



laetus in praesens

Alternative view of segmented documents via Kairos

5 June 2017 | Draft

Envisaging NATO Otherwise – in 3D and 4D?

Potentially hidden faces of global strategy highlighted through polyhedra

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Introduction

Explanation as interplay of projection and "conjection"?

Surrogates of "conjection" as an unrecognized cognitive process?

Reframing NATO and The Pentagon?

Simple possibilities of exploring the complexity of NATO otherwise

Polyhedral duality as a means of engaging otherwise with dualism: NATO's shadow?

Comprehension of NATO as a four-dimensional dynamic entity?

Implications of stellation of the NATO star symbol?

Comprehending NATO through biomimicry?

NATO as a dynamic configuration of coats of arms and feedback cycles?

Classification of "projections" versus Classification of "conjections"?

References

Introduction

This exercise is a development of the possibility noted in an earlier document with regard to rendering the 2D NATO logo into 3D (*Framing Global Transformation through the Polyhedral Merkabah: neglected implicit cognitive cycles in viable complex systems*, 2017). This was briefly illustrated with images (reproduced for convenience below). A similar argument was made with respect to envisaging The Pentagon otherwise.

That argument followed from several earlier exercises of a more general nature (*Towards Polyhedral Global Governance: complexifying oversimplistic strategic metaphors*, 2008; *Polyhedral Pattern Language: software facilitation of emergence, representation and transformation of psycho-social organization*, 2008; *Configuring Global Governance Groups: experimental visualization of possible integrative relationships* (2008) and *Polyhedral Empowerment of Networks through Symmetry: psycho-social implications for organization and global governance*, 2008; *Polyhedral Empowerment of Networks through Symmetry: psycho-social implications for organization and global governance*, 2008; *Dynamic Exploration of Value Configurations: polyhedral animation of conventional value frameworks*, 2008).

The question is whether new insights into the nature and potential of NATO (or The Pentagon) could be derived from depiction in 3D -- or 4D, if dynamics can be reflected in suitable animations. Whether these aspects are already implicit, or could be usefully rendered explicit, remains to be investigated. The previous arguments notably explored the use of such polyhedral projections as mapping surfaces through which otherwise disparate insights could be configured in an integrative manner in order to facilitate comprehension of complex systems of organization -- beyond the possibilities in 2D.

Use of NATO as an example is relevant at this time when its future has been called into question -- despite dependence on it for security. There is of course the further issue of the controversy and criticism surrounding its functions. Depiction in 3D and 4D offers a means of reframing such issues. This may be especially valuable in a period in which ever greater use will be made of [virtual reality](#) and [augmented reality](#) technologies to comprehend complexity in ways which are challenging in 2D representations.

The focus of the argument here is on **overly simplistic conventional use of a logo or symbol to provide a succinct insight into the nature of a complex entity** -- whether an organization or a system of concepts or values. As illustrated by any map of the planet, **if a logo or symbol is a form of map, of what subtlety is it a map -- a cognitive map?** A conventional map of the globe is a "projection" of a sphere onto the flatness of a two-dimensional surface. Rather than projection, the question then might be how the "conjection" of the multidimensional form (from which the logo derives) is to be determined and understood -- rather than through the commonly problematic process of "interpretation", as in the case of any symbol.

Curiously the question then also suggests the value of reflecting on the strange relationship between that geographical sense of projection and the understanding of projection extensively explored by psychology and psychoanalysis -- with respect to engagement with an

"other", most notably one framed as an opponent. What is the process of "conjunction" in that respect -- through which a coherent, integrative "global" understanding is achieved?

Arguably, richer visualization in support of "conjunction" enables more fruitful imagination.

Explanation as interplay of projection and "conjunction"?

Projection as explanation? The following argument is best clarified by the geographical example with which most are familiar to varying degrees. The question of how a 3D globe (the Earth) can be represented in 2D (a map) is the focus of a wide variety of [map projections](#) (see [List of map projections](#)). These are the subject of extensive commentary and innovation, notably by [John P. Snyder](#) (*Flattening the Earth: two thousand years of map projections*, 1993; L. M. Bugayevskiy and John Snyder, *Map Projections: A Reference Manual*, 1995). It is the primary concern of [mathematical cartography](#) (Qihe Yang, John Snyder and Waldo Tobler, *Map Projection Transformation: principles and applications*, 1999).

As noted by the *GIS Encyclopedia*, there are an infinite number of possible [map projections](#) of which many have been developed for use by cartographers. By nature, **all map projections distort** different properties of the spheroid-based features. Different projections exist in order to preserve certain features but at the expense of others. Depending on the purpose of the map, some distortions are acceptable while others are not (Robert Lloyd and Theodore Steinke, *Recognition of Disoriented Maps: the Cognitive Process*. *The Cartographic Journal: The World of Mapping*, 1984). In what sense could the 2D NATO symbol be considered a distortion of a more complex reality.

Comprehension of maps and cognition: Aside from the extensive literature on map projection, there is a related concern with the comprehension of maps, namely on cartography and cognition (J. S. Keates, *Understanding Maps*, 2014; Melita Kennedy and Steve Kopp, *Understanding Map Projections*, 2001).

These place emphasis to different degrees on the cognitive process from a psychological perspective (Chen Yufen, *Map Spatial Cognition Theory: the interface of cartography and cognitive science*, In: *Proceedings of the International Cartographic Association*, 2001; M. Blades and C. Spencer, *The Implications of Psychological Theory and Methodology for Cognitive Cartography*, *Cartographica*, 1986; P. P. Gilmartin, *The Interface of Cognitive and Psychophysical Research in Cartography*, *Cartographica: the international journal for geographic information and geovisualization*, 1981). The International Cartographic Association has a [Commission on Cognitive Issues in Geographic Information Visualization](#) which offers a limited [list of resources](#). A wider range has been included in the references below to provide a context for this argument.

Now known as [cognitive geography](#), the cognitive challenges of cartography have been pointedly highlighted in an early paper of Barbara Petchenik (*Cognition in Cartography*. *Cartographica*, 19, 1977):

A considerable amount of perceptual research within the general framework of behavioral psychology has been conducted by cartographers during the last ten or fifteen years. However, as one reviews the findings of this research in connection with problems encountered during the normal process of making maps, it doesn't seem to add up to much. No whole theory or set of principles, greater than the sum of the small component parts, has emerged.... The important shift that has occurred in psychology is away from an emphasis on strict behaviorism, and toward an emphasis on thought processes, toward what has come to be called cognitive psychology.... The terminology employed attracts the cartographer's attention, for the notion of "cognitive mapping" appears frequently in the psychological literature. The term suggests that there might be something in it for us, and indeed, I believe there is.... The real problem is this: How does a map user develop internal, personal knowledge of relations among things in space on the basis of viewing a sheet of paper covered with ink marks? How, in common language, does one read a map?

If the function of a map is to trigger meaning, then meaning becomes all-important. We must determine what the meaning of a map is, and how research could take account of such meaning.... Meaning seems to come from an all-at-once grasp of the relation of the stimulus to the reader's previous knowledge structures, rather than from a bit-by-bit build up.... One interesting point has been made recently in cognitive psychology, having to do with the question of the form in which knowledge exists in the mind. In the past, some have argued for verbal encoding, others for imagery, still others for a combination of the two.

So far cartographic research in map reading has not penetrated at all deeply into matters of this sort. In fact, comparing what has been done in map reading with what has been done in text reading, it seems fair to say that what has been done with maps in the way of symbol perception, is to total map reading, as typeface perceptibility studies are to reading comprehension research. **We really lack a word that describes the apprehension of spatial knowledge from maps, a word that would compare to "comprehension" for text....**The difficulty.. is that much of what goes on in cartography is not explicitly understood, particularly at the level of the nature of the human knowledge transfer that is involved. *[emphasis added]*

Writing much later, Wiesława Zyszkowska (*Map Perception: theories and research in the second half of the twentieth century*) notes:

Until the 1990s map perception research was one of the main parts of cartography as a scientific discipline. In the last years of the century map perception research fell out of favor as cartographers turned their attention to the new computer technology. In the first decade of the 21st century the problems of map perception became more frequent in cartographic journals. (*Polish Cartographical Review*, 47, 2015)

Word-play indicative of cognitive dysfunction? Whether "conjunction" or "conjunction", naming the process offers a provocative

contrast to "projection" -- in a context in which much is made of the need for "[joined-up thinking](#)" through which seemingly disparate elements are integratively "conjoined". The "word-play" may be explored in the light of previous efforts to clarify the question (*New Paradigms via a Renewed Set of Prefixes? Dependence of international policy-making on an array of operational terms*, 2003; *Exploration of Prefixes of Global Discourse: implications for sustainable confideliity*, 2011; *Checklist of words prefixed by "con" with frequency of usage*, 2016). The latter distinguished the following, with other terms associated with prefixes in relation to the truncation "-ject":

- **-jection**: abjection, adjunction, dejection, disjunction, ejection, injection, interjection, introjection, objection, projection, rejection, subjection, superinjection, trajectory
- **-jecture**: conjecture, dejecture, projecture

The processes of interest may be clarified by the following, with frequencies derived Google search results (with all the reservations this may imply).

