D Vitruvian depiction are the conditions in which cognitive dynamics can be understood through the person variously encompassed by the sphere and curve. These are more consistent with the implications of the original image in which the person is encompassed by a circle and can be understood as an embodiment of it through the much-studied proportions of the image (*"Sphering the Circle" (from 2D to 3D): a Klein-bottle relationship "belt drive"?* 2007).

Vitruvian archetype with a simpler global focus			



There are obviously several possibilities for such animations, with or without the sphere, most notably with respect to the direction and rate of movement. A wireframe rendering helps to indicate other colouring options. The animation on the right adds a second version of the curve.

Vitruvian archetype with a more complex global focus



Technical note: Humanoid representation and animation in 3D is a focus of considerable development. The model used above in X3D is much larger than is conveniently handled by simple web pages. Hence the displays above of animated GIFs derived from MP4 video recordings (best experienced in separate browser windows where they can be enlarged). As templates, the representations could indeed be variously modified experimentally with respect to colouring, transparency, rates and directions of movement, and relative sizes -- especially in support of alternative narratives. There are necessarily issues with the graphic quality of the animations, given the challenging choice of colours and contrasts -- in addition to the personal preferences of those viewing them.

Cognitive circulation of the light -- around the baseball curve?

From static to dynamic? As variously suggested above, the traditional 2D Vitruvian depiction has been a major inspiration in Western civilization, most notably with respect to the proportions of architecture. That influence is less evident with respect to the architecture of knowledge. However the implications of the form have indeed been a focus of exercises in sacred geometry. It is appropriate to ask how the inferred sacredness of the geometry then "translates" into cognitive dimensions, especially into the dynamics of cognition of relevance to current crises of global governance.

With respect to any understanding of "global", the question highlighted above is of curious relevance. **How is it that a game ball offers the most widely accessible symbol to enable vital understanding -- but is subject to such violent treatment in the course of the game, through being struck and kicked?** Is this strangely indicative of an attitude to the globe and the subtly complex integration it is otherwise held to represent? Whether in terms of debate or governance, has the focus on a ball reduced strategic thinking to the triviality long associated with the phrase *Anyone for tennis?* -- despite the message it may so symbolically carry?

Also curious is the deep commitment to scoring points skillfully through that process as a means of subjugating opponents -- at a time when this translates into an inability to achieve any coherent policy attracting global consensus. Such game playing -- and the spirit of the game -- seemingly offers unexplored insights in a period experienced by many as globally "pointless". What "circulates" through that process?

The so-called baseball curve offers a useful challenge to the essentially static Vitruvian depiction and to the necessarily static architecture it may inspire. The question is the nature of the cognitive dynamic potentially framed and enabled by such architecture. This question goes beyond what might be simply associated with the circle in the Vitruvian depiction or appreciation of the proportions to be inferred from it.

There is a certain irony to challenging the attribution of fundamental significance to a Vitruvian archetype depicted statically -- by the use of animation to emphasize a dynamic. With respect to any appropriate symbol of global knowledge architecture for the future, it suggests an adaptation of the insight of Galileo Galilei: *E pur si muove* (*And yet it moves*)

Cyclic thinking? The baseball curve is then suggestive of a form of cyclic cognitive movement around it. The twists and turns in 3D might be usefully compared to a roller-coaster ride -- in contrast to any simpler pattern of movement typical of circular movement in "flatland". Subtler still is the sense in which that cognitive roller-coaster also passes through tunnels -- implying experience of a netherworld or underworld, as discussed previously (*Systemic recognition of the "cognitive underworld" -- integrating the "netherworld"*, 2020).

As argued, this effectively acknowledges unconscious and tacit processes -- "under the table" and "behind the scenes" -- which are not commonly rendered explicit, as with corruption and organized crime (John Ralston Saul, *The Unconscious Civilization*, 1997).

Backside? Despite being frequently upheld as a key symbol of Western civilization, the fact that the significance of the back of the 2D image can only be inferred (if not readily considered irrelevant), justifies any caricature of it as effectively a paper "cut-out" -- namely "all front and no back". As noted above, this might indeed be said of many Western institutions, despite vigorous claims to the contrary.

Although the nakedness of the depiction (from the front) can be appreciated as a form of healthy honesty, beyond the conventions of prudery, the absence of any depiction of the "backside" can be held to be symbolically significant in reinforcing an effectively blinkered worldview. Exhibition of the backside is deemed inappropriate -- if not insulting. The association with waste management is indicative of the multiple challenges in that regard. Such limitations are of course compounded by the gender bias of the image (as noted above) and the highly controversial implications for sexuality, many of which emerge "beneath the radar" of political correctness.

Mirroring through twisting and turning: The form of the curve is also reflective of what might be variously termed "cognitive mirroring", usefully dissociated between complementary portions of the curve of similar form (*Mirror self-recognition and environmental mirroring*, 2008; *Stepping into, or through, the Mirror: embodying alternative scenario patterns*, 2008; *Mirroring Global Moral Equivalence*, 2010; *Burkha as Metaphorical Mirror for Imperious Culture?* 2009)

A related approach to the engagement with "otherness" is through the challenge of "integrating the shadow" and the engagement with otherness (*Progressive integration of the shadow of non-self-reflexivity*, 2007). The twisting form usefully holds the non-linearity associated with any cognitive twist, as may be variously argued, and especially in relation to the process of enantiodromia, namely the transformation process into an opposite form, even a change of chirality (*Enantiodromia: cycling through the "cognitive twist"*, 2007).

More simply the process could be recognized in terms of "recycling" -- however that might be understood cognitively (David L Barack, *Cognitive Recycling*, *The British Journal for the Philosophy of Science*, 70, 2019, 1; Giorgio Bertini, *Cognitive Recycling*, *Learning Change*, 17 March 2020). Exploiting waste management as a metaphor, this process can be explored in terms of remaindering (*Reintegration of a Remaindered World: cognitive recycling of objects of systemic neglect*, 2011).

Experiential embodiment: Such indications avoid recognition of the experiential challenge of engaging with a complex cycling process and with the cognitive embodiment of "what circulates" as an invariant in the cyclic transformation of perspective. This can be variously discussed (*Circulation of the Light: essential metaphor of global sustainability?* 2010). The latter notes that that metaphor is used to describe a key process (*neidan*), as notably highlighted by Carl Jung and Richard Wilhelm with respect to a Chinese classic, *The Secret of the Golden Flower* (*Tai Yi Jin Hua Zong Zhi*).

The Wilhelm translation is accompanied by a translation of another classic, the *Book of Consciousness and Life* (*Hui Ming Ching*) containing images indicative of the toroidal channel within which the "circulation of the light" takes place in that process. The baseball curve could be recognized as such a "toroidal channel", perhaps appropriately twisted.

Completion: opus, opera and operacy: Other indications are offered by the succession of phases in the creation or execution of an "opus" -- understood as a learning cycle, rather than as the linear framing of stages in implementation of a project. Aspects of this understanding are notably interrelated in the enneagram, held to represent the main stages of any complete process, and related to the notes of a musical octave (Anthony Blake, *The Intelligent Enneagram*, 1996).

Process stages and phases: Of potential interest in relation to any embedding of the Vitruvian archetype within polyhedra such as the icosahedron (as discussed below) is the degree to which a 3D representation of the enneagram is suggestive of the form of the baseball curve. The enneagram was noted as "hanging" within the icosahedron by management cybernetician Stafford Beer. This has been discussed and represented separately in 3D (*Imagining the nature of cognitive "flight" in terms of the enneagram*, 2014). As noted there, Beer describes the enneagram as emerging from collaboration with Joseph Truss -- in a chapter on *The Dynamics of Icosahedral Space* (*Beyond Dispute: The Invention of Team Syntegrity*, 1994, pp. 196-209):

> But it is a matter of great interest that in the whole of the literature... the enneagram occurs as a *plane figure*. Nowhere had there been the slightest hint that a three-dimensional manifestation existed... No wonder the search took so long, given that **the diagram was discovered spread across four vertical planes**... The icosahedron is the actual *origin* of the enneagram... (p. 206, emphasis added)

Varieties of N-foldness: Any comparison of a complete cycle with a musical octave is especially indicative in that it calls for recognition of how such a cycle may be cognitively "segmented" -- as so remarkably rendered explicit by the many tuning systems, so variously appreciated (and deprecated). Such varied preferences in the recognition of completeness can also be explored in terms of the "N-foldness" of ways and means (*Patterns of N-foldness: comparison of integrated multi-set concept schemes as forms of presentation*, 1980).

