



# *laetus in praesens*

Alternative view of segmented documents via Kairos

16 December 2019 | Draft

## Hearing the Variety of Voices in Climate Change Discourse

### Recognizing the challenge of soundscape comprehension in controversy and emergency

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## Introduction

Current discourse on any theme is readily recognized as characterized by distinctive "voices" and their associated "tones". This could be recognized as the primary characteristic of discourse between political parties -- between the right and the left -- now variously held to be "poisonous" and "toxic".

In a world increasingly preoccupied by tragic loss of biodiversity, less evident is recognition of the range of voices as a requisite variety. So framed the issue has further implications with the loss of song birds and their contribution to the experiential quality of the environment. There is considerable irony to the parallel explosion of engagement in Twitter -- readily recognized as an experiential surrogate. What of the variety of voices on Twitter?

Arguably there is a case for exploring the nature of the soundscape of discourse implied by "voice". How are types of "voice" and "tone" distinguished -- by whom and for what purpose? Who cultivates what kind of "voice" and for what effect?

Most obvious is the characterization of singing voice. A number of systems are used for that purpose, each with particular distinctions of subtypes. Any consensus relates primarily to classical singing and to modes cultivated "in the West". How are the singing voices of other cultures distinguished and appreciated? Do some cultures distinguish voices in highly surprising ways in contrast to those of "the West"?

"Voice" tends to be recognized quite differently in drama where the characterization of singers is relatively irrelevant. This is indicative of the distinctions recognized in discourse and debate -- in parliamentary assemblies, conferences and via the broadcast media. To what varieties of "voice" and "tone" are audiences exposed? How is this variety recognized and valued in the rhetorical arts? When and why is "gravitas" held to be of such value -- or deprecated as a cynical pretence to authenticity? What voices are evoked by disasters and emergencies -- such as climate change?

What "voices" are typically excluded from such contexts? Do these include voices which are more evident in popular protest and demonstrations? What of the voices of the needy and of beggars?

Other voices are to be heard in more tragic contexts -- associated with suffering, bereavement, and loss. These are the voices of agony - - however they may be simulated by actors in dramatic representations. They may well be heard only in constrained contexts and in

private -- as with those evoked by abuse or confined to institutions.

Written text may be recognized as expressing a variety of voices. Authors and others may choose to read such texts, possibly using particular voices and tones as deemed appropriate. Much value may be attached to such a reading by the original author, especially in the case of poetry. Story tellers may well be much appreciated for their capacity in this respect. How varied is the narrative voice?

The following exploration has been provoked by the account of the philosopher François Noudelmann. with regard to the need for "thinking with the ear" -- in a manner capable of hearing beyond what is otherwise conventionally heard (*Penser avec les Oreilles*, 2019). This follows from earlier evocation of that possibility (Theodor Reik, *Listening With the Third Ear*, 1948). Are there indeed lessons from the extensively researched duets of birds which might be of relevance to the "duets" between government and opposition, and between right and left?

## Climate change discourse according to classification of singing voice types?

As introduced by *Wikipedia*,

A **voice type** classifies a singing voice by **vocal range**, **vocal weight**, **tessitura**, vocal **timbre**, vocal transition points (*passaggi*) like breaks and lifts, and **vocal register**. Voice classification was developed for European classical music and seldom applies to other kinds of singing; voice classification is in the **opera** to pair roles with voices. Several different voice classification systems are available to identify voice types, including the German *Fach* system and the **choral music** system among many others; no system is universally applied or accepted.

Voice classification is a tool for singers, composers, venues, and listeners to categorize vocal properties and to associate roles with voices. While choral singers are classified into voice parts based on their vocal range, solo singers are classified into voice types based more on their tessitura – where their voice feels most comfortable for the majority of the time

Distinctions are made between

- female voices: soprano, mezzo-soprano, contralto
- male voices: countertenor, tenor, baritone, bass
- children's voices

Especially in a context in which climate discourse could be understood as taking operatic form, what insights could be derived from distinguishing such voices? Who are the sopranos, the baritones, and the "children's voices" and how are their contributions to be distinguished? The latter question is clearly especially relevant given the surprising role that schoolchildren and adolescents have come to play in that discourse -- as now widely publicized by the media.

In opera importance is attached to the pairing of voices. Is that evident in the case of climate change debate? Are panel discussants chosen to reflect the variety of voices -- from "soprano" to "baritone"?

Especially provocative to exploration through the metaphor of singing voice is the purity of voice of young males -- epitomized by the traditionally much-valued **castrato**. This is a type of classical male singing voice equivalent to that of a soprano, mezzo-soprano, or contralto. The voice is produced by castration of the singer before puberty, or it occurs in one who, due to an endocrinological condition, never reaches sexual maturity.

## Types of singing as indicative of modes of climate change discourse

The metaphoric relevance of singing voices to climate change can be fruitfully extended through types of singing, as notably related to music genres and separately argued (*Clues to patterns of dialogue from song*, 2011). These may include,

- **plainsong**, as developed within the liturgies of the Western church. This is monophonic, consisting of a single, unaccompanied melodic line. Could its harmonic purity when chanted be upheld as comparable to the discourse processes of climate scientists -- then to be recognized as a form of "sacred music" envisioning "heaven" (and requisite belief) and rejecting the temptation and dangers of "hell"? *Wikipedia* offers profiles of **Gregorian chant** types, for example: **Prayer**, **Reading** or **Lection**, **Psalm**, **Canticle**, **Hymn**, **Prose**, **Antiphon**, **Responsory**, **Introit**, **Gradual**, **Tract**, **Alleluia**, **Sequence**, **Offertory**, and **Communion**. As a form of sacred music this is consistent with metaphoric reference to strategies of climate change promoting the necessity that everyone should be "singing from the same hymn sheet". Failure to do so is then readily framed as disruptive -- a form of discordance which may be seen to justify condemnation employing other metaphors from religion.
- other types, as particularly recognized from a Western perspective: pop / rock, opera and classical, country, folk, blues and jazz, hip hop, rap, reggae, and avant garde

More challenging (and of potentially greater relevance) in the quest for the implications of such styles for climate change discourse is the interactive map on the **Every Noise at Once** website. This is an ongoing attempt at an algorithmically-generated, readability-adjusted scatter-plot of the musical genre-space, based on data tracked and analyzed for 3,786 genre-shaped distinctions.