Frequency of selected uses of pro- and con- prefixes					
	-jection(s)	-ject(s)	-jecture(s)	-junct(s)	-join(s)
pro-	projection (s): 337 m.	project (s): 4,300 m.	projecture(s): 35,300	projunction(s): 2,100	projoin(s): 2,600
con-	conjunction(s): 31,400	conject(s): 152,000	conjecture (s): 19,550 m.	conjunction (s): 157 m,	conjoin(s): 915,000

This strange mix might be interpreted as follow:

- **"projection"** is widely used, but not "projecture" (implying "beyond the surface"). Very extensive use is however made of "project"
- **"conjection"** is rarely used (if ever), it has however been defined in terms of *a conflict arising from two sources of information, which should be the same, are totally different*. Little if any use is made of "conject". Frequent use of made of "**conjecture**", most notably in mathematics. It is defined as *a guess about something based on how it seems and not on proof*. In mathematics this is phrased as a *conclusion or proposition based on incomplete information* (see [List of conjectures](#)). It may be deprecated in the common expression "merely a conjecture". By contrast, "projection" is called into question, but only to a limited degree, with the expression "merely a projection".

There is a sense in which project as a verb implies rendering explicit a disparate array diverging from a common perspective -- echoing the use of "projectile". In contrast with this sense of "throwing apart", a complementary process merits recognition as "drawing together". Hence the case for "conjection", especially given the current value attached to the prefix (*Considerable Conglomeration of "Cons" of Global Concern: eightfold constraint on constructive conflict control?* 2012). However there is the strange contradictory sense in which "pro" is considered "positive" and supportive, whereas "con" is considered "negative" and opposed.

Also known as the North Atlantic Alliance, in terms of "projection", NATO can be understood as a "project" of the [North Atlantic Parliamentary Assembly](#) which sets its broad strategic goals. NATO adopted the Alliance Strategic Concept during its [Washington Summit](#) (1999) -- emphasizing conflict prevention and crisis management, despite its very extensive investment in "projectiles". The inadequacy of that investment, despite past commitments, was a widely publicized feature of the Brussels Summit of 2017 (*Trump lectures NATO allies on defense spending, USA Today*, 25 May 2017; *Trump insists NATO members boost defense spending, Politico*, 25 May 2017; *President Trump Pushes NATO Members to Pay 'Their Fair Share'*, *Time*, 25 May 2017).

Given the extensive investment in the NATO "project" and its instruments -- the "projectiles" -- is it appropriate to ask of what it is a "conjection"? How is the underlying "conject" to be understood -- and what might be the associated "conjectiles" -- in cognitive terms?

Surrogates of "conjection" as an unrecognized cognitive process?

Rather than focus on any complementary term to projection. it can be readily assumed that some such process is recognized through other terms, techniques and metaphors. These could include:

- **Mapping the intangible** as variously distinguished:
 - **Cognitive map** (sometimes called a **mental map** or **mental model**) is a type of **mental representation** enabling the acquisition, coding, storing, recalling and decoding information about the relative locations and attributes of phenomena in everyday or metaphorical spatial environment. They can be mental representations of physical locations. There is an extensive literature on mental mapping, notably associated with geography. The methodology can be successfully applied to cognate areas, as noted by Sorin A Matei (*Mental Maps: making the invisible visible*, 2007)
 - **Topic map** recognized as a standard for the representation and interchange of knowledge, with an emphasis on the **findability** of information.
 - **Concept map** or conceptual diagram is used to depict suggested relationships between concepts. : Concept maps are rather similar to topic maps in that both allow to concepts or topics via graphs.
 - **Mind map** understood as a diagram used to visually organize information, however this is to be contrasted with a cognitive mapping. Both concept maps and topic maps can be contrasted with mind mapping, which is often restricted to radial hierarchies and tree structures.
 - **Semantic map** as used in a method of teaching reading using graphical representations of concepts and the relationships between them
- **Interpretation of symbols** has given rise to a very extensive literature on a variety of theories and practices, recently

summarized by Vasil Rainov (*Interpretation of Symbols, Encyclopedia of Life Support Systems (EOLSS)*, 2004). That summary notes the different "illusions" associated with the various approaches -- reminiscent of the "distortions" in cartography. **Semiotics** is the study of signs, symbols, and signification as communicative behavior. Noteworthy with respect to the argument below is the extent to which symbols take geometric forms with particular symmetries. By contrast the interpretation of symbols is far from succinct, tending to be unfortunately verbose in various senses of the term. Is an interpretation to be recognized as a "conject"? The implication of "conjection" could be usefully explored otherwise in terms of the far more frequent use of "contention" -- which any interpretation of a symbol (and its "content") could be held to be.

- **"Optics"** has recently developed as a metaphor in the political arena as a description of perception -- political appearance -- otherwise associated with public relations and image making (Ben Zimmer, *Optics*, *The New York Times*, 4 March 2010; Wendy L. Patrick, *The Optics of Politics: appearances are not always reality*, *Psychology Today*, 1 November 2014)
- **Interdisciplinarity** as the use of a variety of disciplines to elicit a coherent understanding of a complex of phenomena. Various approaches to **interdisciplinarity** have been identified and distinguished from **transdisciplinarity** and **multidisciplinarity** (Robert Frodeman, et al, *The Oxford Handbook of Interdisciplinarity*, 2012; Joe Moran, *Interdisciplinarity: the new critical idiom*, 2010; Harvey Graff, *Undisciplining Knowledge: interdisciplinarity in the Twentieth Century*, 2015; Felicity Callard and Des Fitzgerald, *Rethinking Interdisciplinarity across the Social Sciences and Neurosciences*, 2015; Alasdair Gleed and David Marchant, *Interdisciplinarity: survey report for the Global Research Council*, 2016; Susan A. Nancarrow et al., *Ten principles of good interdisciplinary team work*, *Human Resources for Health*, 2013). With each discipline as a metaphorical "eye" or "lens", and the particular understanding of projection in optics, especially valuable in this respect is the need for a "polyocular" mode of understanding to focus effectively on complex subtlety, as argued by Magoroh Maruyama (*Polyocular vision or subunderstanding?* *Organization Studies*, 25, 2004).

In a post-truth era, conventional modes of "explanation" are clearly no longer "fit for purpose" -- as remarkably demonstrated by explanations of climate change and other emerging crises. This calls into question the adequacy of the responses to the **Edge Foundation Question of 2012: *What is yours favorite deep, elegant, or beautiful explanation?*** In a compilation of 150 selected responses, the editor notes that:

The common thread is that a simple and nonobvious idea is proposed as the explanation for a diverse and complicated set of phenomena. (**John Brockman**, *This Explains Everything*, 2013).

It is curiously assumed that any "simple and nonobvious idea" is readily and widely comprehensible. There is however no reference to "comprehension" in the extensive index or to how it is enabled -- other than through the significance attributed to "deep, elegant, or beautiful".

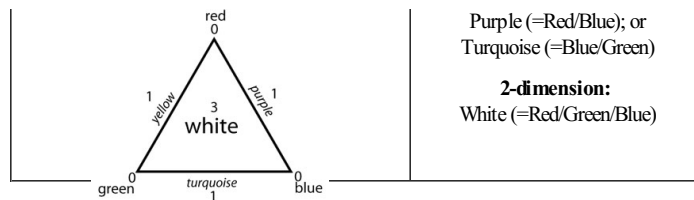
"Conjection" as an unrecognized cognitive process? With the emphasis on mapping, **much of the literature conflates projection with explanation**. This reinforces any assumption that if it can be mapped then this constitutes an explanation. Arguably this conflation can be recognized in the recently emergent possibilities of visualization. **Visualization as explanation?**

The implications of 9/11 destruction of the Twin Towers, together with the attack at the time of writing on London Bridge, suggest that it is symbols that empower, not explanation. The issue has become especially evident in disregarded explanations regarding climate change, or the **psychic numbing** evoked by starvation imagery (*Starvation Imagery as Humanitarian Trump Card? Counterproductive emotional blackmail engendering worldwide indifference*, 2016). Clearly there are concerns with whether, and how, any map can be understood.

Given the extensive mathematical literature on "projection" of a global reality onto a flat surface, it is appropriate to ask whether there is an inverse or reverse process (not to be confused with **"back projection"**). This might be described as taking one map projection (or more) and deducing from the configuration in 2D the form in 3D from which the map was derived -- most obviously in the case of a globe. This process may be variously implied in the preoccupation with projection in mathematical cartography. This is not immediately relevant from the literature, and may well be considered of little interest -- except in the sense of **stereographic projection**. Metaphorically it could also be explored in terms of decryption, with the map understood as a form of encryption -- two or more maps being of value to the decoding process.

The challenge to comprehension of "conjection" has been remarkably clarified using the mathematics of **q-analysis** as developed by Ron Atkin (*Multidimensional Man; can man live in 3-dimensional space?*, 1981), as separately summarized (*Comprehension: Social organization determined by incommunicability of insights*). Atkin illustrates the challenge of comprehension in relation to experience "within" the geometry of a triangle.

Comprehension through transcending the plane (as indicated by the q-analysis of Ron Atkin)	
Conjection as recognizing "white"	Relative orders of comprehension
	<p>0-dimension: Red, Green or Blue</p> <p>1-dimension: Yellow (=Red/Green)</p>



Beyond the "plane" of explanation? The geographical challenge of reducing the sphere to a plane as a means of explanation highlights the continuing challenge of a "flat earth" understanding of global reality, however absurd (*The Flat Earth Theory has seen a resurgence, with people trying to prove our planet is not a sphere*, *News.com.au*, 1 June 2017). This has been famously emphasized by Thomas Friedman (*The World is Flat*, 2005) and the focus for criticism (*Irresponsible Dependence on a Flat Earth Mentality -- in response to global governance challenges*, 2008).