Pattern that connects: To the extent that the Vitruvian archetype is seen as "facing forward", the associated curve holds implications for what happens "at the back", as evoked above. Given the form of the curve, the explicit separation into distinct portions on the forward side is complemented by the connection between the separate portions of the curve on the hindside -- with the implication that this occurs "at the back of the mind". This is echoed by the manner in which vision through two separate eyes is integrated through the nervous system and the brain to offer a stereoscopic perspective with depth.

This usefully frames the nature and locus of so-called "joined-up thinking" (Rick Lewis, *Joined-up Thinking*, *Philosophy Now*, Nov/Dec 2014; Chris Frith, *Neuroscience: Joined-up thinking*, *Nature*, 2014; Philip Delves Broughton, *Joined-up thinking*, *Financial Times*, 8 June 2011; *Joined-up Thinking*, *Lloyd's News*, 1 December 2014; *EU development policy needs joined-up thinking, say*

MEPs, *European Parliament News*, 25 October 2012). This can be otherwise expressed through the "pattern that connects" -- exemplified here by the role of the twisting nature of the curve. The theme was first evoked by Gregory Bateson (*Mind and Nature: a necessary unity*, 1979) in making the point that:

> The pattern which connects is a meta-pattern. It is a pattern of patterns. It is that meta-pattern which defines the vast generalization that, indeed, it is patterns which connect.

And it is from this perspective that he warns in a much-cited phrase: *Break the pattern which connects the items of learning and you necessarily destroy all quality.* That framing can be variously explored (*Walking Elven Pathways: enactivating the pattern that connects*, 2006; *Configuring the pattern that connects*, 2006).

Whilst the argument with respect to these patterns is indeed speculative, it is useful to recall the manner in which insight of a purportedly higher order has traditionally been indicated by depiction of a halo, notably above and/or behind the head. In some cases this may take the form of the lemniscate (figure of eight) or infinity symbol. These are usefully suggestive of another pattern of connectivity involving a degree of paradox appropriate to the cognitive challenge.

The argument could be developed otherwise in the light of the limited capacity of the brain allegedly employed in normal cognitive processes -- in contrast to extensive capacity seemingly unused. Is this the domain within which the connectivity of patterns is elaborated and recognized -- "at the back of the head"? This allegation has however been challenged -- but without any commensurate understanding of the emergence of creative insight into higher orders of connectivity, or the preference for oversimplification (*Ten percent of the brain myth*, *Wikipedia*). If, as noted above, civilization is indeed "unconscious" to an unfortunate degree, as yet to be understood is "where" such consciousness might emerge (John Ralston Saul, *The Unconscious Civilization*, 1997).

Hypervision? Beyond the optical metaphor, too readily emphasizing "supervision" and the problematic ambiguity of "oversight", reference could be made to the emergent metaphor of "hypervision" (*From sports visors to hypervisors: enabling global governance otherwise?* 2020). This derives from the role of hypervisors in computer technology providing an explicit framework for the management of multiple virtual computers (*Comparison of platform virtualization software*). By analogy, a future Vitruvian archetype could then be understood as a form of platform for virtualization knowledgeware.

Aesthetic attraction of the baseball curve -- and sports visors?

Poetry: The connectivity identified above can be fruitfully framed in aesthetic terms -- as an art, rather than a science. Bateson is again helpful in that respect in explaining why "we are our own metaphor" to a conference on the effects of conscious purpose on human adaptation:

> One reason why poetry is important for finding out about the world is because in poetry a set of relationships get mapped onto a level of diversity in us that we don't ordinarily have access to. We bring it out in poetry. We can give to each other in poetry the access to a set of relationships in the other person and in the world that we are not usually conscious of in ourselves. So we need poetry as knowledge about the world and about ourselves, because of this mapping from complexity to complexity. (Cited by Mary Catherine Bateson, pp. 288-9)

Appropriately the association with "back of the mind" has been explored in such terms (Paige Scott, *In The Back Of My Mind*; Lydia Shivley, *In The Back Of My Mind* ; Aaron Burr, *At The Back Of My Mind*; Jamie P Bazley, *From The Back of My Mind: Poetry*, CreateSpace Publishing, 2015).

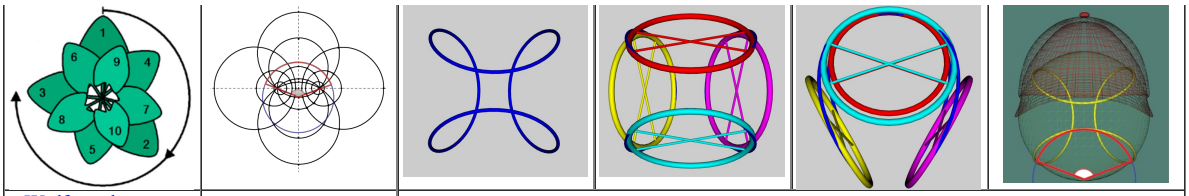
Bateson's argument featured in a discussion of *Poetry-making and Policy-making* (1993). The argument can be developed with respect to the role of *haiku* in enabling such connectivity (*Ensuring Strategic Resilience through Haiku Patterns: reframing the scope of the "martial arts" in response to strategic threats*, 2006).

Golden angle: In the previous discussion it was noted that the jeweller Philippe Mingard deemed the curve to be the "*the manifestation of simplicity and purity incarnate*", as quoted by Robert Ferréol (*Bicylindrical Curve*, 2018). This suggestss that the curve may be related to the golden ratio in some way -- given the latter's long-explored relation to aesthetic perfection, notably in the case of the Vitruvian archetype.

Potentially more relevant, and more provocative, is then the question of the attraction of a baseball cap and any deeper insight into why it is felt to be so "cool" by the wearer. These possibilities can be explored through the golden angle (137.5 degrees) as one variant of the golden ratio, as tentiavely indicated by the following images. That angle is widely noted in the nature in the arrngement of petals, as shown in the image on the right below (Takuya Okabea, *Biophysical optimality of the golden angle in phyllotaxis*, *Scientific Reports*, 2015). It is seldom mentioned that the angle between the upraised arms of the Vitruvian image is 137.5 degrees, depending on how the angle is measured (*The Secret of the Golden Angle*, *Jain 108*).

Three of the images below indicate how four circles can be fitted to the baseball curve in 3D with inflection points spaced 137.5 degrees apart (although confirmation calls for images in 3D of greater precision). Two additional circles (sharing a common centre with the baseball curve) could possibly be angled in relation to gaps of 137.5 degrees on the curve between the circles shown (confirmation requires greater precision). The image on the left shows how views of the baseball cap itself might be framed by a golden angle.

Images variously illustrative of a golden angle					
Petal arrangement	Bipolar coordinates	Placement of circles on baseball curve in 3D			Baseball cap



Wolfgangbeyer at German Wikipedia. / CC BY-SA		Images relating to *Baseball Cap Implications in the Quest for Global Hegemony* (2020)

As noted above, the baseball curve is defined geometrically as a bicylindrical curve, with the variation for which this may allow. Also of relevance is the geometry of a bipolar coordinate system and bipolar cylindrical coorsinates (*Bipolar Coordinates*, *Wolfram Mathworld*). A simplified version is presented above with an indication of how this in turn might involve a golden ratio.

It is appropriate to note the continuing reflections on the possible fundamental relation between the golden ratio and the fine-structure constant of approximately 1/137, as summarized by Michael A. Sherbon (*Fine-Structure Constant from Golden Ratio Geometry*. *Research Gate*, 2018). From a cognitive perspective, such relations might be understood as governing any global insight (*Embodying Global Hegemony through a Sustaining Pattern of Discourse: cognitive challenge of dominion over all one surveys*, 2015).