Given the variety this mapping encompasses, it clearly reflects a methodology of which there is little trace in relation to climate change discourse. It would be difficult to distinguish the styles of such discourse in terms of even the simpler classification of types from a Western perspective. This then frames the challenging question as to whether such discourse is indeed best framed metaphorically as monophonic "plainsong" or "plain chant" -- adapted to the "liturgical form" of international climate change conferences.

## Distinctions of "voice" in the art of climate change rhetoric?

Potentially of the greatest relevance to climate change discourse is the artful practice of [rhetoric](#). This is the art of persuasion which -- together with grammar and logic -- is one of the three ancient arts of discourse. Historically this has played a central role in Western education in training orators, lawyers, counsellors, historians, statesmen, and poets. Renewed interest in the art has subsequently been developed.

Concern with rhetoric has been articulated in relation to climate change:

- Roger Pielke: *The Yawning Gap Between Climate Rhetoric and Climate Action* (*Forbes*, 19 September 2019)
- Daniel W. Drezner: *The Rhetoric of Reaction to Climate Change: futility and the Fourth Climate Change Report* (*The Washington Post*, 26 November 2018).
- Sarah Ives: *Super-Storms, Polar Bears, and Droughts: the rhetoric of climate change* (*Stanford Libraries*, 2016)
- Edit Antal and Simone Lucatello: *Narrative, Rhetoric, and Reality Of Climate Change: do we need more?* (*Revista Scisan*)
- Philip Malley: *Changing the Rhetoric in the Climate Change Debate* (*Unite America*, 25 April 2018)
- Philip Eubanks: *The Troubled Rhetoric and Communication of Climate Change: the argumentative situation* (*Routledge*, 2015)
- Lynda Walsh: *Understanding the Rhetoric of Climate Science Debates* (*Wiley Online Library*, 2016)

The latter reference is especially helpful in clarifying a misunderstanding with regard to the meaning and use of rhetoric, as expressed by the following:

Scientists and policymakers alike frequently call for the elimination of rhetoric from discussions of climate science. These calls betray some fundamental misunderstandings about the 2500-year-old art of rhetoric. Once these are dispelled, it becomes apparent that what we need for effective climate-science debate is not less rhetoric but more: that is, more sensitivity to the political frame within which every debate takes place and how that frame shapes deliberation; more awareness of the unstated values and assumptions supporting statements made on all sides; more ways to link climate to stakeholders' daily lives, values, and decisions.

Especially elusive is the meaning of "voice" in debate characterized by rhetorical art. This is less evident in relation to climate debate. Some clarification is offered in quotations compiled by Richard Nordquist (*The Writer's Voice in Literature and Rhetoric: glossary of grammatical and rhetorical terms*, *ThoughtCo*, 24 April 2019) -- if extended into debate more generally. For example:

- Donald Murray: Voice is usually the key element in effective writing. It is what attracts the reader and communicates to the reader. It is that element that gives the illusion of speech...." Voice carries the writer's intensity and glues together the information that the reader needs to know. It is the music in writing that makes the meaning clear (*Expecting the Unexpected: Teaching Myself--and Others--to Read and Write*, 1989).
- Don Fry: Voice is the sum of all strategies used by the author to create the illusion that the writer is speaking directly to the reader from the page. (quoted by Roy P. Clark, *Writing Tools*. Little, Brown, 2006)
- Ben Yagoda: Voice is the most popular metaphor for writing style, but an equally suggestive one may be delivery or presentation, as it includes body language, facial expression, stance, and other qualities that set speakers apart from one another. (*The Sound on the Page*. HarperCollins, 2004)

With regard to the attentive clarification of the variety of voices, it is somewhat amazing to discover an early argument by [Benjamin Suggitt Naylor](#) (*A Rhetorical Grammar, Wherein the Common Improperities in Reading and Speaking are Exposed, and the True Sources of Elegant Pronunciation Pointed Out*, C.A. Spin, 1822) in commenting on a seminal analysis by [John Walker](#) (*Elements of Elocution: in which the principles of reading and speaking are investigated*, Cooper and Wilson, 1799):

It may be remarked in passing, that Mr. Walker was a much better Rhetorician than Arithmetician; for (according to the Compiler's computation) the *five* modifications of the voice alone, admit of a variety to the number of 120; and the addition of but *one* of the combinations swells the variety to 720; while the *five* modifications united with the *six* principal variations admit of 39,916,800 varieties of voice; and this astonishing number is still augmented by the lesser variations, which being indeterminate are thereby rendered incalculable.

Did the varieties of the Voice not amount to more than about 200, there would be but little difficulty in arresting speaking sounds, and reducing them to Rule; it is the vast variety of tones which the speaking voice is susceptible of that presents the insurmountable barrier to placing all the turns and tones of voice upon paper, which a good reader or speaker throws into his delivery.

Were *Alexander's Feast* by Dryden, to be read with only about 200 varieties of voice, it would be a most pitiable reading indeed: a good reader would not rest satisfied with hundreds, but would throw thousands of varieties of voice into that Ode; and no correct Ear could be charmed unless there were several thousands.

Any tongue-in-cheek implications aside, of some relevance is the sense that climate change may call for a wide variety of voices -- potentially reflecting the complexity of the situation, the variety of climate types, and even the biodiversity endangered by any change. The question lends itself to speculative reflection (*Enrolling Winnie-the-Pooh's Companions in Climate Change Discourse: key roles in the environmental psychodrama of Hundred Acre Wood*, 2019).

The challenge may however lie in recognition of the requisite variety of roles and in their orchestration. It is unclear how explicitly or

implicitly this challenge is addressed in the design of conferences, debates and collective presentations via the media.

Who has been attentive to the range of rhetoric styles at the periodic COP summits -- and its requisite variety in articulating the challenge and evoking a coherent response?

## Gravitas as the requisite voice for crisis and climate emergency?

Especially valued in times of emergency, expression with "gravitas" serves to frame the serious nature of the situation. In a study devoted to boosting gravitas, Caroline Goyder distinguishes the importance of low vocal tone, the fundamental role of pauses, with pace recognized as a key (*Gravitas: Communicate with Confidence, Influence and Authority*, 2014). The development of gravitas is the focus of courses:

- *How to Develop Gravitas: be the voice of wisdom and influence;*
- *Lunch and Learn Workshop: Gravitas: voice and presence*
- *Ignored by people you want to impress? Understand and develop Gravitas!*
- *How to Develop Gravitas*, (YouTube, 2015)
- *Gravitas and Confidence and Training*

Achieving gravitas is a particular focus of public speaking, especially in order to engender confidence in the speaker and the credibility of the message. Clearly it has an import role to play with respect to engendering confidence with respect to the gravity of the climate change crisis. References to that focus are confused by the fact that "Gravitas" has been appropriated as the name of a charity having a particular concern with climate change (*Gravitas: Climate Change: The Inconvenient Truth*, YouTube, 26 November 2019). Similarly the term has been adopted by Gravitas Ventures otherwise variously associated with climate change.