The inadequacy of the quest to reduce complexity through projection onto a plane is only too evident in the extension of the metaphor into "planning", namely the conception of strategic "plans" in response to "global" challenges. This tendency is curiously exemplified in the interpretation of the religious agendas by which governance may be especially informed (*Adhering to God's Plan in a Global Society*, 2014).

Conventional explanation may therefore be characterized as the projection onto a plane -- supposedly offering a perspective from "elsewhere", as indicated by "ex". Some form of "extraction" from the plane is then implied as a key to comprehension. Greater coherence regarding the disparate elements forming the explanation -- in the plane -- might then be more significantly related to a process of "conjection" from the plane. This is variously confused and conflated with surrogates, most notably those associated with interpretation and inference.

With respect to maps, it has been famously stressed by Alfred Korzybski that "the map is not the territory", The available maps are clearly inadequate for a civilization characterized by a combination of high degrees of uncertainty and high degrees of certainty -- itself questionable. Many offer guidance (E. F. Schumacher, *A Guide for the Perplexed*, 1977; Maimonides, *The Guide for the Perplexed*). Clarifying "conjection" in relation to mapping may then offer a more fruitful means of engaging with the "territory" (*The Territory Construed as the Map: in search of radical design innovations in the representation of human activities and their relationships*, 1979). Missing is a process which is the reverse of "zooming down" and "drilling down" -- as originally argued by Joel de Rosnay (*The Macroscope*, 1979). Geometry suggests the possibility of "zooming up" to the high orders of symmetry which render symbols so meaningful -- to whatever degree they are comprehensible.

How indeed can invisible coherence be rendered comprehensible? How might the process of projection be reversed in the light of mathematical insights -- starting with a 2D representation and extending it into 3D, with the possibility of 4D animation? Is "conjection" the key to empowerment in a period of crisis, as can be otherwise argued (*Polyhedral Empowerment of Networks through Symmetry: psycho-social implications for organization and global governance*, 2008).

Rather than offering commentary and explanation, the focus here is on the use of such imagery to evoke interest in the possibility and its potential. The exercise relies on use of the possibilities of morphing the basic 3D analogue to the 2D NATO symbol through the geometrical transformations enabled by *Stella Polyhedron Navigator*.

Reframing NATO and The Pentagon?

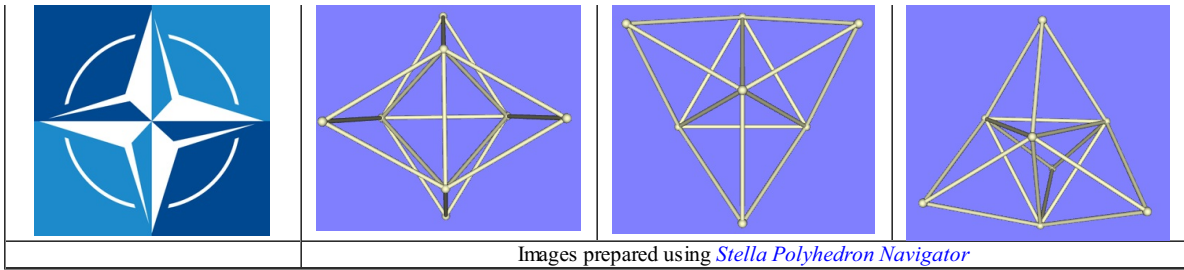
NATO: At the time of writing, with new strategic directions of NATO as a principal theme of the presence of Donald Trump at a NATO Summit, the approach explored previously with respect to the Star of David and the Merkabah may also be explored with respect to the symbol with which NATO is identified (*Framing Global Transformation through the Polyhedral Merkabah: neglected implicit cognitive cycles in viable complex systems*, 2017). This can be illustrated by the images below.

The NATO symbol or logo is necessarily in 2D (*A Star is Born: choice of design*, 2016). **The question is whether the geometric extension of the NATO logo into 3D would enable recognition of "missing strategic dimensions"** -- whatever this might imply in strategic terms. Just as the 2D depiction may be assumed to reinforce certain cognitive processes, would the reinforcement of a more complex set of processes be reinforced -- of greater relevance to global governance?

The previous discussion argued for the value of basing this design on a four-fold augmentation of a fundamental central polyhedron, namely the tetrahedron -- informally named the augmented tetrahedron, composed of 5 tetrahedra. Each tetrahedron, as the most fundamental polyhedron, could be understood as embodying one of the 5 fundamental values of NATO, and of the Europe it is designed to defend: *Democracy, Freedom of speech, Freedom of the media, Independence of the judiciary, Protection of minorities*. These were reaffirmed by NATO Secretary General Jens Stoltenberg (*NATO's Enduring Mission -- Defending Values, Together*, NATO, 8 September 2016).

The augmented tetrahedron depicted below is composed of 12 faces (of 1 type), 18 edges (of 2 types) and 8 vertices (of 2 types). It can be understood as composed of 5 tetrahedra.

Juxtaposition of NATO 2D symbol with views of augmented tetrahedron in 3D		
Reproduced from <i>Framing Global Transformation through the Polyhedral Merkabah: neglected implicit cognitive cycles in viable complex systems</i> (2017)		
NATO symbol		Screen shots of 3D augmented tetrahedron (variously rotated)
design in 2D	schematic in 3D?	

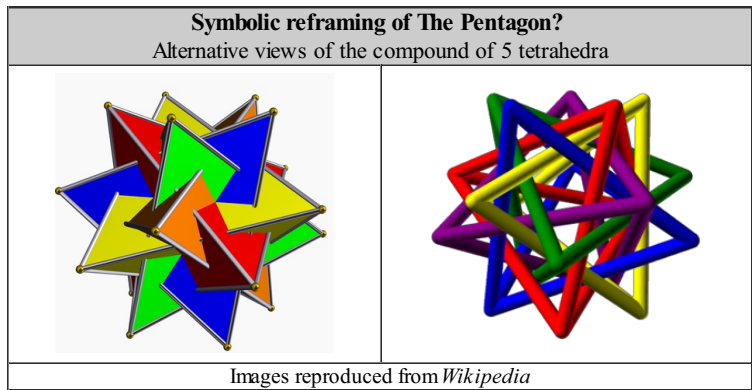


Images prepared using *Stella Polyhedron Navigator*

Curiously, but perhaps appropriately, the 3D form recalls that of the [morning star](#) spiked club of medieval times -- of which a variant, as a [mace](#), is now a central feature of some parliamentary ceremonies. The structure also resembles that of certain types of road traffic spike deployed by security services.

The Pentagon: Given the fundamental strategic importance of [The Pentagon](#) (as headquarters of the US Department of Defense) with respect to global security -- understood in terms of [full-spectrum dominance](#) -- there is a case for extending the above exploration in terms of the 5-fold symmetry of that body as a symbol. As noted, the augmented tetrahedron, indicated above as a means of depicting NATO otherwise, is composed of 5 tetrahedra, one of which is central to the configuration.

This suggests the possibility combining 5 such tetrahedra otherwise in what is known as a [tetrahedron 5-compound](#) (with 20 faces, 30 edges and 20 vertices). The vertices of the compound then form the 20 vertices of the [dodecahedron](#). It is one [stellation](#) of the regular [icosahedron](#). The compound is unusual in that the dual figure is the [enantiomorph](#) of the original. If the faces are twisted to the right, then the vertices are twisted to the left. The compound has been extensively studied by geometers, notably as a geometric illustration of the notion of [orbits and stabilizers](#); it is one of five regular polyhedral compounds. Two such [tetrahedron 5-compounds](#) of opposite [chirality](#) combine to make a [tetrahedron 10-compound](#) (with 40 faces, 60 edges, and 20 vertices).

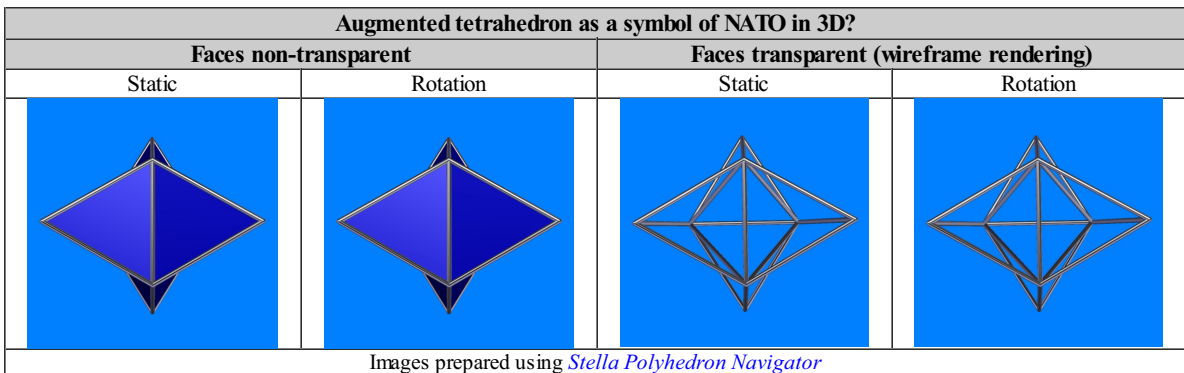


Images reproduced from *Wikipedia*

Such structures in 3D (with geometry reflective of the number of members of NATO, for example) are an indication that the conventional simplicity of the Pentagon as a symbol may be inherently misleading.