Clues to 3D representation from 2D Vitruvian commentary

As noted above, Leonardo da Vinci's depiction has evoked considerable commentary from a wide range of perspectives, speculative or otherwise -- many with elaborations of the geometry implied by the original image. These include:

- Leno Mascia:
  - *A Vitruvius Inspired Criterion for the Construction of Polygons* (*Nexus Network Journal*, 18, 2016)
  - *Observation on the Geometry behind the Design of the 'Vitruvian man' by Leonardo da Vinci* (June 2018)
- Vitor Murtinho: *Leonardo's Vitruvian Man Drawing: a new interpretation looking at Leonardo's geometric constructions* (*Nexus Network Journal*, 17, 2015)
- Margarita Fernandez: *Da Leonardo a Barbaro: Lettura Grafica dell'Uomo Vitruviano* (*Disegnare. Idee immagini*, 16, 2005, 2)
- F. Manenti-Valli: *Per una Rivisitazione Matematica dell'Uomo Vitruviano*. (In: Approfondimenti sull'Uomo Vitruviano di Leonardo da Vinci, 2014)
- Kelly Richman-Abdou: *The Significance of Leonardo da Vinci's Famous "Vitruvian Man" Drawing* (5 August 2018)
- C. Lance Harding: *Mysteries of the Vitruvian Man* (*Academy of Sacred Geometry*, 9 April 2014)
- Rocco Sinisgalli:
  - *Playing With Leonardo: The Vitruvian Man* (Federighi Editori, 2010)
  - *The Vitruvian Man of Leonardo: symbol of Western Civilization* (Federighi Editori, 2006)
- Toby Lester: *Da Vinci's Ghost: obsessions and how Leonardo created the world in his own image* (Free Press, 2012).

Despite the explicit use of a square as a frame in the image, it is noteworthy how the image has been variously held to imply (or be the basis of) construction of pentagonal, hexagonal, heptagonal and octagonal frames, most explicitly articulated in the work of Leno Mascia.

The following comments on the image derive from earlier discussion (*Embodying topological succinctness beyond questions* (in *Embodying a Hypercomplex of Unhygienic Nescience: questionable connectivity enabling apprehension of matters otherwise*, 2014)

Embodying the world: The point may be made otherwise by reference to Leonardo da Vinci's famed Vitruvian Man -- framed by "architectural" proportions. As encompassed architecturally in the image, the human being could also be understood as "incarcerated" or "entombed", if only cognitively.

It is in this sense that the ring encircling the Vitruvian Man can be explored with respect to separate arguments regarding the "The-O ring" (*The-O Ring and The Bull Ring as Spectacular Archetypes: dramatic correlation of theatre, theory, theorem, theology, and theosophy*, 2014). As stated there, the argument could be caricatured by an adaptation of the title of a famed study of psychotherapy: *We've Had a 1000 Years of Theo -- And the World's Getting Worse*.

The Vitruvian Man is widely used to illustrate the principle of ***man as the measure of all things*** -- provocatively excluding "woman", or seemingly so. It is indicative of how "everything" is reflected, or mirrored, in man -- especially in terms of comprehension -- most notably in the light of arguments made by George Lakoff and colleagues (*Philosophy In The Flesh: the embodied mind and its challenge to western thought*, 1999; *Where Mathematics Comes From: how the embodied mind brings mathematics into being*, 2001; *Women, Fire, and Dangerous Things: what categories reveal about the mind*, 1987). This is suggestive of how humans might "embody" the world -- even creatively *Envisioning and Embodying a New World*, (as was the theme of the 2014 gathering of the Scientific and Medical Network).

Challenging embodiment: The extent to which Vitruvian Man has exemplified the problematic insensitivity highlighted by feminist scholars has been fruitfully discussed by Thomas Spitzer-Hanks (*As Through a Glass, Darkly: abjection and masculinity in narrative*, 2010):

> In his guise as universal ideal Vitruvian Man explains the cosmos, the divine, and the orderly relations between the two as a function of specificity disingenuously subsumed in supposedly objective, representative humanity. He is the perfect thinker whose body does not matter... the expression of ideal genetic potential towards which humans should strive. In his relation to mathematics and science he is the embodied virtue of objectivity, the 'logic of the One' clothed in flesh and thus the ideal

> scientist, philosopher,and statesman.

Spitzer-Hanks then articulates the challenge to this interpretation:

> However, there is another way of reading Vitruvian Man. He can be read as symbolic of the male as the pinnacle of the human, the white as the pinnacle of the ethnic, and the phallus as the safe, symbolic stand-in for the messy, intractable penis. In fact Vitruvian Man is an incarnation of the ancient Greek ideal of the *kalagathon* (Margaret Morse,1983).

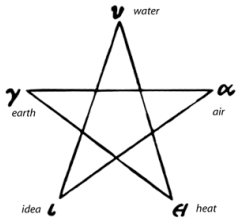
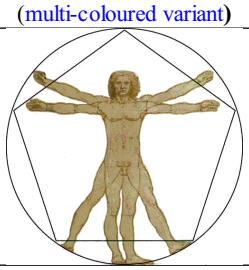
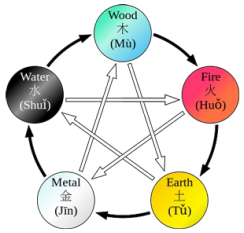
He continues:

> Vitruvian Man is thus shown to be an index of the normative power of white masculinity, linked to scientific knowledge, social control and political-imperial application of that power. In his guise as ideal he leads the way towards patriarchal assumptions about gender, ethnicity, sexuality, and social order that privilege the human only in as much as it resembles the kalagathonic ideal, and offers the seductive vision of perfect sight, perfect knowledge, and absolute Truth.

This plays out in the contrast between the worldwide attention invested in the FIFA World Football Cup for men and that for women -- of which few are aware -- in a period of bloody regional conflicts. As a preliminary exercise, "Vitruvian Man" can be embedded in an animation (below) with "Vitruvian Woman" -- in which the skin colour of both is changing. Skin colours could have ranged through those of the von Luschan scale or those of the Fitzpatrick scale. However the point is perhaps better made by the addition of unusual skin colours for both.

Human mirroring: The challenge of succinctness remains -- especially worldwide comprehension of the world in all its complexity, under the conditions of information overload noted above. It is in this respect that Vitruvian "Man" is only partially indicative of a human being as constituting what is effectively a cognitive mapping surface -- understood through topological forms of requisite complexity. However, with its associations to vitrification, mirrors and glass ceilings, there is a need to shatter the mirror, or to step through it in some "magical" way (*Stepping into, or through, the Mirror: embodying alternative scenario patterns*, 2008). The static ideal image clearly fails to take account of "black", "female", and multiple variants, which together contribute to the challenging dynamics with which people are faced.

Various pentagonal symbols can obviously be seen as reflective of alternative appreciations of that pattern, as separately discussed (*Cycles of enstoning forming mnemonic pentagrams: Hygiea and Wu Xing*, 2012). The point may be made otherwise by an adaptation of the Vitruvian archetype as reproduced below from an earclier exercise (*Embodied and emergent symbols: Christian cross, rose windows, mandalas and Wu Xing?* 2017).

Complementary pentagonal configurations		
Hugieia Pentagram of Pythagoreans	**Vitruvian Animation -- man/woman** (multi-coloured variant)	Chinese 5-phase Wu Xing cycle
		
Reproduced from Hygiea entry in Wikipedia (G. J. Allman Greek Geometry From Thales to Euclid, 1889, p.26) ***with labels added***	Adapted from that of Leonardo da Vinci	*Adapted from Wu Xing entry in Wikipedia* ***Interaction arrows:*** *black=generating; white= overcoming*

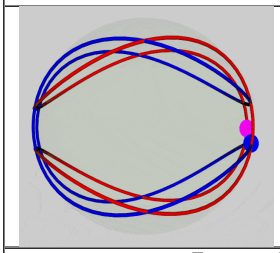
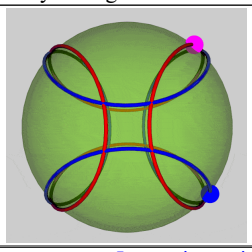
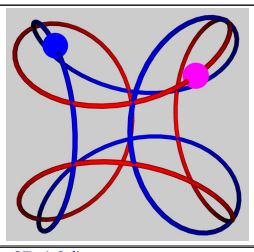
Alternative framings of the Vitruvian archetype -- polyhedral and otherwise?