The association of climate change with gravitas is however less than evident. The point is usefully argued more generally by Ian Jack (*Our Age Lacks Gravitas -- that's why we cannot deal with crisis*, *The Guardian*, 8 December 2018).

However [The Climate Change Project](#) introduces its series of reports with the argument:

There are many climate change conversations underway, including how governments, cities, intergovernmental organisations, and the private sector are working to comply with the Paris Agreement. These conversations are complex, with numerous players and issues involved. The Climate Change Project's report series reflects a "conference in a box" approach to informing readers about some of these conversations, including clean energy finance, technology innovation, legislative initiatives, and evolving city infrastructures. The reports feature new insights in the form of interviews, panel discussions, and whitepapers authored by expert contributors. Stylistically, the reports combine the gravitas and integrity of academic reports with the more creative and social elements of a worthwhile conference.

As noted by Jon Barnett (*Security and Climate Change*, *Global Environmental Change*, 13, 2003):

The President of the Federated States of Micronesia has put this bluntly: "sea-level rise and other related consequences of climate change are grave security threats to our very existence as homelands and nation-states."... Despite these problems with any potential climate-change security discourse, it may nevertheless have some utility. Security communicates a certain gravitas that is arguably necessary in climate change policy. In that climate change is a security problem for certain groups, identifying it as such suggests that it is an issue that warrants a policy response commensurate in effort if not in kind with war.

Climate reductionism has been identified by [Mike Hulme](#) in terms of five intersecting dimensions through which climate has been extracted from "the matrix of interdependencies that shape human life within the physical world" (*Reducing the Future to Climate: a story of climate determinism and reductionism*, 2011, p. 247). In commenting on this, Lisa Reyes Mason and Jonathan Rigg note:

Because such positivist assessments, which have dominated not least the work of the Intergovernmental Panel on Climate Change, "determine the framing of what exactly is the climate change 'problem' that needs to be 'solved; and they set the tone for the human imaginative engagement with climate change" (Hulme, 2011, p. 177). Scientific knowledge is both partial and political. Issues are framed in particular ways, and evidence takes a certain form, is collected using approved protocols and methodologies, and is given intellectual gravitas through accepted framings. (*People and Climate Change: vulnerability, adaptation, and social justice*, 2019, p. 6)

More problematic however is the cynical recognition of the necessity for communication "with gravitas" -- given that the authenticity of any such communication is readily called into question as authorities exploit assumptions regarding the credibility it engenders. As noted by Nina Hall:

Governments adopted this alarmist view of climate change migration as it fitted with their conception of high politics. Leaders securitized climate change as it communicated a "certain gravitas ... and warrants a policy response commensurate in effort if not in kind with war. (*Displacement, Development, and Climate Change: international organizations moving beyond their mandates*, Routledge, 2016, p. 38)

The constraint on the use on gravitas is especially evident in operatic drama, where it may be variously challenged to good effect by

those using a different voice. The challenge may take the form of humour in some contexts. This process could be recognized in the discomfort to those in authority currently caused by protesting schoolchildren worldwide.

## Unquestionable voices of authority and command in a context of emergency?

The climate change crisis has made especially evident that the authority which climate scientists claim, and to which their academic credentials supposedly entitles them, does not command the automatic response they consider appropriate. A similar pattern has long been evident as a challenge for religious leaders and leaders of political parties. The challenge is a feature of leadership of business enterprises and the military and of how the voice of command is interpreted by those exposed to it.

The question in relation to emergency is what form the voice of command can take -- with its associated tone. How might any choice play out in the case of climate change?

Clues might be found in a range of contexts:

- Domestic animals: Clearly the process of taming and subsequent control necessitates a tone of command. Nuances are highlighted through movies such as *The Horse Whisperer* (1998) and *Dances with Wolves* (1990). Distinctions are made between those who employ a forceful voice and those who favour a softer approach.
- Children: much is made of the appropriateness of voice and tone in commanding children. Different styles are adopted and controversially debated. Some verge into abuse and others into laissez-faire. There are many commentaries on the failure of children to obey their parents commands, however formulated.
- Employees: Again a considerable range of styles are advocated, adopted and variously disputed. As with children, employees may variously seek to avoid obeying to the letter the orders of their employees
- Educational institutions: With respect to this argument, little needs to be said in the light of the crisis in universities in the USA, and elsewhere to lesser extent.
- Religious institutions: The obedience to orders, however reinforced by religious obligations, has been called into question in many historical contexts. This pattern remains a matter of controversy.
- Military institutions: The need for obedience is especially evident in the military. The instances of disobedience, and its appropriateness, continue to be a matter of debate.

It is the military which claims a mandate to respond most appropriately to emergencies and to distinguish their relative urgency. Like other countries, the USA distinguishes a 5-level [Defense Readiness Condition \(DEFCON\)](#) and the corresponding 5 [UK threat levels](#). These are a measure of the progressive postures of activation and readiness of the armed forces. Of relevance to climate emergency, it could be asked what form of voice and tone a command might take at the different threat levels distinguished by the military.

The question is more readily understandable in the case of natural disasters, given the voice with which the relief services consider it appropriate to usher people to their safety -- or require that they leave their homes. Here too however, there are those who resist such voices and refuse to be ushered. How grave must climate change become before the voice shifts from that appropriate to one threat level to another more extreme -- with sanctions mandated against those who disobey?

Whilst some branches of the military claim and require total and immediate obedience, it is science fiction which has explored extreme forms of "voice". In the case of the iconic *Dune* (1965) series, "voice" referred to an audio-neuro control mechanism that enables the manipulation of speech to achieve complete control over a receiver. In that context, it is perfected by the Bene Gesserit through the combined training of several advanced techniques. A related device featured as the voice of extraterrestrials in *Stargate* (1994). Is there a need for "Bene Gesserit" of climate change?