Simple possibilities of exploring the complexity of NATO otherwise

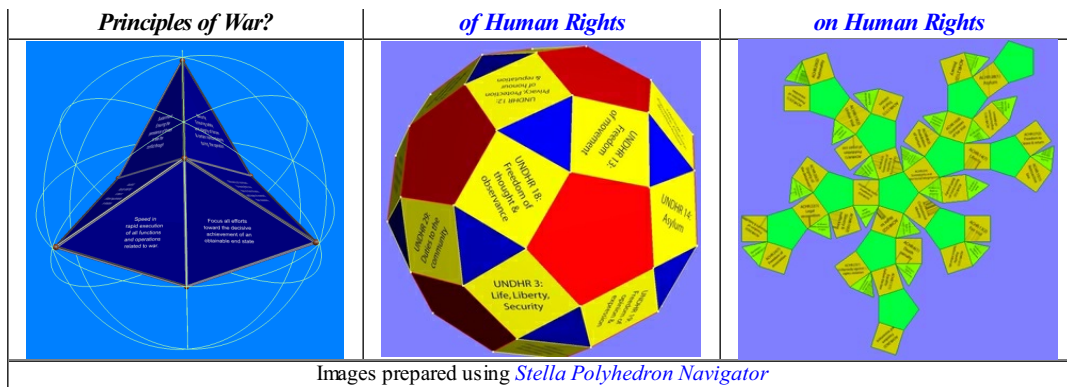
The following images of a 3D form are essentially self-explanatory. The possibility of switching between alternative variants (transparent or non-transparent) is also of interest. The suggestion above that there was additional value in a "4D" representation is partially indicated here in the rotations of the structure. It is also the case that with the use of virtual reality software the structure can be explored interactively -- variously rotated and zoomed. Additional colouring of faces was not applied in these examples.



Images prepared using *Stella Polyhedron Navigator*

Even in this simple form, the symbol may be used as a mapping surface to which images, text and hyperlinks can be attached -- as one means of articulating the significance of the form. One example is illustrated in the animation below. This derives from an articulation by Christopher E. Van Avery (*12 New Principles of Warfare*, *Armed Forces Journal*, 1 July 2007).

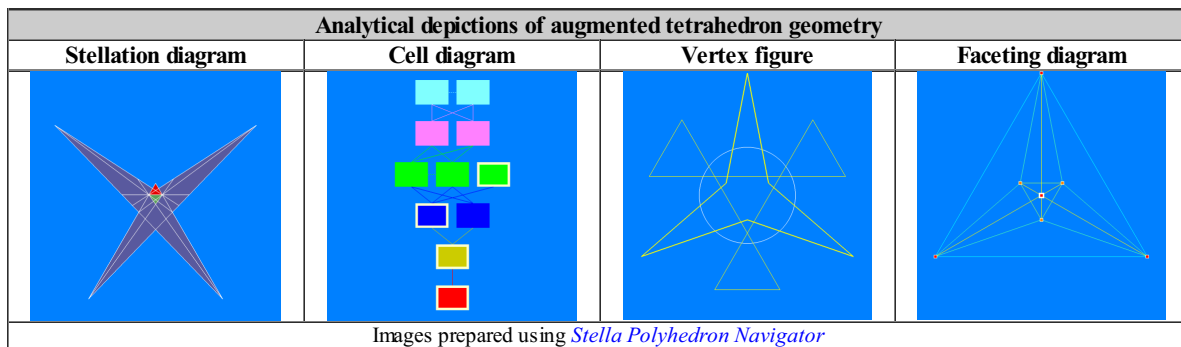
Mapping selected sets of strategic principles onto polyhedra		
NATO	Universal Declaration	Arab Charter



As shown above (centre and right), a wider variety of possibilities of mapping text onto polyhedra is demonstrated in a previous exercise focusing on declarations of human rights (*Dynamic Exploration of Value Configurations: polyhedral animation of conventional value frameworks*, 2008). Although now inactive, the issues recognized by the NATO Committee on the Challenges of Modern Society could have been coherently portrayed in that way, as with those of its successor: NATO Science for Peace and Security.

A more complex form was, for example, used to give insight into the implicit coherence of a conference of the International Peace Research Association, as illustrated separately (*Polyhedral Conference Representation as a Catalyst for Innovation: polyhedral animation of IPRA 2008*, 2008).

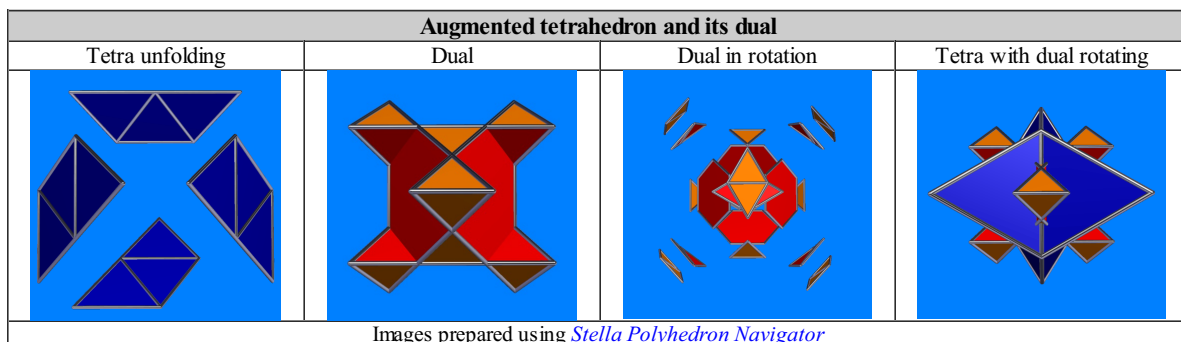
Assuming an equivalence to the augmented tetrahedron, the following visualizations offer insights into NATO from an analytical perspective. These are variously reminiscent of systems and other diagrams favoured by management. Could a polyhedral form be elicited from such conventional depictions -- notably network diagrams, as argued separately (*Polyhedral Empowerment of Networks through Symmetry: psycho-social implications for organization and global governance*, 2008).



Polyhedral duality as a means of engaging otherwise with dualism: NATO's shadow?

In addition to the representations above, the basic form may be "unfolded" or "exploded" into its component tetrahedra, as illustrated in the animation on the left below.

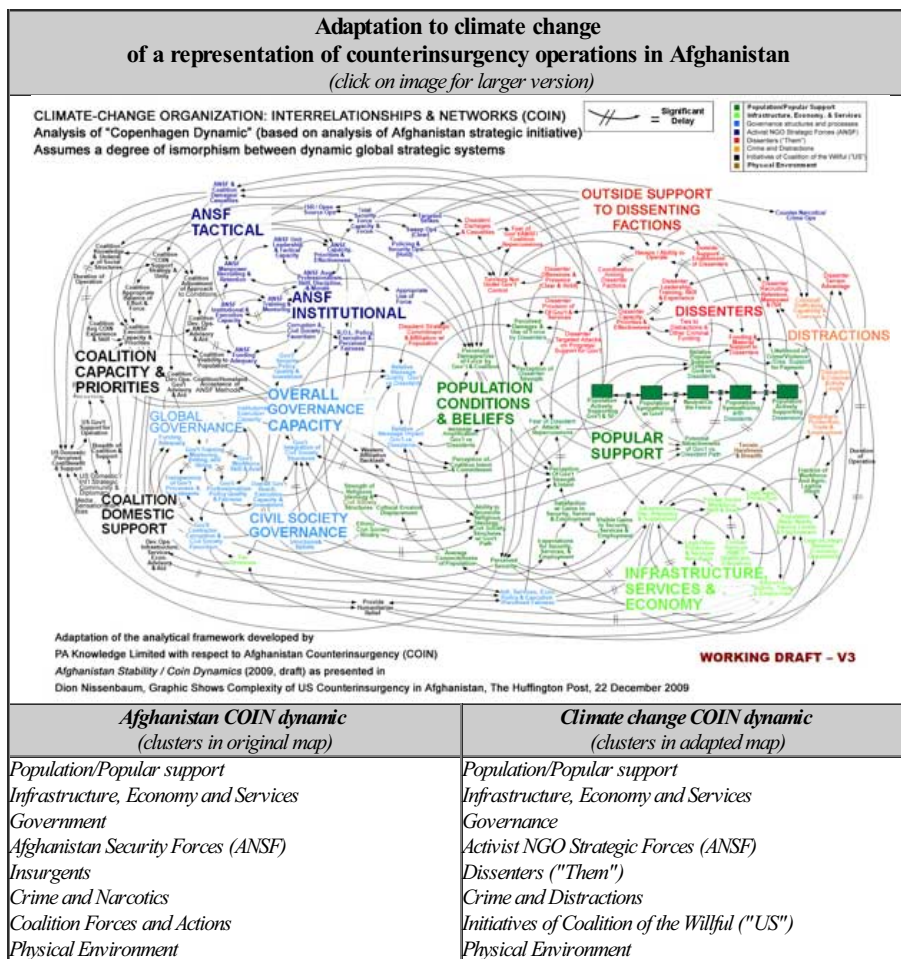
Duality and double standards: More intriguing, as with any polyhedron, is the nature and significance of its *polyhedral dual*. This contrasting structure is indicated below, where the vertices of one correspond to the faces of the other and the edges between pairs of vertices of one correspond to the edges between pairs of faces of the other. The dual is rotated on its own below -- and separately with the augmented tetrahedron embedded within it. Again, text and imagery could be added to the dual, in contrast to what might be associated with faces, vertices or lines of the base polyhedron.