Rotation of curve: As presented in the animations above, the rotation of the curve is a contrast to two distinct static presentations, one with the curve appearing to be split vertically (in front) and the other with the curve split horizontally (in front) -- both cases presenting alternatives (from the back). The examples given evoke reflection on the cognitive investment binary division and the challenge of any integration.The examples are especially provocative with respect to the cognitive significance in the genital case -- given the importance attached to that distinction and its physiological form.

Less evident is the significance to be attached to the rotation of the curve -- especially given the possibility of rotating it in the opposite direction-- symbolism? rotate tennis -- clockwise versus anti-clockwise. These considerations frame the problematic cognitive engagement with "otherness" and the fundamental challenge it continues to represent, despite arguments to the contrary (*Elaborating a Declaration on Combating Anti-otherness -- including anti-science, anti-spiritual, anti-women, anti-gay, anti-socialism, anti-animal, and anti-negativity*, 2018; *Oppositional Logic as Comprehensible Key to Sustainable Democracy: configuring patterns of anti-otherness*, 2018; *Encountering Otherness as a Waveform -- in the light of a wave theory of being*, 2013).

Curve reversal: A previous exercise presented animations with a second curve -- reversed, as shown below. This option could be integrated into the animations presented above. Of some interest would then be any implications of the curves rotating in opposing directions.

The manner in which the two curves can together frame a perspective was considered previously in terms of the protective cage design on a baseball catcher's helmet.

Combination of one baseball curve with its reversed form (with spheres shown travelling along each)		
Animations of coherent mutually orthogonal views		Twisted view
		
For smooth movement see Interactive variant in 3D (x3d)		

Movement around the curve: Narratives in relation to the curve can be enriched by showing small spheres travelling around it (as above). This enables the possibility of having two such spheres on the same curve, possibly suggestive of:

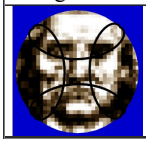
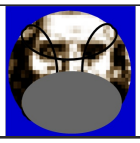
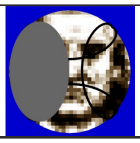
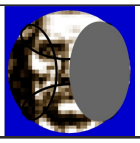
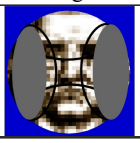
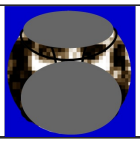
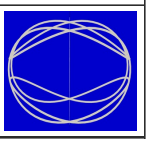
- travelling in the same direction but from opposite sides of the curve, namely 180 degrees apart and never to meet
- travelling in opposite directions and meeting at opposite points on the curve -- usefully recognizing any sense of coming into focus, as with the manner in which the two eyes are focused or failing to do so as with the cognitive implications of being "cross-eyed" or "squinting"
- in the case of two such curves (as indicated above), more complex cases can be portrayed

Movement up/down the spine: The vertical positions along the spin of the Vitruvian archetype could be transformed from static locations to movement up or down the spine. Just as the static positions lend themselves to interpretation in terms of the chakra system, such movement could be understood in terms of the dynamics of the associated kundalini process with all its cognitive associations.

More intriguing, if only as an exercise in representation, is the sense in which that movement is not "up/down" but is understood in cyclic terms, with some kind of hyperdimensional link between the head locus and and that of the genitals, as potentially implied in a separate exercise (*Global Insight from Crown Chakra Dynamics in 3D? Strategic viability through interrelating 1,000 perspectives in virtual reality*, 2020)

Selective masking of the Vitruvian worldview

The following set of images speculatively frames the head of the original Vitruvian image within the baseball curve and its reversal (as shown above). That on the left recalls the protective masking of security forces worldwide -- and of the baseball catcher's helmet. The framework can be used as a mnemonic device to represent the variety of forms of masking which are currently so controversially evident in society. That on the far right is a side view of the double curve (as shown above) -- the 2D image of the head appropriately invisible as a consequence of the rotation of the framework in 3D.

Illustrative strategic constraints on the Vitruvian worldview -- framed by two baseball curves							
Protective grid?	Expression Infection	Blindness Justice?	Right-wing alternatives	Left-wing alternatives	Blinkered strategies?	Total face cover	Side-view?
							

Each image lends itself to reflection and commentary from a strategic perspective. The set of masks recalls the traditional image of the three wise monkeys, as featured separately with a fourth (*Monkeying with Global Governance: emergent dynamics of three wise monkeys in a knowledge-based society*, 2011).

Three Wise Monkeys	**And the Fourth?**	
		*With a sly grin upon his face* *This monkey sits* *Upright and true,* *With his hands covering* *His private place,* *So no evil,* *Shall come to you.* *(On The Fourth Monkey)*

Vitruvian hyperdimensionality: eight limbs, not four?

The question of whether humans are most appropriately understood in 3D, has been variously challenged -- just as it is appropriate to challenge any 2D "paper cut-out" depiction, however its higher dimensionality is implied, imagined or interpreted. Examples are: Ron Atkin (*Multidimensional Man; can man live in 3-dimensional space?* 1982; Antonio de Nicolas, *Meditations through the Rig Veda: four-*

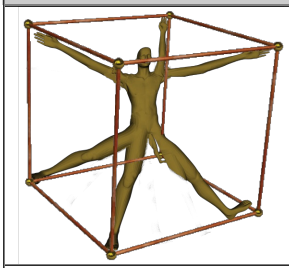
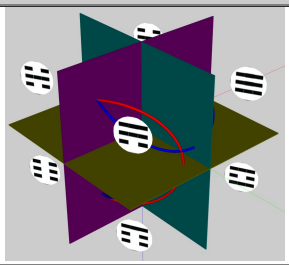
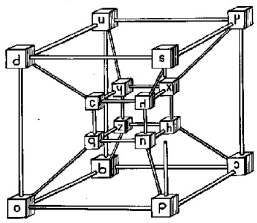
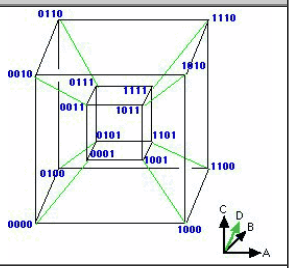
dimensional man, 2003). The possibility has invited a wide range of speculation as an extension of the inspiration for sacred geometry offered by the Vitruvian archetype. Potentially most coherent are the implications argued by Alexander Wendt (*Quantum Mind and Social Science: unifying physical and social ontology*, 2015).

With respect to any hyperdimensionality, much could be made in representational terms of the depiction of the Vitruvian archetype as possessed of eight limbs rather than four. Whereas four of the limbs are allusively associated with the corners of the square in the original image, any expansion of that square into a cube in 3D could suggest that the eight limbs are associated with its eight corners -- however improbably.