## Engendering a reality distortion field for climate change: the role of charisma?

Charisma has been an acknowledged -- if controversial -- feature of promotion of environment-related concerns through use of iconic animal like the panda.

Usefully recognized as far more subtle than gravitas is the role that voice plays in projection of charisma. Arguably, despite criticism of her style, it is a form of charisma which has contributed to the remarkable role of Greta Thunberg in relation to climate change and its particular recognition (*Greta Thunberg named Time magazine's person of the year*, *The Guardian*, 11 December 2019). Her charisma is potentially to be considered as greater than that of others in the field -- especially since many with that preoccupation would attach little meaning to charisma in contrast with "facts". Given the emphasis on voice in this argument, it is appropriate to note the probable influence of Greta Thunberg's mother as a Swedish mezzo-soprano (*Malena Ernman, is an opera rock star* (*CBC Music*, 26 September 2019).

Rather than charisma as such, the entrepreneurial world has recognized the role of so-called "[reality distortion fields](#)" projected by key personalities (Steve Jobs, Egon Musk, and the like) -- most notably through the use of voice. Such fields are described as the ability to convince oneself and others to believe almost anything with a mix of charm, charisma, bravado, hyperbole, marketing, appeasement and persistence -- many of which involve the use of voice.

Reports note that business is cultivating the quality of voice used by CEOs is variously described (Robert Lee Hotz, *How to Train Your Voice to Be More Charismatic*, *The Wall Street Journal*, 1 December 2014). This is based on the scientific analysis of the voices of public leaders -- in terms of the harmonics of pitch, frequency and timbre -- to discover the basis for charisma. It is suggested that the secret of a CEO's success may be in the voice. In order to improve image, the use by Margaret Thatcher of a voice coach is noted (*Margaret Thatcher - Voice Before-and-After Lessons*, *Awesome Stories*, 7 October 2013). Of potential relevance to presentations by climate scientists, research on the voice of surgeons suggests that this may be a determining factor in the initiation of malpractice

litigation by patients (N. Ambady, et al, *Surgeons' tone of voice: a clue to malpractice history*, *Surgery*, 132, 2002, 1)

A newsletter with charisma as its major theme has noted its manifestation in the climate change discourse (*Charisma News: Climate Change*). Michael Brown: *The Religion of Climate Change and the New Doomsday Scenario* *Charisma News*. 10 February 2019).

Of particular relevance to climate change discourse is the clarification of the nature of "charismatic facts" (Abby Cunnane, Lina Moe, and Amy Howden-Chapman, *Climate Change Poetry and Prose, The Distance Plan*):

Charismatic facts are magnetic; they move from speaker to speaker, gaining velocity and weight the more they circulate and the further they travel from their point of disciplinary origin. Charismatic facts can be used by speakers in many situations, including academic, political, or informal conversation. Before a data point becomes a charismatic fact, linguistic and methodological barriers preventing interdisciplinary circulation must be overcome. One might encounter a charismatic fact on a protest sign, in a speech before the UN, or over the course of a family argument. A charismatic fact becomes commonsensical and emotionally compelling when it is stripped of field-specific language, but retains vestiges that signal its credentials. These authority signals might be authorial, institutional, or linguistic.

The editors of *The Distance Plan* conclude:

This issue offers the idea of charismatic fact as provocation rather than fixed concept, as something prompting further thought and welcoming opposition. Our contributors gesture towards the potential instrumentality – as well as liability – of charismatic facts in the public discussion of climate change. In their crystalline portability and ready-to-handedness, do charismatic facts offer frustrated climate scientists a discursive strategy for making their arguments not just heard, but repeated, and circulated, even while retaining their core meaning? Can the 'stickiness', the ear-worminess, the dynamism of a charismatic fact be put to work in aid of a more informed, participatory discussion? Rather than fear-driven sound bites that bring paralysis to our confrontation with the gravity of contemporary climate science, we ask whether that charismatic facts, as information in motion, may collectively pull us forward into new and urgently needed discussion.

## Distinctions of tone and voice of value in addressing climate change

Greater insight with respect to climate change communication might be expected to be found in the preoccupation of actors with choice of voice in seeking to interpret a character. As discussed by the BBC with respect to *Describing Voice*, the voice elements to be considered include:

- pitch: speaking in a high, low or natural voice.
- pace: the speed at which someone speaks, eg the speed of response in an argument.
- pause: a dramatic pause at a crucial moment could merit a comment.
- tone: this suggests your mood and your intention towards the listener, eg happy or sad.
- volume: you might be commenting on audibility but you're more likely to be discussing the effect of a loud, powerful voice or a quiet, nervous or sad voice.
- accent: you may be talking about how someone has achieved a convincing accent or how the choice of accent enhanced their characterisation.
- emphasis: the pressure on individual words that makes them stand out. Emphasis or stress for a particular effect is significant and can change the meaning of a sentence as well as the feeling behind it.
- intonation: the rise and fall of the voice. There's a clear movement up at the end of a sentence when we ask questions for example. Intonation also helps us to say what we mean.

Of interest is the question as to where the diversity of tones and voices might be found of potential relevance to climate change. Drama offers one source and indeed one list of 148 words is available (Justin Cash, *Words Used To Describe Voice In Performance, The Drama Teacher*).

A more extensive list is also available, with comments on each word (J. A. Stinger, *240 Words to Describe Someone's Tone/Voice, Words Can Inspire the World*, 14 November 2017) -- unexpectedly reposted on a science fantasy site (*240 Words to Describe Someone's Tone/Voice (Star Trek Theurgy)*). A much shorter list of 37 words is used to describe tone of voice in planning or evaluating a website content (Kate Moran, *Tone-of-Voice Words*, Nielsen Norman Group, 17 July 2016).

The question can then be reframed in terms of which descriptors are vital to climate change discourse and emergencies and which can be considered irrelevant -- and why. Inspection of such lists also evokes questions about particular descriptors which are absent, even though a case could be made for their inclusion.

Seemingly missing from lengthy checklists of descriptors of voice and tone is a systemic clustering which would facilitate identification of those most valuable in relation to urgency. Part of the difficulty is that "voice classification" focuses too readily on singing voices, whether or not each is understood as implying qualities with which such descriptors are associated. Additionally, [voice classification](#) is a subject about which there is much disagreement, as noted separately -- however rich the articulation.