In a psychosocial system much challenged by duality and "otherness", what might be the significance of the interplay between the base polyhedron and its dual? What might any symbolic representation of this complex dynamic encompass? Arguably this offers a means of encompassing the tendency to *double standards*, as variously described (*Enabling Suffering through Doublespeak and Doublethink*, 2013; David Rohde, *Ending NATO's Double Standard on International Justice*, *The Atlantic*, 18 May 2012; Taras Kuzio, *NATO's Double Standards: Why Montenegro but Not Ukraine?* *Atlantic Council*, 31 May 2017; *Double Standards? Nato's Afghan Errors*,

Challenging images of otherness: Such questions are especially pertinent in the case of NATO which is fundamentally structured and configured to respond to the threat of particular forms of otherness -- namely potential opponents and enemies. In any conventional depiction of NATO these threats are effectively extra-systemic, although essentially messy representations of them may be made as in the case of Afghanistan, as discussed separately (*Cultivating Global Strategic Fantasies of Choice: learnings from Islamic Al-Qaida and the Republican Tea Party movement*, 2010). This included the following image adapted from that by the PA Consulting Group and presented to the Office of the Joint Chiefs of Staff of the US of counterinsurgency (COIN). This takes the form of a map, notably publicized on behalf of McClatchy Newspapers by Dion Nissenbaum (*The great Afghan spaghetti monster*, *Checkpoint Kabul*, 20 December 2009; *Graphic Shows Complexity of US Counterinsurgency in Afghanistan*, *The Huffington Post*, 22 December 2009). Coincidentally this map was publicized over the web at the end of the 2009 Copenhagen climate change event.

To illustrate the possibilities (as in the above exercise), the "spaghetti map" was adapted (as reproduced below) to suggest the relevance of such a perspective to the climate change debate (*Insights for the Future from the Change of Climate in Copenhagen*, 2010). As with other enduring "wars", the need for another strategic approach is remarkably demonstrated by the decades-long conflict in Afghanistan (*Transforming the Unsustainable Cost of General Education: strategic insights from Afghanistan*, 2009; *Review of the Range of Virtual Wars: strategic comparison with the global war against terrorism*, 2005).

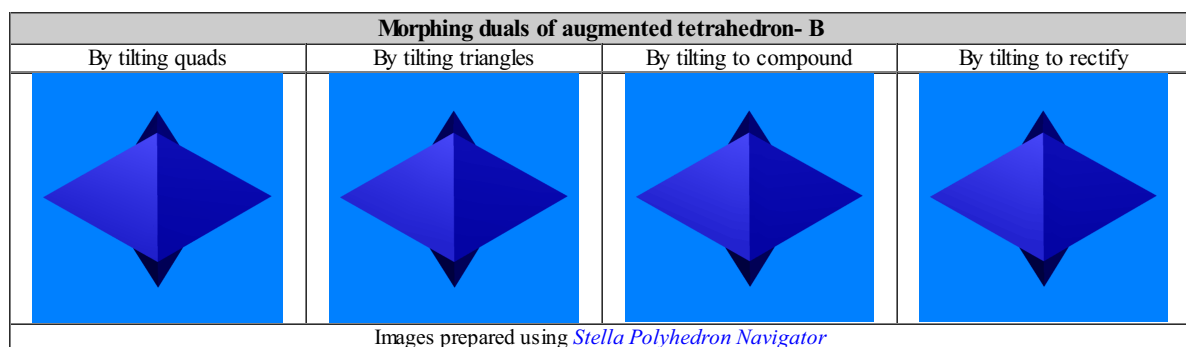
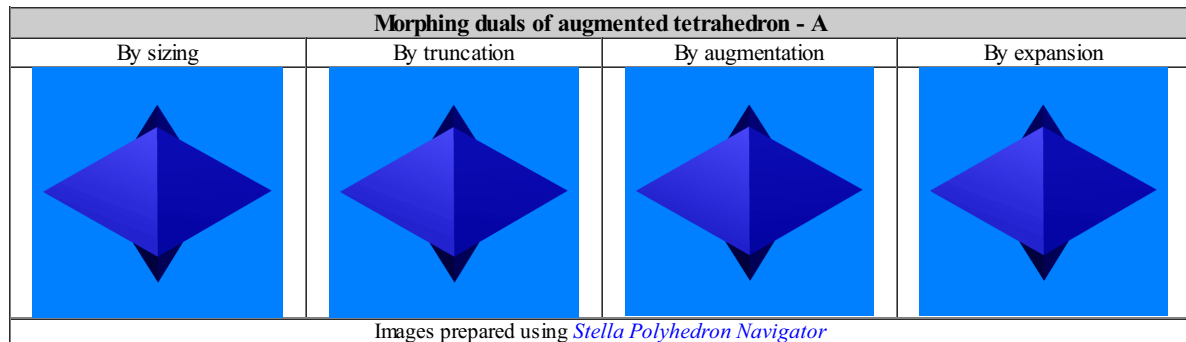


NATO's shadow? Any polyhedral dual, generated from a more complex polyhedral representation of NATO, then offers at least three distinct possibilities for exploration:

- dual as external opponent of NATO -- onto which the possibility of threat is projected. This is the issue of the engagement with "otherness", especially when it is framed as "evil" (*In Saudi Speech, Trump Declares Absolute War Between Good and Evil*, *Anti-War*, 21 May 2017).
- dual as external perception of NATO -- notably understood in terms of its problematic perception by others (of "its ugly face"), onto which they may project their own (mis)conceptions (Vladislav B. Sotirovic, *The NATO's Violations of the "Just War" Principles in 1999*, *The Global Politics*, 28 December 2016; *US, NATO war crimes against thousands of Afghan civilians ignored*, *RT*, 11 August 2014; *Nato accused of war crimes in Libya*. *The Independent*, 19 January 2012; *Iraq, Libya, Syria: Extensive US-NATO War Crimes*, *4th Media*, 22 June 2013)
- dual as internal psychosocial **collective shadow** -- potentially to be understood in terms of unintegrated dimensions of NATO's structural modality and dynamics

Clearly there is an interplay between such understandings to be explored in the light of the insights of Carl Jung who argued: *None of us stands outside humanity's black collective shadow* (*On the collective shadow and evil*). Others write of its current implications (Paul Levy, *Shadow Projection: the fuel of war*, 2010; Mats Winther, *Thanatos: a contribution to the understanding of the collective shadow*, 2012; Nadine Kreisberger, *Trump's election and what it reveals about our collective Shadow*, 2016; Rosko Green, *Trumpism: the*

Dynamics of engagement with the other: To give a degree of form to this shadow, through a process of "conjection" the possibility of geometric morphology may be used to transform the dual of the proposed NATO symbol through various procedures consistent with mathematical cartography. These are illustrated in the animations below. There is clearly some advantage to the colour contrast between the blue of the NATO symbol and the "threatening" red of the dual as it variously emerges. Are such emergent forms in red helpful in comprehension of what terrorism (ISIS, Al Qaida, etc) can be framed and understood in strategic terms from a NATO perspective? What are the possible cognitive analogues to these geometric transformations?



The animations offer a sense of the struggle of NATO with its own shadow -- whether the shadow "within" or that projected without, as with the struggle with Islamic terrorism. Curiously this is consistent with the Islamic understanding of *jihad* as a continuing struggle, especially one with a praiseworthy aim. As noted by *Wikipedia*: *Jihad* can have many shades of meaning in an Islamic context, such as struggle against one's evil inclinations, or efforts toward the moral betterment of society. In classical Islamic law, the term refers to armed struggle against unbelievers, while modernist Islamic scholars generally equate military jihad with defensive warfare. In Sufi and pious circles, spiritual and moral jihad has been traditionally distinguished under the term "**greater jihad**"

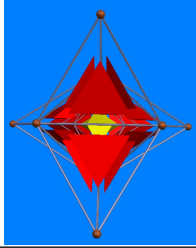
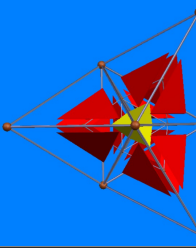
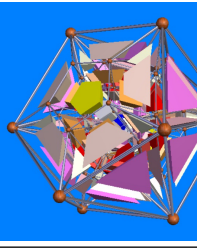
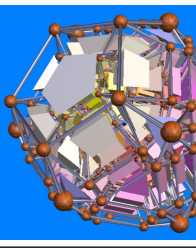
Such interpretations naturally find their analogues in the Christian understanding of *crusade* -- by which NATO is inspired to a greater degree -- and in the light of the traditional Christian response to Islam (Richard C. Caspar, Jr, *1,400 Years of Christian/Islamic Struggle*, CBN). However the sense of internal struggle has also figured in Christian mysticism (Neil Holman, *The Struggles of a Christian*, Bible Study, 21 December 2009; John Edmiston, *The Christian's Struggle with Sin*, *Global Christians*, 2010).

Of particular interest for NATO are the institutional games in which it may engage as notably explored through a martial arts metaphor by [Thierry Gaudin](#) (Les katas institutionnels. *Transnational Associations*, 30, 1977) identified 21 tactical moves (*katas*) open to institutions, subsequently included in English translation as *The Institutional Katas* in an argument with regard to *Game-playing in global governance? (Engaging an Opposing Ideology via Martial Arts Philosophy: reframing the challenge of Trump and Jihadism as worthy opponents*, 2016). Of relevance in this respect is that the leader of the nation framed as the primary opponent of NATO is a martial arts black belt (*Vladimir Putin Earns 9th Degree Black Belt In Taekwondo*, *Huffington Post*, 16 November 2013). It is also the case that Donald Trump has been a major sponsor of [mixed martial arts](#).