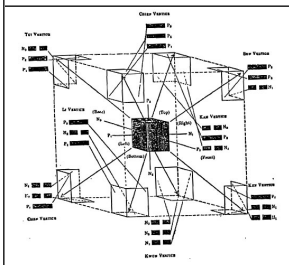
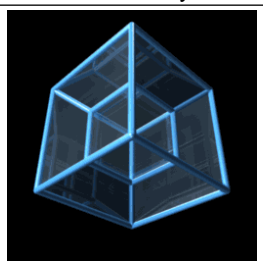
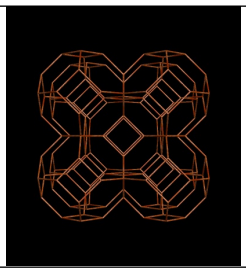
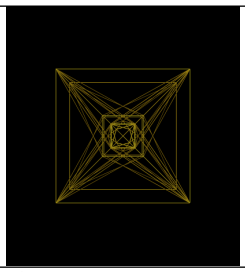
The seemingly improbable "octopoid" configuration of the Vitruvian archetype (below left) is of questionable significance in conventional terms. However, as shown below (second from left), the pattern is consistent with the previous discussion of the manner in which the curve passes through eight octants (*Non-linear pathways curving between octants*, 2020). The association of the limbs with the eight corners of a cube recalls the strange references in Buddhism to the Noble Eightfold Path -- strangely echoed in contemporary secular articulations (Eightfold Way of physics, and Eightfold Way of policy analysis).

The pattern acquires particular legitimacy in the light of oppositional geometry and the manner in which it highlights the role of the tesseract (namely a cube in 4D) as a means of holding the set of Boolean logical functions, as indicated on the right below. The images are reproduced from a separate discussion (*Reframing forms of connectivity through the logic of oppositional geometry*, 2020).

The credibility of the configuration is further increased when the "limbs" are understood as relationships taking dynamic form, namely alternate connections with particular modalities. The physical embodiment of limbs is of course primarily characterized by their dynamic functions rather than that suggested by any (Vitruvian) static posture. This dynamic is most evident in dance -- suggesting that any eightfold hyperdimensional relation could be more fruitfully understood as an imaginative "cognitive dance" (*Reframing an eightfold way by entangling imagination and reality?* 2019).

8 Vitruvian "limbs" in relation to a cube	Octant model with 2 curves (trigram encoding)	Logic Alphabet Tesseract - a four-dimensional cube (see coding) by Shea Zellweger	Venn diagram as 4D cube by Tony Phillips
			
"Repositioning" of the limbs in the 2D depiction	Interactive variant in 3D (x3d)	Diagram by Warren Tschantz (reproduced from the Institute of Figuring) .	Edges going off in the 4th dimension are shown in green.

The use of the Chinese trigram coding in the image above can be found in an earlier presentation of such a pattern (below left). With the "limbs" understood as a form of connectivity, comprehension of the cognitive relation between an "inner" cube and an "outer: cube (as depicted above right) can then be suggestively depicted in animations suggestive of 4-dimensionality (as below). The animations on the right (below) offer other clues to imagining any such eightfold "meta-organization", reproduced from separate discussions (*Challenge of mapping 144 distinct forces in 3D*, 2020).

Cubical representation of *BaGua* pattern of *I Ching*	**Tesseract animation** simulating requisite 4-dimensionality?	**Truncated octahedron 8** Rotating wireframe	**Truncated octahedron 8** (dual) Rotating 4-fold perspective
			
From Z. D. Sung, *The Symbols of Yi King or the Symbols of the Chinese Logic of Changes* (1934, p. 12)	by Jason Hise [CC0], via Wikimedia Commons	Generated using Stella Polyhedron Navigator	

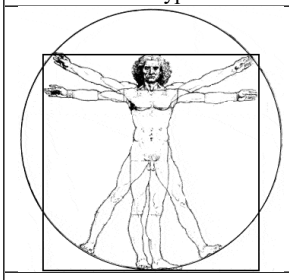
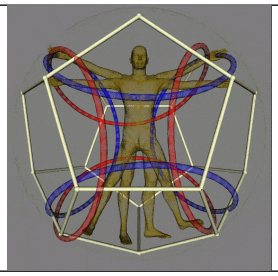
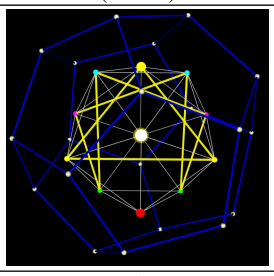
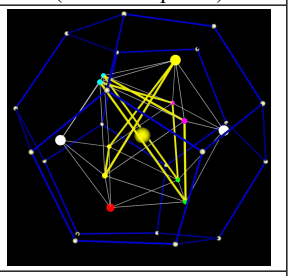
Cube inversion/eversion: The animation above of the otherwise unimaginable transformation of a tesseract, is suggestive of another consideration of potential significance. Whereas the Vitruvian archetype might indeed "hold onto" each corner of the inner cube, the manner in which this transforms into an outer cube is of significance in its own right. This goes to the heart of any cognitive appreciation of the relationship between insideness and outsideness, as can be variously discussed (*Cognitive Osmosis in a Knowledge-based Civilization: interface challenge of inside-outside, insight-outsight, information-outformation*, 2017; *Global potential for living sustainably "outside-inside"*, 2013).

In terms of any animation, this is tantalizingly represented by the conventionally unimaginable process of sphere eversion (turning a sphere inside out), or a similar process with respect to a cube (cube inversion), as presented separately (*Inversion of the cube and related forms: configuring discourse otherwise?* 2018). Could the Vitruvian archetype be better recognized as invariant at the centre of such transformation?

Association of baseball curve with polyhedral framing of the enneagram?

The circle in the original Vitruvian image lends itself to exploration as a sphere in 3D, as variously indicated above. Similarly the square in the image can be explored as a cube (as above), with the possibility that it might take other polyhedral forms. In 2D this is suggested by the animation below left. One 3D experiment is indicated below using the dodecahedron.

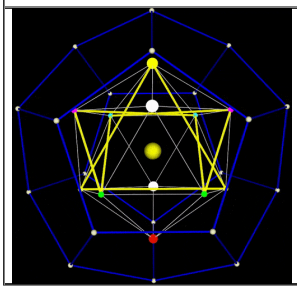
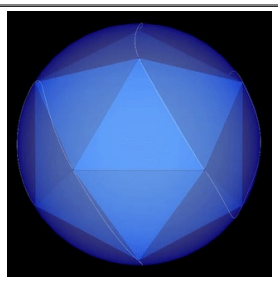
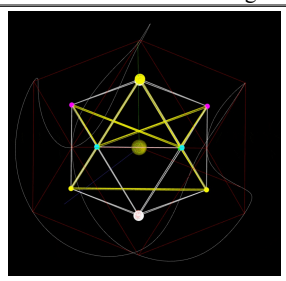
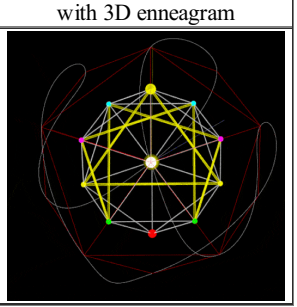
Potentially far more intriguing, is the embedding of the 2D enneagram as a 3D structure within the icosahedron (as noted above from the cybernetic work of Stafford Beer, on *Beyond Dispute*, 1994). Its relation to the dodecahedron would follow from the fact that the dodecahedron is a dual of the icosahedron. The 9 vertices, with which the 3D enneagram is associated in the icosahedron, would then correspond to 9 face centres of the dodecahedron. An icosahedron could be nested within a dodecahedron to illustrate this as shown (below right, and in the animation which follows).

Vitruvian framings -- from 2D to 3D -- to enneagram?			
Animation of alternative polygonal framings of Vitruvian archetype	Animation of Vitruvian archetype within a dodecahedron	3D Enneagram in icosahedron within dodecahedron ("front")	3D Enneagram in icosahedron within dodecahedron ("side" -- 4 planes)
			
	Interactive models in preparation		

Also intriguing, given the unique role played by the "superior" vertex of the enneagram is the sense that there would be 12 icosahedral vertices with which an enneagram could be associated, thereby potentially nesting 12 enneagrams within either the icosahedron or the dodecahedron. Either of these would then suggest a 108-fold pattern of communications -- somewhat ironic, given the number of stitches required for the curve on a baseball.

The symmetry of the rotation of the icosahedral enneagram (below left) somewhat obscures the structure of the enneagram as recognized in 2D and as shown above. That perspective is offered when the structure is tilted such that the two white spheres are aligned with that at the centre. As shown, the four planes recognized by Stafford Beer are however clearly visible during the rotation.