Given that the checklists frame voice-tones variously held to be of value, a method could be envisaged to derive a provisional clustering. Two approaches could be considered, or their combination:

- identification of the values with which each descriptor can be associated through the database of the [Human Values Project](#). This distinguishes 987 "constructive" and 1992 "deconstructive" values. These are variously paired into 230 "value polarities" which are

in turn clustered into a 5x9 matrix of 45 "value types".

- independently of the existing checklists, the set of "value types" could be interpreted as contrasting forms of voice expression -- to be challenged by confrontation with those identified in the checklists (and recognition of descriptors missing from them).

Of some relevance, the database of the Human Values Project is integrated with that of the [World Problems Project](#) and that of the [Global Strategies Project](#) -- suggesting a possibility of linking "voice" with climate change as a problem, and with strategies envisaged in response to it. The approach would then be potentially relevant to other crises. Given the manner in which the figurative implies or holds values variously deemed vital, such classification calls for continual refinement (*Questionable Classification of Figures of Speech -- as fundamental to the need for powerful rhetoric in governance*, 2016).

## Orchestration of a requisite variety of voices in response to climate change?

**"Instruments"**: Symphonic and orchestral music has long had a preoccupation with the [orchestration](#) of a variety of instruments and "voices" -- typically those distinguished by "voice type" and "voice classification" (soprano, baritone, etc) and their subtypes. As noted by *Wikipedia*, The typical symphony orchestra consists of four groups of related musical instruments: [woodwinds](#), [brass](#), [percussion](#), and [strings](#). Other instruments such as the [piano](#) and [celesta](#) may sometimes be grouped into a fifth section such as a [keyboard section](#) or may stand alone, as may the [concert harp](#) and [electric and electronic](#) instruments. The orchestra, depending on the size, contains almost all of the standard instruments in each group.

This suggests the metaphorical use of such distinctions in clarifying cognitively the requisite variety of modes of expression -- as "instruments" -- through which the challenge of climate change could be fully articulated and comprehended. The possibility is of topical interest given the recent historic agreement of the European Parliament (*The European Parliament declares climate emergency*, *News: European Parliament*, 29 November 2019; *European Parliament declares global climate emergency*, *Politico*, 28 November 2019).

The relevant point that can then be made is that, as with other European institutions, the Parliament attaches symbolic importance to the [Anthem of Europe](#) -- based on "Ode to Joy" from the fourth movement of [Beethoven's 9th Symphony](#). Could the European Parliament see itself as an orchestra with the range of "voices" characteristic of the political parties within the Parliament? The orchestration of the Anthem does however suggest the need for strategic recognition of the variety of "voices" through which strategic implementation can be articulated most appropriately.

<b>"Instrumentation" required for the Anthem of Europe -- indicative of distinctive voices required for climate change?</b>				
Woodwinds	Brass	Percussion	Strings	Voice (*)
Piccolo (*)	Horns 4	Timpani Bass drum (*)	Violins I, II	Soprano solo
Flutes 2	Trumpets 2	Triangle (*)	Violas	Alto solo
Oboes 2	Trombones 3 (*)	Cymbals (*)	Cellos	Tenor solo
Clarinets 2			Double basses	Baritone (or bass) solo
Bassoons 2				SATB choir
Contrabassoon (*)				
(*) fourth movement only				

**"Orchestration"**: It has been too conveniently forgotten that "organization", as the conventional basis for implementation of any strategy, derives from early reference to [singing the organum](#) -- a plainchant melody -- and its later associations with the [organ as a musical instrument](#). Metaphorical use may however continue to be made of "orchestration" in elaborating an institutional response, including any related public relations campaign. This suggests the need for further consideration of the [musical organ metaphor](#).

Whether as human voices or musical instruments, climate change suggests a need to explore how these should be "orchestrated". As exemplified in singing, of particular relevance are the insights from the multi-vocal dynamics of polyphony and multi-part singing. These contrast with what is readily recognized as the cacophony of voices in a democracy -- or the boredom which monologues may dangerously engender. How is a gathering of stakeholders to be understood as orchestrated -- especially when "singing in unison" or "from the same hymn sheet" fails to recognize the contextual complexity -- the psychosocial diversity?

The description of the process of orchestration, as by *Wikipedia*, calls for recognition in metaphorical terms as indicative of more fruitful ways of considering the strategic possibilities of psychosocial orchestration:

An orchestrator is a trained musical professional who assigns instruments from an orchestra or other musical ensemble to a piece of music written by a composer, or who adapts music composed for another medium for an orchestra. Orchestrators may work for musical theatre productions, film production companies or recording studios....

The term orchestration in its specific sense refers to the way instruments are used to portray any musical aspect such as melody, harmony or rhythm. For example, a C major chord is made up of the notes C, E, and G. If the notes are held out the entire duration of a measure, the composer or orchestrator will have to decide what instrument(s) play this chord and in what register. Some instruments, including woodwinds and brass are monophonic and can only play one note of the chord at a time. However, in a full orchestra there are more than one of these instruments, so the composer may choose to outline the chord in its basic form with a group of clarinets or trumpets (with separate instruments each being given one of the three notes of the chord). Other instruments, including the strings, piano, harp, and pitched percussion are polyphonic and may play more than one note at a time. As such, if the composer/orchestrator wishes to have the strings play the C major chord, he could assign the low C to the cellos and basses, the G to the violas, and then a high E to the second violins and an E an octave higher to the first violins. If the composer/orchestrator wishes the chord to be played only by the first and second violins, he could give the second violins a low C and give the first violins a double stop of the notes G (an open string) and E.

Additionally in orchestration, notes may be placed into another register (such as transposed down for the basses), doubled (both in the same and different octaves), and altered with various levels of dynamics. The choice of instruments, registers, and dynamics affect the overall tone color. If the C major chord was orchestrated for the trumpets and trombones playing fortissimo in their upper registers, it would sound very bright; but if the same chord was orchestrated for the cellos and string basses playing *sul tasto*, doubled by the bassoons and bass clarinet, it might sound heavy and dark.

It is appropriate to note the focus of [John Kao](#) on a variant of this metaphor for strategic innovation (*Jamming: The Art and Discipline of Business Creativity*, 1996). He notes:

Management is a performing art. Like teachers, like litigators, like film directors, like politicians, like generals, like coaches, the best managers have a bit of the ham in them. Or they should, if they want to build creative organizations.