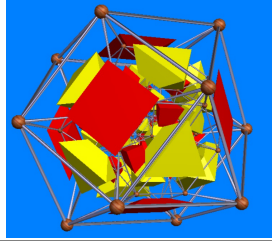
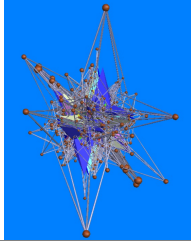
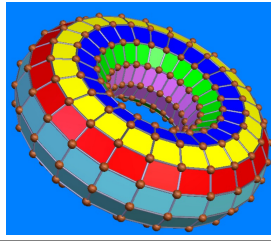
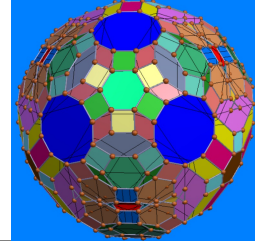
Comprehension of NATO as a four-dimensional dynamic entity?

Despite the emphasis of NATO on "unity", frequently framed in terms of "solidarity", it is necessarily misleading to frame NATO as a static entity. There is a sense, especially from a military strategic perspective of the need for strategic nimbleness more appropriately associated with "fluidity". Any "unity" is likely to be more appropriately found in 4 (or more) dimensions. As in the metaphor evoked for corporations, NATO needs to "dance" ([Rosabeth Moss Kanter](#), *When Giants Learn To Dance: mastering the challenge of strategy, management, and careers in the 1990s*, 1989). Some sense of the possible dynamics can be offered by various animations of the augmented tetrahedron, as presented above -- offering one sense of a 4D entity.

Another approach is to make use of facilities to present the augmented tetrahedron in geometric emulations of 4D -- a technique offered by [Stella4D](#) (as an extension of *Stella Polyhedron Navigator* used to prepare the figures above). This includes four-dimensional polytopes, known as *polychora* (projected into 3D), with the possibility of animating 3D cross-sections in real-time and 4D rotation. Their relevance is discussed separately (*Four-dimensional requisite for a time-bound global civilization?* 2015; *Comprehending the shapes of time through four-dimensional uniform polychora*, 2015; *Five-fold ordering of strategic engagement with time*, 2015).

Representations of NATO as a 4-dimensional entity?			
4D	4D	Runcinated	Runcinated and expanded
			
Images prepared using <i>Stella Polyhedron Navigator</i>			

Other techniques can be used to transform the augmented tetrahedron in ways which variously invite imaginative exploration -- especially as mapping surfaces.

Transformations of the augmented tetrahedron -- NATO explored otherwise?			
Waterman polyhedron 4D polytope	4D Truncated expansion	Transformation into a torus	Zonohedrification
			
Images prepared using <i>Stella Polyhedron Navigator</i>			

Implications of stellation of the NATO star symbol?

Use of "star" as a metaphor, especially in launching the NATO symbol (*A Star is Born: choice of design*, 2016), suggests the merit of exploring the geometric operation of [stellation](#) with respect to the proposed augmented tetrahedron. In this context, stellation is the process of extending the polyhedron in three dimensions to form a new figure. Starting with the augmented tetrahedron, the process extends specific elements such as its edges or face planes, usually in a symmetrical way, until they meet each other again to form the closed boundary of a new figure. The new figure then constitutes a stellation of the original.

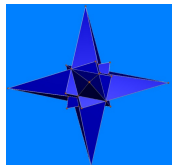
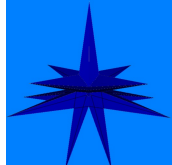
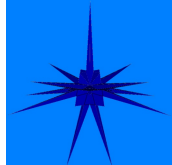
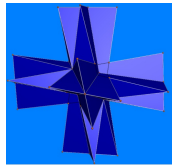
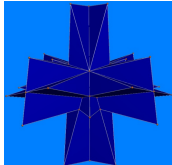
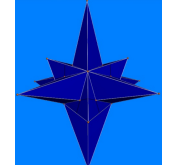
Polyhedra typically have extensive sets of stellations. For example, in the case of the Platonic polyhedra:

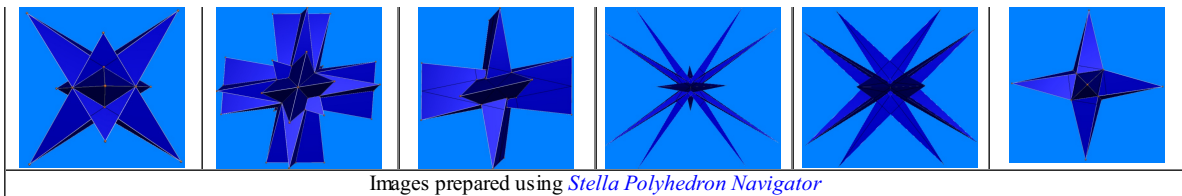
- 0 stellations of the tetrahedron, because all faces are adjacent
- 0 stellations of the cube, because non-adjacent faces are parallel and thus cannot be extended to meet in new edges
- 1 stellation of the octahedron, the [stella octangula](#), which was the focus of the previous exercise (*Framing Global Transformation through the Polyhedral Merkabah: neglected implicit cognitive cycles in viable complex systems*, 2017)
- 3 stellations of the dodecahedron: the [small stellated dodecahedron](#), the [great dodecahedron](#) and the [great stellated dodecahedron](#), all of which are Kepler-Poinsot polyhedra.
- 58 stellations of the icosahedron

Given the preoccupation of NATO with "order" within the global system, there is a case for exploring the insights of [Christopher Alexander](#) in a *magnum opus* with a related concern (*The Nature of Order: an essay on the art of building and the nature of the universe*, 2003-4). This gave rise to his insights of potential relevance to further understanding of NATO (*New Concepts in Complexity Theory: an overview of the four books of the Nature of Order with emphasis on the scientific problems which are raised*, 2003; *Harmony-Seeking Computations: a science of non-classical dynamics based on the progressive evolution of the larger whole*, *International Journal for Unconventional Computing (IJUC)*, 2009).

The latter study identified 15 "transformations" whose implications for the psychosocial realm merit clarification, as discussed separately (*Comprehending Alexander's transformation principles within the psychosocial realm*, 2010; *Tentative adaptation of Alexander's 15 transformations to the psychosocial realm*, 2010). Those considerations framed the possibility of using a subset of the stellations of the icosahedron as a guide to reflection on the *Geometrical configuration of Alexander's 15 transformations* (2010).

The selection of stellations of the augmented tetrahedron presented below therefore invites reflection on their potential significance in a richer understanding of NATO. Are they indicative of what NATO variously imagines itself to be -- or aspires to be -- as a "star"?

Selection of stellations of the augmented tetrahedron -- as the imagined significance of NATO?					
					



Images prepared using *Stella Polyhedron Navigator*

The stellations above can be presented together (below left) as animations suggestive of phases in NATO's imagination of itself. The exploration can be taken further by juxtaposing that animations with a second (on the right below). This could be seen as a representation of NATO's enemy -- as the primary source of threat (whether Russia, ISIS, or the like) with which NATO is confronted and against which a defensive posture is considered vital. As such it is a dynamic depiction of NATO's worst fear -- the hydra-headed monster with which it is committed to deal.

Following the earlier argument with respect to the "shadow", the animation on the right can also be explored as a depiction of how NATO is (mis)perceived by others -- its "ugly face", as it appears in the mirror into which NATO never looks. Similarly it could be understood as inherent in NATO -- the unrecognized dimensions of the entity which have yet to be integrated into a mature form of organization.

Animation of phases in the stellation of the augmented tetrahedron	
NATO as it imagines itself to be? as it aspires to be? "isotopes" of varying "half-lives" ?	NATO's perception of its enemies? perception by opponents? traits denied ("shadow")?
Images prepared using <i>Stella Polyhedron Navigator</i>	

Curiously, but as might be expected, there are few references to the "psychology of NATO". However some NATO studies do indeed focus on the application of psychology (Mark E. Koltko-Rivera and P. A. Hancock, *Psychological Strategies for the Defence Against Terrorism*, NATO RTO-MP-SCI-158, 2004). Far more problematic is the degree to which these imply NATO's deniably complicity in harbouring so-called "black sites", as notoriously used by the CIA (Jane Mayer, *The Black Sites: a rare look inside the C.I.A.'s secret interrogation program*, *The New Yorker*, 13 August 2007; *Trump Administration Moves To Keep Full CIA Torture Report A Secret*, *Reuters*, 2 June 2017; Ray McGovern, *Hiding the Ugly Business of U.S. Torture*, *Information Clearing House*, 5 June 2017).

The coloring of the complementary animations offers a usefully reminder of the existential choice in society between the "blue pill" and the "red pill", as framed in the science fiction movie *The Matrix* (1999). NATO might itself be understood symbolically as a remedial "pill", as framed by an earlier argument (*Psychosocial Transformation by "Pill Pushing"? Model-making, strategic advocacy and the myth of the "red pill"*, 2017). That study used other animations in 3D to envisage the possibility of transcending that choice through a third possibility (*Visualization in 3D of a trinity of connotations as a cognitive pill*, 2017).