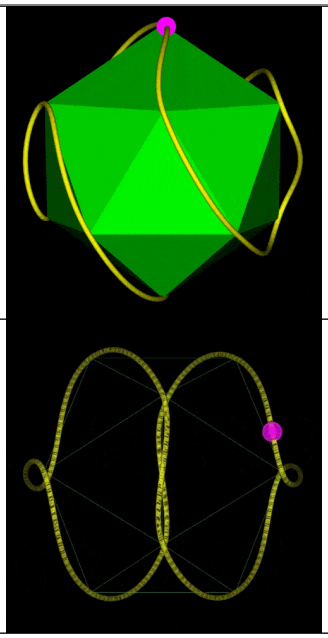
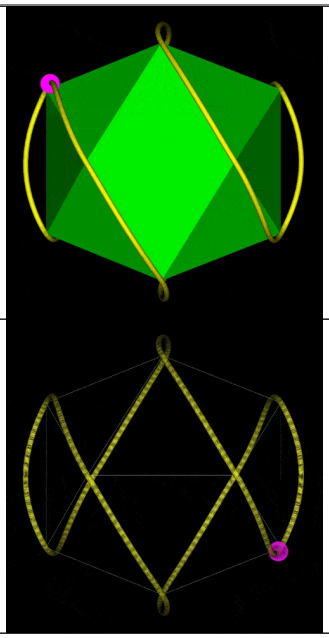
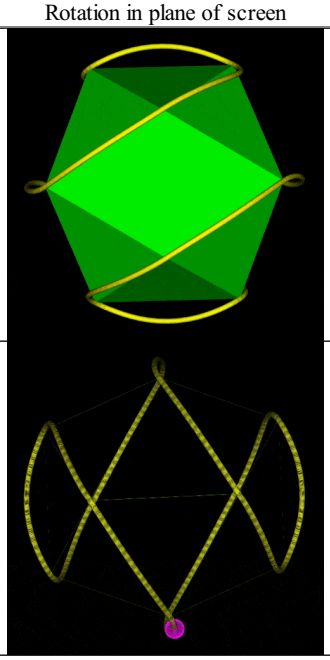
Taking the exploration further with respect to the baseball / tennis curve, Sergey Bederov of Cortona 3D kindly produced a 3D icosahedron with a single spherical curve passing through all 12 vertices of an icosahedron (as shown below). This is not create a true tennis curve since some asymmetry was introduced; nevertheless, the curve possesses rotational symmetry and divides the sphere into two identical areas. The 3D enneagram pattern of connections between 9 vertices of the icosahedronm could then be embedded in that model as shown in the animations on the right.

Animation of 3D enneagram ("tilted") in icosahedron within dodecahedron	**Curve passing through all icosahedral vertices**		
	Rotation of icosahedron with solid faces	Horizontal rotation of icosahedron with 3D enneagram	Vertical rotation of icosahedron with 3D enneagram
			

Such speculation can be taken further in the light of a degree of similarity between the form of the enneagram and the form of the baseball curve. The generalization of the baseball curve, illustrated in the earlier animations (and in the separate interactive 3D version), suggests the possibility that those phases (passing through that of the baseball curve) may successively interrelate distinctive points on a polyhedron such as the dodecahedron or the icosahedron.

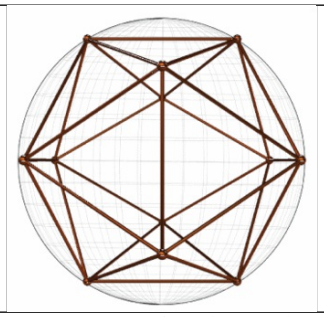
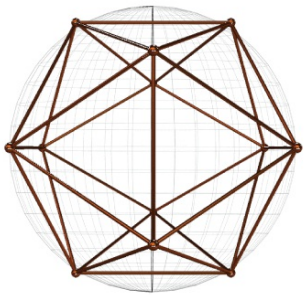
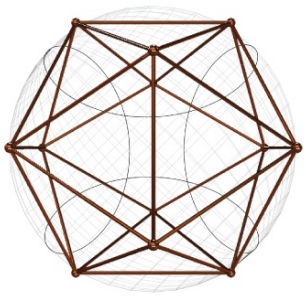
The remarkably elegant animation (in blue above) by Sergey Bederov of Cortona 3D can be adapted as variously shown below to highlight possibilities associated with the passage of a single spherical curve through all 12 vertices of an icosahedron. The curve is especially suggestive in interrelating coherently the strategic and other patterns of items which are typically only presented as simple lists (*Checklist of 12-fold Principles, Plans, Symbols and Concepts: web resources*, 2011).

Animation of single curve passing through the 12 vertices of an icosahedron (selective)
(adaptation of the model of Sergey Bederov of Cortona 3D, with wireframe variant below)

Vertical rotation	Horizontal rotation	Rotation in plane of screen
		

Some further sense of this possibility is offered by reproducing the earlier animations -- but with an icosahedron superimposed (as crudely shown below). This would then imply that (in 3D) particular settings of that generalization might well correspond to both the enneagram points on the icosahedron and to the baseball curve -- if not to both simultaneously. Exploring this would require further development of the interactive hypotrochoid (as used to produce the screen shots for the animations below).

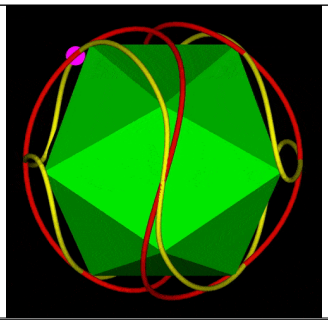
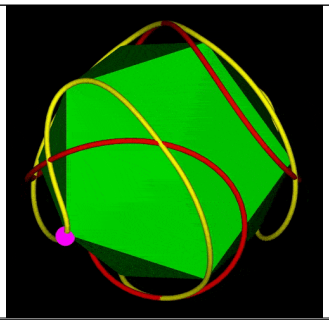
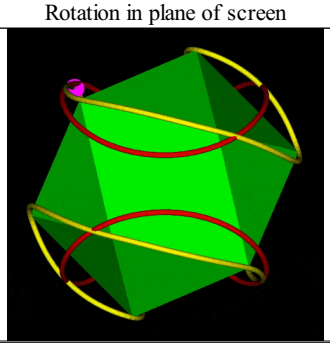
Adaptation of synchronized animations of transformations of generalized baseball curve in 3D
(with mutually orthogonal views of specific curve on right)

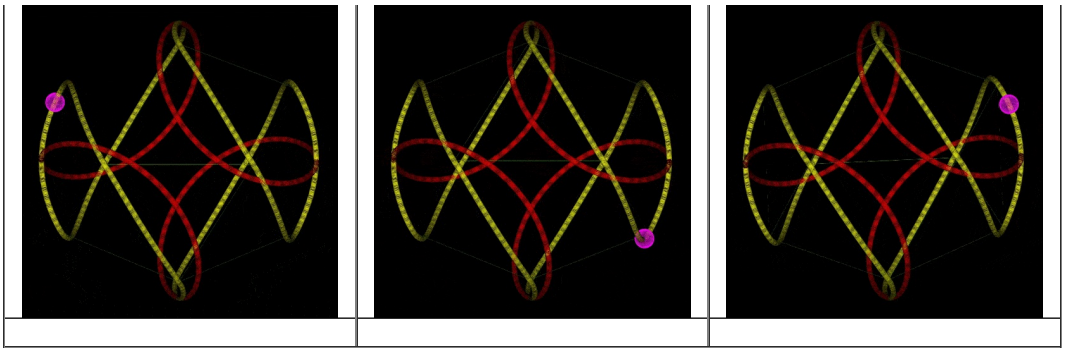
"Front" view	"Side" view	Baseball / Tennis ball curve
		

Adaptation of animated sequences of screen shots of phases from the interactive model

Further clarification of the possible relation between a generalization of the baseball curve and the icosahedral 12-vertex curve is indicated by the following. The animations without transparent faces highlight the fact that the red baseball curve does not pass through the vertices of a polyhedron like the yellow curve -- although **they suggest that with slightly different parameters it would indeed do so** (whether this is a trivial conclusion in terms of spherical geometry is yet to be clarified). The wireframe animations are especially intriguing in the light of the visual interplay between the two curves through the transparent models.