As described by Jon McKenzie (*Perform Or Else: From Discipline to Performance*, Routledge, 2002):

Kao does not cite marching music or Shakespearean theater, but rather the improvisational jam session of experimental jazz, which he uses as a metaphor throughout his text. A jazz musician himself, Kao writes that a jam session *is not formless self-indulgence or organizational anarchy. The music follows an elegant grammar, a set of conventions that guide and challenge our imagination .... That's jamming. The management of creativity is rich in such paradoxes. It is both an art and a discipline.*..., Kao stresses the need to work with different value systems, but rather than present a dialogue of thinkers, he outlines a postindustrial "idea factory". Here the improvisational mastery of *creativity management is matter of process skills as well as finding and developing a variety of spaces where critically supportive listening can take place*. Kao also justifies the need for creativity by pointing to rapid and continuing changes in the business environment, such as the increasing importance of information, worker demands for more creative jobs, and the shift to customer-oriented services. (p. 87)

How might the response to climate change be fruitfully reframed from the aesthetic perspective of orchestration?

**Proactive response to crisis:** Given the current crisis of Europe, the possibility of raising the [Flag of Europe](#) upside down as a sign of distress is not meaningful -- especially given the design of the flag. However, combined with the crisis of climate change, the challenge could also be provocatively indicated by reversal of the Anthem of Europe, as separately discussed (*Reversing the Anthem of Europe to Signal Distress*, 2016).

However, rather than exploring such an extreme, the EU proposal for a [European Green Deal](#) offers a quite distinctive opportunity, consistent with the argument above (Ursula von der Leyen, *Europe must lead on the climate crisis: the European Green Deal shows how*, *The Guardian*, 11 December 2019). Through what "voices" could such a Deal be rendered comprehensible and attractive -- as an extension of a more general argument presented separately (*A Singable Earth Charter, EU Constitution or Global Ethic?* 2006; *Participative Development Process for Singable Declarations*. 2006).

Stated in its most succinct terms, if the Green Deal is not articulated in "singable" form, how probable is it that it will be quickly forgettable to most -- as with [Agenda 21](#) and the [Millennium Development Goals](#)?

Given its remarkable musical heritage, and the role of the *Anthem of Europe*, why has European imagination not engendered a creative manner of framing the [requisite variety](#) of voices to sustain any European initiative in response to the challenge of climate change?

## Loss of sentinel species as an "inaugural voice" for decision-making?

With respect to this argument, there is a strange irony to the fact that it is only at the other end of the planet from Europe, within a country currently in flames, that music in contrasting styles has emerged to address the challenge of climate change:

- [Climate Justice Network](#) (University of Tasmania): *Global Warning*. World premiere performance of a song cycle for soprano and string quartet by Tasmanian composer Owen Davies, with Helen Thomson, soprano, and the Pillinger String Quartet
- [Climate Tasmania](#): *Music for a Warming World* (a concert hosted by Folk Federation of Tasmania; *Music for a Warming World sponsored by Climate Tasmania*, 24 February 2017)
- Chris Gillett: *Pond's Tasmania takes on the perils of climate change* (*Young Post*, 10 March 2019; El Hunt, *Pond reveal all about climate change-inspired, Kevin Parker-produced new album 'Tasmania'*, *NME*, 20 February 2019). These describe an Australian band's eighth studio album

There is a further and far more tragic irony to the fact that it is the original inhabitants of a distant land, currently in flames as a consequence of climate change, that continue to uphold the traditional practice of "singing the land" (Helen Watson, *Singing the Land, Signing the Land*, 1989; Jill Stubington, *Singing the Land: the power of performance in Aboriginal life*, 2007). The process has been notably highlighted by [Bruce Chatwin](#) (*The Songlines*, 1987).

Faced with widespread drought, Aboriginal communities are now holding special festivals:

We're going to start dancing and singing the land... Singing the rivers, singing our environment back again to make it healthy (*Thirst turns to anger as Australia's mighty river runs dry*, *Euronews/Reuters*, 24 October 2019)

This is a tradition totally marginalized and meaningless in Europe, if not completely lost. Curiously it could be said that "singing the land"

had been enabled in quite a different way in Europe -- through songbirds. Their voices have however been increasingly lost through their negligent destruction, and despite specific European Commission directives in that regard. Originally home to more than 500 wild bird species, at least 32 % of the EU's bird species are currently not in a good conservation status ([The Birds Directive, European Commission: Environment](#), 7 August 2019). Concerned with their decline, Member States had unanimously adopted Directive 79/409/EEC in April 1979 -- the oldest piece of EU legislation on the environment and one of its cornerstones. Amended in 2009, it became the [Directive 2009/147/EC](#). This has not prevented systematic hunting of such birds in some EU countries -- defended as a traditional practice.

As noted by Richard Conniff, when Europeans walk out the door these days, they hear or see an estimated 421 million fewer birds than in 1980 ([Hundreds of Millions of Songbirds Are Disappearing, TakePart](#), 4 November 2016; Luke Dale-Harris, [The Massacre of Europe's Songbirds, Newsweek](#), 2 July 2015; Michael Gross, [Europe's bird populations in decline, Current Biology](#), 25, 2015).

More curiously, songbirds could now be appropriately recognized as [sentinel species](#) -- providing humans with advance warning of danger -- as with historical use of canaries to detect gas in coal mines. Europe is now in the curious situation of both effectively ignoring the voices of its sentinel species and enabling their eradication. Over the period of their recent demise, the focus of collective attention has shifted to a strange surrogate, namely the "tweeting" enabled by Twitter -- with the strange new opportunities of sonification now offered (as discussed below)

By contrast, from a historical perspective, it is appropriate to note the considerable importance for decision-making associated with wild birds in the Roman Empire.

By the time of the Romans, those practiced in the art of augury were helping to make key social and military decisions based on their interpretations of the world of birds ([A Brief History of Forecasting, ForesightR: trends and forecasting strategies](#), 6 May 2016)..

Traces of this are evident in current institutional practice through use of "inauguration" and "auspices". In ancient Rome, the appointment and inauguration of any magistrate, decisions made within the people's assembly, or the advancement of any campaign, always required a positive *auspicium*. [Augury](#) was the practice from ancient Roman religion of interpreting omens from the observed flight of birds. When the practitioner, known as an [augur](#), interpreted these signs, it was termed as "taking the auspices" -- literally by "one who looks at birds". It might be asked how augury would now interpret the implications for the EU of the dramatic decline in migrating birds -- in contrast with interpretation by modern equivalents such as [forecasting](#), [futures studies](#) or anticipation studies (Roberto Poli, [Introduction to Anticipation Studies](#), 2017).