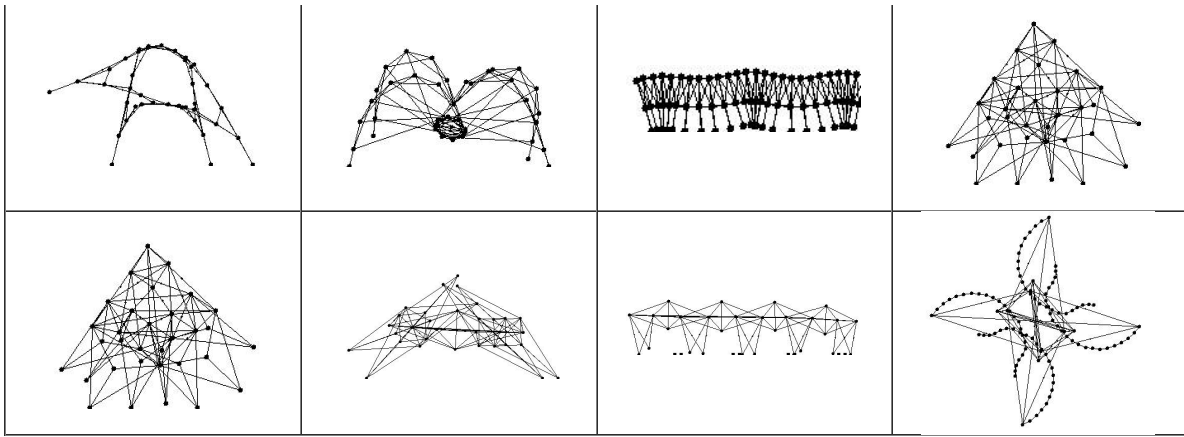
Comprehending NATO through biomimicry?

The representations above, irrespective of the animations and transformations, rely to a questionable degree on geometrical constraints without considering how they might be fruitfully relaxed -- as a source of greater insight. One approach would be to foreshorten or lengthen the lines in the depictions -- selectively shearing the depiction as a whole.

A distinctive approach, consistent with this possibility, is to build dynamics into the models otherwise. This was remarkably illustrated by the award-winning *Soda Constructor* a java-based physics engine, central to *Soda's* collaborative learning environment *Sodaplay.com*. The facility enables users to create and share "models". These models are made of "masses" and "springs" and follow strict physical laws. By turning springs into "muscles", models can be animated and made very lifelike. Although thousands of models have been created, it is uncertain whether the facility continues to be viable, given the evolution of web technologies and incompatibilities. Many legacy websites and online fora are however partially accessible.

Of relevance to the argument with respect to NATO, the potential of the *Soda Constructor* approach was reviewed with respect to the institutions of Europe (*Animating the Representation of Europe: visualizing the coherence of international institutions using dynamic animal-like structures*, 2004).

Examples of multi-legged animated Soda models
(clicking on the images originally "brought them to life"; a feature **now deactivated**)



The argument in terms of [biomimicry](#) and [naturomimicry](#) has achieved greater relevance given recognition of its acknowledged value in two complementary arenas:

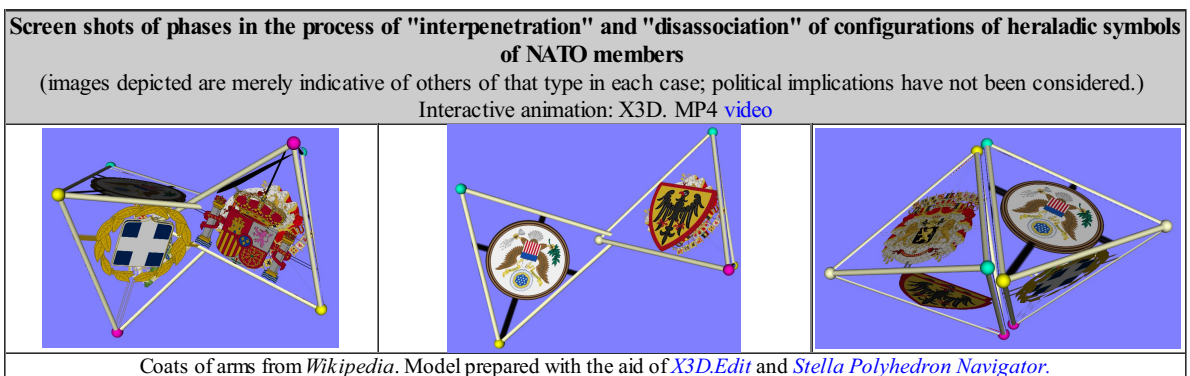
- strategic insights, as variously suggested ([Dudley Lynch, *Strategy of the Dolphin: scoring a win in a chaotic world*, 1990;](#) [Systemic Biomimicry of Dinosaurs by Multinational Corporations](#), 2011)
- design insights, following from the inspiration of bird flight for airplane and helicopter development, as discussed separately ([Engendering a Psychopter through Biomimicry and Technomimicry: insights from the process of helicopter development](#), 2011)

Such arguments help to focus the questions as to whether NATO can learn to "swim" or "fly" in a global psychosocial system ([Counteracting Extremes Enabling Normal Flying: insights for global governance from birds on the wing and the dodo](#), 2015).

NATO as a dynamic configuration of coats of arms and feedback cycles?

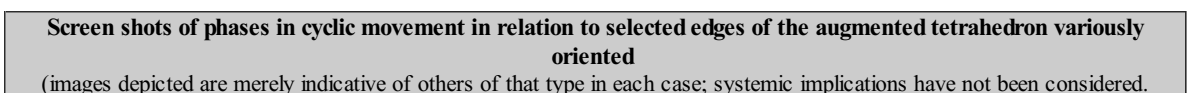
Heraldic coats of arms of NATO members: It is easy to forget that central to the collective identity of each member country of NATO is an emblem or heraldic symbol -- otherwise known as a "[coat of arms](#)" (see [List of coats of arms](#)). Clearly these are symbols relevant to the military preoccupations of NATO -- and effectively implicit in the significance of its own logo. Each national coat of arms has been displayed alongside the coats of arms of other member states in the assembly chamber of the United Nations. They typically feature on the cover of passports and on other official documents.

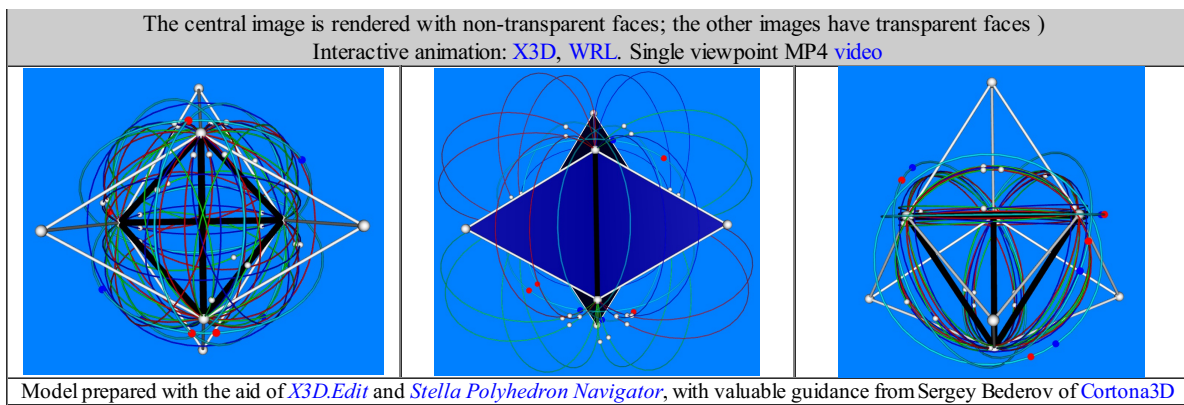
The previous argument with respect to the star tetrahedron and its association with the Star of David focused on the fundamental symbolism of the [Merkabah](#), noting its use (in the form ([Merkavah](#)) as the name of the primary battle tank of the Israel Defence Forces ([Framing Global Transformation through the Polyhedral Merkabah: neglected implicit cognitive cycles in viable complex systems](#), 2017). , The visualizations there can be adapted, as a **preliminary proof of concept exercise**, to indicate how such heraldic devices might be dynamically configured in 3D. The images below show various phases in a complex animation (see [video](#)) using just two tetrahedra (as in the Merkabah exercise). This approach could be extended to include all 5 tetrahedra of the augmented tetrahedron proposed in the above argument. Obviously the limitation in the exercise below is restriction to the use of only 8 faces as mapping surfaces for the symbols of 8 NATO members. This could be extended to 20 (5x4) faces if the augmented tetrahedron was used. Another approach would be to associate such symbols (or some of them) with other features (edges and/or vertices).



It is appropriate to note that NATO has produced its own freely accessible [video regarding NATO membership](#).

Feedback cycles: In the light of the arguments used with respect to the tetrahedral configuration of the Merkabah, circles can be associated with the edges of the augmented tetrahedron as an indication of implicit feedback cycles. This was illustrated in the Merkabah case with a complex animation (see [video](#)) which can be adapted (as with that above) to a complex of cycles. The argument made was that the edges could be understood as implying cycles -- reduced in the symbol to the diameter of an implied circle. As argued with respect to the Merkabah, the question is how complexity in relation to NATO can be reduced to succinct representations which are far more readily comprehensible.





The above animation is again a proof of concept exercise. Many of the features involve design choices which could be made otherwise, notably with respect to rates of movement, circle properties and colouring (as is evident in the contrast with the Merkabah video). In particular the animation only shows circles in relation to sides of the central tetrahedron, not to the four tetrahedral augmentations.

In offering the possibility of associating systemic content with the circles, as a pattern of feedback loops these give a sense of the communication pathways essential to the viability and integrity of NATO. With respect to the argument above for biomimicry, such an animation is visually reminiscent of the [motile cilia](#) in some [eukaryotes](#), or the potentially complex movement of bird wings or fish fins. As pathways, the pattern of circles also recalls the set of [metabolic pathways](#) vital to biological organization (*Comprehending cognitive metabolism*, 2012).