Animation of single yellow curve passing through 12 vertices of an icosahedron with baseball curve (red)
(adaptation of the model of Sergey Bederov of Cortona 3D, with wireframe variant below)

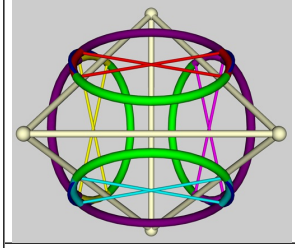
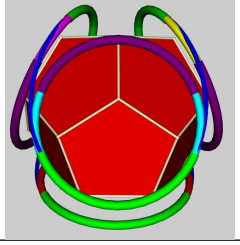
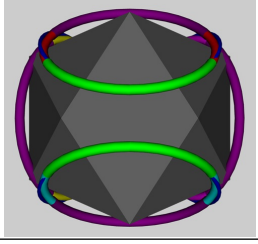
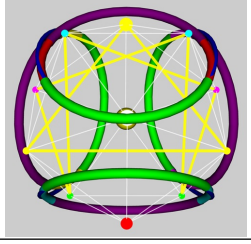
Vertical rotation	Horizontal rotation	Rotation in plane of screen
		



An animation above showed the positioning of 4 circles on the baseball curve such that an arc on each circle formed a golden angle. That process can be continued as shown below left, where the portion of the curve forming a golden angle is coloured bright green on all the circles (superimposed on the underlying curve in blue). A complementary portion of each circle (unrelated to the curve) is colured dark mauve, thus associating 8 golden angles with the baseball curve -- 4 explicitly and 4 by implication. It should be stressed that **any such association is an approximation in geometrical terms**, presented here in an exploratory mode.

Surprisingly the manner in which the circles are angled to each other appears to match the sides of a tetrahedron to some degree, as shown below left. As indicated above, the parameters used for the baseball curve could then be considered slightly incorrect -- or else the imperfection of the match is due to unresolved issues of orientation (although **any apparent match may indeed be simply fortuitous**).

The tetrahedron can be replaced by the icosahedron which featured in the animations above, as shown in an image below. Again the question arises as to the reason for the degree of mismatch. The same is the case when the dodecahedron is substituted. Given the relation of the enneagram to the icosahedron noted above, the exploration can be continued with the integration of the enneagram, as shown below left.

Association of arcs of circles with baseball curve thereby highlighting golden angles (tentative) (arcs coloured green follow the baseball curve; dark mauve arcs do not)			
Relation to tetrahedron?	Relation to dodecahedron?	Relation to icosahedron?	Relation to enneagram?
			

If the seam curves of the baseball and tennis ball can indeed be associated with the three Platonic polyhedra in this way, this would clearly call for further consideration of the global patterning they imply -- despite the manner in which the balls are most frequently used. In the tetrahedral case, for example, the transition from the orientation of the plane of one face to another by the curve recalls the role of gravity assist in interplanetary sling shot manoeuvres of spacecraft. It is noteworthy that such dynamics are a feature of the Interplanetary Transportation Network and are variously evoked in a gravity simulator at the heart of a popular smartphone game by which eight planets are positioned (*Orbit Playing with Gravity*).

Re-membering the globe through re-threading the Roman dodecahedron?

An earlier exercise explored the need at this time for mnemonic clues to connectivity (*Time for Provocative Mnemonic Aids to Systemic Connectivity? Possibilities of reconciling the "headless hearts" to the "heartless heads"*, 2018). That noted a mysterious legacy of the Roman Empire, the so-called Roman dodecahedron (*Roman dodecahedron, Chinese puzzle balls and Rubik's Cube?*, 2018).

Roman dodecahedron	**Chinese ivory puzzle ball**	**Neolithic carved stone ball**
		
By Lokilech [GFDL, CC-BY-SA-3.0 or CC BY-SA 2.5],from Wikimedia Commons	British Museum [CC BY 2.0], via Wikimedia Commons	National Museums of Scotland, via Wikimedia Commons

Given the argument above, the question is whether there is any evocative relationship to be explored between "re-membering" the globe for purposes of future governance and a relic of global form -- of unknown purpose -- from one of the most coherently organized empires of the past.

The animations above focus on the icosahedron, with some reference to the dodecahedron as its dual. The curiously curving pathway between the 12 vertices of the icosahedron necessarily correspond to those between the 12 faces of the dodecahedron. The Roman artefact has a single hole in each face, surrounded by the 20 vertices corresponding to the faces of the icosahedron.

The curve between the icosahedral vertices can then be understood as passing into, or out of, each hole of the dodecahedron -- perhaps winding around the vertices rendered so prominent in the artefact. Speculation with regard to the original use of the artefact has mentioned weaving or knitting (*Knitting with the Roman dodecahedron*, *YouTube*, 1 July 2014; Martin Hallett, *Has The Roman Dodecahedron Mystery Been Solved? YouTube*, 3 June 2014).

Given the possible interplay between the baseball curve and the icosahedral curve -- as yet to be further clarified -- it is appropriate to recall the symbolic pattern shared between that curve and circlets of prayer beads. There are 108 double stitches on a baseball, a number variously celebrated in baseball culture (*How Many Stitches on a Baseball*, 13 July 2020; Ron Darling, *108 Stitches: loose threads, ripping yarns, and the darndest characters from my time in the game*, 2019).

The number 108 is considered sacred in many Eastern religions and traditions, such as Hinduism, Buddhism, Jainism, Sikhism and connected yoga and dharma based practices (*What is the significance of '108' beads in the rosary (japmala)? Hinduism Stack Exchange*; *Why is there 108 beads in a japamala (Rosary)?* 22 February 2017; *The Magic Number 108 in all Religions*).

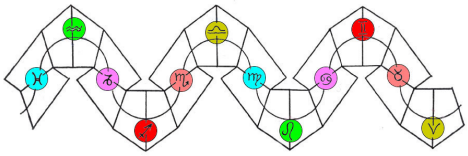
There is a strange coincidence to the correspondence between the 108 stitches in the baseball and the number of prayer beads in the rosaries of many religions. Any such correspondence has been strongly denied in the case of the Catholic rosary which has a more limited number of beads (*There's 108 beads in a Catholic rosary and there's 108 stitches in a baseball: What does it mean?*, *Yahoo Answers*). It has however been argued that the 59 prayer beads of Christianity, being half 108, reduces the length to manageable proportions for purposes of prayer and any associated chanting (*The Structure of the Rosary*, *Dynamic Catholic*). In the light of the argument here, it is however certainly bizarre that there are precisely 59 stellations of the icosahedron (H. S. M. Coxeter, et al, *The Fifty-Nine Icosahedra*, 1938).

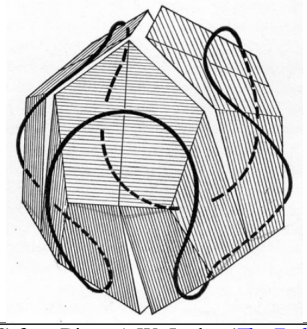
Clearly, for many at least, circlets of prayer beads offer a quite distinctive approach to "re-membering" what can be understood as "globality" in a cognitive, spiritual and symbolic sense. The possibility merits exploration, as argued separately (*Designing Cultural Rosaries and Meaning Malas to Sustain Associations within the Pattern that Connects*, 2000; *Wholth as Sustaining Dynamic of Health and Wealth: cognitive dynamics sustaining the meta-pattern that connects*, 2013).

Can a circlet of prayer beads be understood as somehow taking both the form of the baseball curve and of the 12 sinusoidal loops of the icosahedral curve? In the case of the latter, this would imply 9 beads per loop to form 108 -- already partially suggested by the segmentation in the animations. Also intriguing is the manner in which such looping frames a 20-fold pattern, whether of dodecahedral vertices or icosahedral faces -- especially in the light of the proclivity for 20-fold patterns of operacy (*Requisite 20-fold Articulation of Operative Insights? Checklist of web resources on 20 strategies, rules, methods and insights*, 2018).