Given the Green Deal under consideration by the European Parliament, is there a case for a "Green Deal for Songbirds" -- as a development of the EU's [Ecosystem services and Green Infrastructure](#)? Alternatively, might the "inauguration" of that initiative be interpreted as dangerously inadequate -- being "without consideration of the birds"?

The corruption of significance with which the EU is now ironically faced is epitomized by the case of "Songbird" as the parent company of "Canary Wharf Group", which is active in the development, investment and management of property in London, primarily in the Canary Wharf area ([Case M.7474 -QIA/ BPP/ SONGBIRD Commission decision pursuant to Article 6\(1\)\(b\) of Council Regulation \(EC\) No139/2004 and Article 57 of the Agreement on the European Economic Area](#), 21/01/2015).

## Types of duet as a reframing of climate change discourse

A [duet](#) is a musical composition for two performers in which each has equal importance to the piece -- whether instrumental or sung. The technical possibilities of the pattern has been a focus of some composers. One summary by Robert Huntington ([Duet: Definition, Singers and Songs](#)) distinguishes:

- Isorhythmic Duets: namely a melody sung by one voice harmonized by a second voice, with both parts moving together in similar rhythm
- Counterpoint/Partner Song Duets: namely with each singer having their own independent melody; possibly with one part moving at a slower rhythm, and each part with its own text.
- Call and Response Dialogue and Duets: namely with an alternation or echo between two voices

Of related interest is the manner in which similar patterns are a feature of jazz groups through the voices of different instruments, possibly allowing for improvisation. For example, from the perspective of avant-garde composer [Vinko Globokar](#), consider the implications, as a metaphor for group operation of his following description of a piece of music generated through the improvisation rules he provided ([Drama and Correspondences](#), Harmonia Mundi, 20 21803-1). Correspondences are based on the principle of mutual psychological reactions and attempts to 'join' the four participants with each other and to make them increasingly dependent on each other. There are four levels:

- a. The musical material is entirely fixed, but the choice of instruments is left open.
- b. Each musician possesses only incomplete instructions. In order to be able to play, each musician must search for missing material in the performance of the neighbour (itches from the first, length from the second, etc) and react to it in different ways: imitate, adapt himself to it (if need be, further develop), do the opposite, become disinterested or something else (something 'unheard of').
- c. The composed material is completely substituted by the description of the possibility arising from the reactions of the performers to their neighbours.
- d. On the last level, it is left up to the performers whether to cease playing or to continue; for not even the selection of reactions is now necessary

As suggested above, much of relevance to political discourse might be learned from the duet of birds. As summarized by Michelle L. Hall (*A Review of Vocal Duetting in Birds, Advances in the Study of Behavior*, 40, 2009):

Avian duetting is an unusual but taxonomically widespread phenomenon, occurring in over 400 species, representing 40% of bird families. Duets vary in form from loosely overlapping songs to highly coordinated duets where paired birds both adjust the timing and type of phrases they sing to fit those of their partner over the course of the duet. Duet coordination therefore signals how attentive an individual is to its partner, both to the partner and to other listeners. While some aspects of duetting are poorly understood, such as its ontogeny and causation (including hormonal and neural bases), it is clear that duetting serves multiple functions, including maintaining the year-round territories and partnerships that characterize many duetting species.

For David M. Logue and Daniel Brian Krupp (*Duetting as a Collective Behavior Frontiers in Ecology and Evolution*, February 2016):

Mated birds of many species vocalize together, producing duets. Duetting behavior occurs at two levels of organization: the individual level and the pair level. Individuals initiate vocalizations, answer their mates' vocalizations, and control the structure and timing of their own vocalizations. Pairs produce duets that vary with respect to duration, temporal coordination, and phrase-type combinations, among other properties.

Of notable interest to bipartisan governance is the role of coordinated duets, as presented by Paweł Ręć and Robert D. Magrath (*Deceptive vocal duets and multimodal display in a songbird Proceedings of the Royal Society B*, 4 October 2017):

In many bird species, members of mated pairs sing coordinated duets to cooperatively defend their territory. By singing together, partners demonstrate that their territory is defended by an alliance of two individuals. Therefore, during territorial conflicts duets generally elicit stronger responses than solo songs, and partners threatened by territorial intrusion are more likely to duet than to sing independently. In addition to signalling about the number of defenders, many duets have superb temporal coordination, which adds an extra message to cooperative signalling. High coordination can reveal pair longevity, and therefore commitment and ability to defend the territory. In addition to producing temporally coordinated songs, duetting birds typically come close together to sing, reinforcing the signal that the pair is ready for cooperative defence.

The challenge of coordination in governance may well be anticipated in the complementary role of body language in the coordination of bird song, as implied by the argument of Paweł Ręć (*Multimodal coordination enhances the responses to an avian duet Behavioral Ecology*, 29, 2018, 2):

Animals communicate with their whole bodies, so their signals can be complex and multimodal. The joint intelligibility of multimodal signal components depends on their temporal coordination, which, when only one signaler is involved, depends on the synchronization between the different modalities of signals involved. Coordination is a challenge, however, in cooperatively signaling species because it requires continuous monitoring of the partner's behavior.

The quest for insight in the context of bird song is potentially of relevance to the controversial role of women in governance, as implied by the arguments of Luis Sandoval, et al (*Different Messages are Transmitted by Individual Duet Contributions and Complete Duets in a Species with Highly Overlapped Duets The Open Ornithology Journal*, 12, 2019):

Duet function hypotheses have been mostly studied in bird species that produce duets with male and female solo songs. However, in order to understand if patterns of duet function are similar across all duetting species, it is highly necessary to test the duet function hypotheses in species that produce duets with vocalizations other than solo songs.

## Voices of despair and desperation -- and the voiceless

**Voices of negativity?** There is no lack of references to the "voice of despair", nor to the "voice of desperation". They are both a feature of drama and are readily acknowledged in political debate as characterizing those neglected by social safety nets. Such voices are to be heard among the impoverished and the otherwise disadvantaged.