Classification of "projections" versus Classification of "conjections"?

Projections in cartography: Many sources endeavour to clarify the [types of projection in cartography](#). A fundamental projection classification is based on the type of projection surface onto which the globe is conceptually projected. The projections are described in terms of placing a gigantic surface in contact with the earth, followed by an implied scaling operation. These surfaces are:

- **cylindrical** (e.g. [Mercator](#)): these map regularly-spaced meridians to equally spaced vertical lines, and parallels to horizontal lines.,
- **conic** (e.g., [Albers](#)): these map meridians as straight lines, and parallels as arcs of circles.
- **azimuthal** (projections onto a plane, e.g. [stereographic](#)): these map meridians as straight lines and parallels as complete, concentric circles. They are radially symmetrical. In any presentation (or aspect), they preserve directions from the center point. This means great circles through the central point are represented by straight lines on the map..

Many mathematical projections, however, do not neatly fit into any of these three conceptual projection methods. Hence other categories have been described in the literature, such as:

- **pseudocylindrical:** these map the central meridian and parallels as straight lines. Other meridians are curves (or possibly straight from pole to equator), regularly spaced along parallels.
- **pseudoconical:** these represent the central meridian as a straight line, other meridians as complex curves, and parallels as circular arcs.
- **polyhedral maps:** these maps can be folded up into a polyhedral approximation to the sphere, using particular projection to map each face with low distortion.
- **retroazimuthal:** these emphasize the shortest route between locations
- **pseudoazimuthal:** these map the equator and central meridian to perpendicular, intersecting straight lines. They map parallels to complex curves bowing away from the equator, and meridians to complex curves bowing in toward the central meridian. Listed here after pseudocylindrical as generally similar to them in shape and purpose.
- **other:** these are typically calculated from formula, and are not based on a particular projection

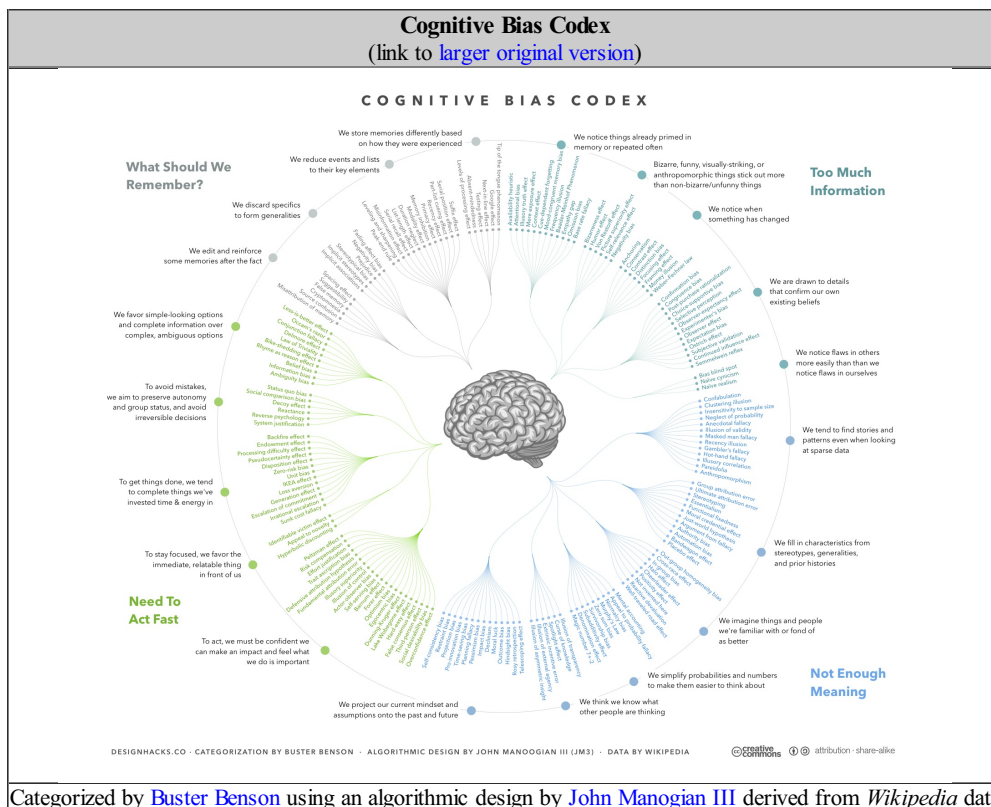
Properties and implied distortions distinguished include:

- **conformal** (orthomorphic): Preserves angles locally, implying that local shapes are not distorted.
- **equal area** (equiareal, equivalent or authalic): Areas are conserved.
- **compromise:** Neither conformal nor equal-area, but a balance intended to reduce overall distortion.
- **equidistant:** All distances from one (or two) points are correct; a trait possible only between one or two points and every other point.
- **azimuthal** (or zenithal), a trait possible only from one or two points to every other point
- **gnomonic:** All great circles are straight lines; preserving shortest route

Projections in psychology: As noted above, [psychological projection](#) is recognized as a process whereby humans defend themselves against their own unconscious impulses or qualities (both positive and negative) by denying their existence in themselves while attributing them to others. Different schools of psychology and psychoanalysis tend to define projection in distinctive ways. A limited number of examples are offered but it is seemingly not the case that there is any classification of modes of projection in any way analogous to projection in cartography (John M. Grohol, *15 Common Defense Mechanisms*, *PsychCentral*, 17 May 2016). With respect to NATO, it is interesting to note the shared emphasis on defence.

Ironically, given the clear distinctions made in cartography, there is a case for exploring the distortions in cartographical projections as a means of distinguishing and "mapping" the distortions in psychological projection. Any such exploration could necessarily be informed by

the more systematic approach to [cognitive biases](#) and their classification (see [List of cognitive biases](#)). The *Wikipedia* description includes a remarkable *Cognitive Bias Codex* as reproduced below. This clusters some 180 biases into 20 subcategories clustered into four main categories:



Such a document is necessarily of value with respect to exploring collective cognitive bias, as might be evident in the case of NATO and its opponents (Robert Cordray III and Marc J. Romanych, *Mapping the Information Environment*, Joint Information Operations Center, 2005; Eric R. Mandel, *Cognitive bias and UNSC Resolution 2334*, *Jerusalem Post*, 3 January 2017; J. T. Byford, *Conspiratorial explanations of the Nato bombing of Yugoslavia: cognitive bias or an ideological tradition*. In: International Society for Political Psychology, Annual Meeting, Berlin, July 2002).

However, whilst the design of the above document necessarily emphasizes the "entropic" tendency towards some form of bias (at any point on the circumference), it offers no clues as to the nature of the reverse "negentropic" process -- framed in the argument above as "conjection". Ironically the form of the diagram echoes that of many traditional [mandalas](#) -- which have that preoccupation but call for other considerations. In the light of the cartographic approaches to projection, it is intriguing that the above design uses an "algorithmic" approach.

Forms of transdisciplinarity as indicative of the "conjection" process: Reference was made above to the various flavours of interdisciplinarity as a conventional surrogate for "conjection". It might therefore be asked how integrative cognitive processes could be fruitfully clustered and classified. One early exercise identified some 600 such "understandings" but explicitly avoided any classification (*Integrative Knowledge and Transdisciplinarity Project: overview*).

A recent exercise collected 43 methods from a number of transdisciplinary research projects dealing with a variety of research topics (Matthias Bergmann, T. Jahn, T. Knobloch, W. Krohn, C. Pohl, and E. Schramm, *Methods for Transdisciplinary Research: a primer for practice*, 2012). These were then grouped into seven classes following an epistemological hierarchy -- starting with methods in the narrower sense, progressing to integration instruments:

1. Integration through conceptual clarification and theoretical framing
2. Integration through research questions and hypothesis formulation
3. Screening, using, refining, and further developing effective integrative scientific methods
4. Integrative assessment procedures
5. Integration through development and application of models
6. Integration through artifacts, services and products as boundary objects
7. Integrative procedures and instruments of research organizations

Missing from such an approach is any sense of the nature of transdisciplinary insight. What is the "transdisciplinary experience", given use of an analogous expression with respect to mathematics (Philip J. Davis and Reuben Hersh, *The Mathematical Experience*, 1981, with a chapter on the *Varieties of Mathematical Experience*; Douglas R. Hofstadter, *Metamagical Themas: questing for the essence of mind and pattern*, 1985; Wolff-Michael Roth, *Phenomenology and Mathematical Experience, Linguistics and Education*). How is this to be related to the argument of [George Lakoff](#) and [Rafael Nunez](#) (*Where Mathematics Comes From: how the embodied mind brings mathematics into being*, 2001).

The latter argument reinforces the implication that "conjection" may be more intimately related to a sense of integrative comprehension

otherwise understood. This was the original preoccupation in collecting some 4,400 such approaches, again explicitly avoiding any classification (*Human Potential and Development Project*). Such classification, through the [AQAL pattern](#), has been a notable preoccupation of the [integral theory](#) articulated by [Ken Wilber](#) (*The Spectrum of Consciousness*, 1977).

Despite the extensive literature cited above, missing would appear to be any meaningful classification of "conjections". Do the classifications with respect to cartography offer indications as to how this might be explored? In terms of the polyocular argument of Maruyama (2004), this would help to clarify the variety of ways in which NATO might be understood -- and might understand itself in relation to its opponents.

References

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