Further pointers to such a dynamic framing are provided (as mentioned above) in the discovery of cube eversion by Paul Schatz (*Rhythm Research and Technology: the evertible cube / polysomatic form-finding*, 2013), as indicated by the following images and separately explored (*Eliciting the dynamics of the cube: reframing discourse dynamics*, 2000). As noted above, a potentially related pointer is offered by the cybernetic focus on the 30 edges of the icosahedron by Stafford Beer (*Beyond Dispute*, 1994) -- edges which are common to the dodecahedron.

Exploring a possible wave pattern relating zodiac functions on a dodecahedron
(showing a curve potentially comparable with portions of the baseball curve)





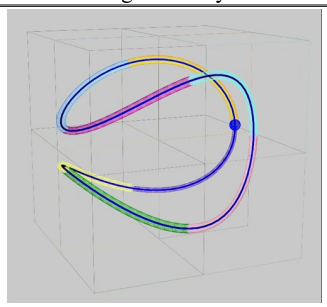
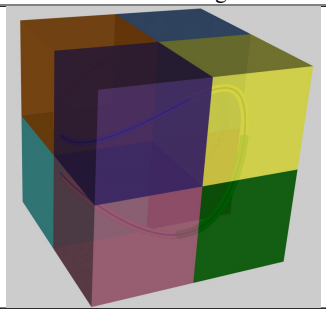
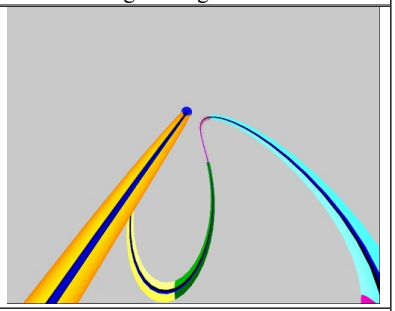
Images by Paul Schatz (*Verlag Freies Geistesleben*, 1975, p.38) from Dieter A.W. Junker (*The Zodiac Dodecahedron*, *flyping-games*, 2004). Original image on left modified with the addition of colours

Envisaging and enabling "riding a cognitive wave"

As suggested above, the curve can be understood as a form of sinusoidal cognitive wave -- wending its way through eight "octants" in succession. It is then of interest as to how 3D information techniques could be used to visualize this most appropriately -- given the options offered by such applications and the constrained ability to communicate the result via web documents. A particular feature of interest. in relation to the movement of a small sphere along the curved pathway, is how a "viewpoint" can be associated with that movement such that the observer moves around the curve with the sphere -- "riding the wave".

Additional features of interest are how portions of the curve, passing through different octants. might then be distinctively coloured to emphasize distinctive cognitive modalities -- as suggested above, and as associated with the indicated Chinese trigram encoding. In the latter case the observer could be said to be taken through an eightfold *BaGua* sequence. A further possibility is to include a second (reversed) curve as shown above, but with the probability of then over-complexifying the imagery. Typically the software enables certain features to be rendered transparent or to offer a wireframe variant.

The following images are necessarily preliminary experiments in 3D visualization. That on the left shows a "viewpoint" (or point of perspective) travelling around the baseball curve -- divided into eight coloured segments. These correspond to the octants which feature in the central animation (although colour coordination with that on the left has not been ensured). The animation on the right is from the perspective of an observer directly associated with the sphere as it moves around the curve -- offering the suggestion of a cognitive roller-coaster, and riding a cognitive wave (again coordination with the movement in the other two animation shas not been ensured).

Animations indicative of the operation of a cognitive "roller-coaster"		
Curve segmented by octant	Animation showing cube	Riding the cognitive wave
		
Model benefitting from the advice of Sergey Bederov of Cortona3D		

In the light of the argument distinguishing some octants as inherently associated with "consciousness" from those potentially associated with "unconsciousness", it is possible to selectively darken those at the back of the image ("back of the brain"), or those in the lower portion of the image (a "netherworld"), or those on the left (as being "sinister), or on the right. In passing through those zones, the curve would then recall the role of tunnels through which a roller-coaster may travel. This option, as with introducing a second curve, has been omitted to avoid over-complexifying the above animations -- anyway better appreciated in their interactivee forms.

Further experiments may suggest ways of enhancing the sense of "riding a cognitive wave'. Given the argument, notably associated with the enneagram, that the phases could be associated with the notes of an octave, exploration of the use of distinctive sounds could be made for each stage of the curve.

Possible "Vitruvian" narratives with psychosocial and symbolic implications

The concluding animations above with a "global focus" help to frame the question of the nature of any symbolic narratives which might be imaginatively associated with them -- but with a cognitive significance. In the absence of any cognitive symbol of global significance equivalent to the Vitruvian significance for architecture, there is a case for exploring how this "void" could be understood as currently filled by other forms -- imaginary or otherwise.

In the case of the "head focus" above, there is a case for reconciling currently imagined "headgear" with the 3D animation of the ball seam curve . Examples might include:

- the exercise with a baseball cap in the earlier exercise (*Baseball Cap Implications in the Quest for Global Hegemony: comprehension of elusive order through the dynamics of angels and demons*, 2020)
- the protective implications of the headgear of security forces and the helmet of the baseball catcher (*Systemic and cognitive implications of baseball cap framing?* 2020)
- the increasingly common depictions of protective headgear required in order to handle hazardous materials, most obviously of a biochemical nature. With the current worldwide focus on face masking against any biological virus, this is curiously suggestive of a corresponding trend towards protection against any memetic virus (*COVID-19 as a Memetic Disease -- an epidemic of panic*, 2020; Richard Dawkins, *Viruses of the Mind*, 1991)
- widespread common depictions of the helmets required by astronauts with any need for extravehicular activity (extensively celebrated in popular movies). The development of the spheroidal dome helmet is recognized as a key to balancing the need for field of view, pressure compensation, and low weight. One inconvenience with some space suits is the head being fixed facing forwards and being unable to turn to look sideways. Astronauts call this effect "alligator head".
- ancient cone-shaped heads of traditional civilizations:
  - Robert D. Martin: *Strange Head Shapes: Revisiting Nefertiti, Akhenaten and Tut* (*Psychology Today*, 30 July 2019)
  - Rita Maria Bargash: *Why did ancient Egyptians like Nefertiti have long heads?* (*Quora*, 1 May 2019)
  - Rita Louise: *The World-wide Mysterious Phenomena Of Elongated Skulls* (*Ancient Origins*, 17 October 2013)
- imagined forms of extraterrestrial heads, most notably inspired by conspiracies with regard to the cone-headed shapes of the previous point
- adoption of winged helmets in sports involving violent contact, following traditional depictions of their use by legendary figures and deities

The possibility of a dynamic of the latter kind has been evoked in the imaginative design of a "machine" for spacetime travel in a science fiction movie (*Contact*, 1997), as discussed separately (*Crown chakra embodying gimbal dynamics to frame the Axis Mundi*, 2020). The

gimbal design of that machine bears a strong similarity to the gimbal rigs used in astronaut training for gravity-free environments.

Such dynamics highlight the probable need for an elusive balance in any form of higher dimensional navigation (*Gyroscopes for balance in higher dimensional navigation*, 2018). The pattern might be understood as a compactification of the extra dimensions which physics now considers necessary to a meaningfully realistic modelling of reality. With astronauts and their extravehicular activity an increasingly common theme, it might be asked what this could imply for "noonauts: and the activity in which they may be challenged to engage beyond the protection of their conventional cognitive vehicles (*Entering Alternative Realities -- Astronautics vs Noonautics: isomorphism between launching aerospace vehicles and launching vehicles of awareness*, 2002).

Representation of the "curled up" subtlety of compactification might now be enabled by AI, as described by John Pavlus (*An Idea From Physics Helps AI See in Higher Dimensions*, *Quanta Magazine*, 9 January 2020).

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