Optimists may contrast such despair with reasons to hope -- thereby offering an expression of the "voice of hope":

- *Global poll of hope and despair* (RedC Research, 2015)
- *Chomsky: Signs of Hope in a Time of Global Despair* (NewsClick, 12 February 2018)
- Graham Vanbergen: *New World Disorder – The Next 20 Years: Hope or Despair?* (*Global Research*, 9 December 2017)
- Kaethe Weingarten: *Hope in a time of global despair* (In: *Hope and Despair in Narrative and Family Therapy*, 2007)
- International Crisis Group: *Council of Despair? The Fragmentation of UN Diplomacy* (30 April 2019)
- Tseggai Isaac: *The Third World in Global Perspective: a journey from hope to despair* (Africa World Press, 2015)

To the extent that there is no place for the voices of despair in conventional decision-making, they are readily associated with the "voiceless" -- and potentially the "silent majority" (Mathias Wallace, *Voiceless*, 2019; Oscar Romero, *Voice of the Voiceless*, 1985). What is not articulated could be explored as the "unsaid" or as a pattern of silence (*Global Strategic Implications of the "Unsaid"*, 2003; *Civilization as a Global Configuration of Silences: recognizing silence of a higher order*, 2013).

If articulated, such voices are dismissed as "cynical", if not simply "negative". However such despair engenders demotivation and the inability to respond to challenges. Desperation may well lead to circumstances being reframed -- notably encouraging radicalisation and violence. Although experienced individually both may have collective implications (*Implication of Personal Despair in Planetary Despair*, 2010). Significantly, "voiceless" is used in the names of a number of animal rights groups, notably concerned with cruelty to animals..

**Migration driven by desperation:** Despair and desperation in many countries can be recognized as the major drivers of the migration process which now constitutes a major crisis for the developed world -- seen as representing "hope at the end of the tunnel".

The controversies aroused by that process have been framed as the struggle between the "heartless heads" and the "headless hearts" -- notably articulated by the economist [Paul Collier](#). He has argued that: *the debate on migration is polarised into two strident positions, a heartless and the headless* (*On Immigration, Head to Head: Al Jazeera*, 7 August 2015; rerun on *Head to Head*, 18 August 2018). Subsequently he clarifies:

To rise to the challenge, we need to combine the instinctive compassion that mass suffering arouses with the dispassionate analysis necessary to craft an effective response. We need the heart supported by the head. The growing humanitarian crisis has come about because we've deployed one without the other. Our response has veered between the heartless head and the headless heart, and the results have been calamitous. (*Why camps are the wrong way to help today's refugees*, *The Spectator*, March 2017)

In an extensive review of the book which Collier co-authored (*Refuge: Rethinking Refugee Policy in a Changing World*, 2017), the metaphor is further emphasized (David Jimenez, *How Europe's 'Headless Hearts' Made Refugee Crisis Worse*, *The American Conservative*, 27 September 2017).

With respect to this argument, this perspective could be expressed as an interplay between the "voice of the heartless" and the "voice of the headless". So framed it is reminiscent of the exploration of that dynamic in fiction and drama. Potentially missing is a fruitful articulation of the extremes in music and song -- in quest of a means of transcending the blame-gaming by which such discourse is characterized.

Highly controversial issues such as migration and climate change can now be recognized as giving rise to dysfunctional discourse of a form appropriately characterized as "[beyond rhyme or reason](#)". Arguably it could be said that the lack of rhyme is especially evident in the "voice of the heartless" whereas the lack of reason is evident in the "voice of the headless".

The possibility is of great relevance in that the discourse of both controversies can be recognized as embodying a "voice of the heartless" (notably climate scientists and technocrats) and a "voice of the headless". The latter are notably represented by those whose livelihoods -- and possibly lives -- are endangered by policy options framed by the "heartless". The crisis of the times warrants an epic encompassing both migration and climate change -- and the impacts of each on the other as individuals and communities are likely to experience them.

Whereas reference to "beyond reason" accords with the deprecated arguments of the "heartful" -- deemed unreasonable -- of greater relevance are the implications of any lack of "rhyme". These accord with appreciation of the subtle feedback loops -- beyond the understanding of science -- best appreciated in terms of the aesthetics of [poetic justice](#).

It is intriguing to recognize how Africa is potentially a nexus of the climate-migration crisis -- as it will evolve over the years to come. This is all the more intriguing in the light of the special relation to music, song and dance in many of the cultures on that continent. Rather than framing the response to that challenge, as has been the practice over many decades past, there is therefore a case for exploration of a strategic response through music -- especially given the constraints on resources for conventional methods of implementation (*Knowledge Gardening through Music: patterns of coherence for future African management as an alternative to Project Logic*, 2000).

Greek chorus \*\*\*

## From "reading between the lines" to "hearing beyond the sounds" -- of a soundscape

**Multidimensionality?** A vast multiplicity of voices could be considered characteristic of the times -- readily deprecated as a cacophony. There is no lack of urgent appeals for unity -- with the metaphorical implication of "singing in unison". The variety of such appeals could itself be seen as itself constituting a cacophony due to its incoherence. It could be asked whether this confusion arises in part from overly simplistic understandings of unity -- or of the form that "singing in unison" might imply as a metaphor.

There is a case for acknowledging the thinking of fundamental physics in engaging with the complexity of physical reality, most notably the need to recognize that understandings of unity call for considerations of multidimensionality. Physics has given itself the remarkable freedom to articulate that understanding in terms of more than 3 or 4 dimensions -- with coherence potentially requiring 11 or more. Despite repeated reference to complexity as a constraint on effective governance, calls for coherence in the psycho-social realm would readily deprecate any equivalent thinking as inappropriate, if not essentially meaningless. Indeed physics is itself challenged to locate the "extra dimensions" beyond conventional comprehension. It does so by suggesting that these are effectively "curled up" in some way through "[compactification](#)".

It is curious that such thinking is considered abhorrent, given that the complexity of psycho-social reality is a matter of frequent comment -- especially given the challenges of governance in engaging with so-called "[wicked problems](#)". It is all the more curious when the appropriate response to climate change is framed in simplistic terms -- even by climate scientists. The attitude to "stopping climate change" might even be challenged by the anecdotal legend of [King Canute and the tide](#).

**Multiverse?** In the light of any frustration and futility regarding discourse, it is readily argued that those in fundamental disagreement inhabit different "universes" -- borrowing to a degree from an understanding of astrophysics. In seeking coherence for its own understanding, that discipline has however usefully hypothesized the existence of "parallel universes" embodied within a "multiverse" -- otherwise understood as a megaverse, metaverse, omniverse, or meta-universe. There is a case for framing the psycho-social quest for coherence in the light of such thinking -- however it may be interpreted.

Given the recognized dangers of borrowing from physics, there is a case for exploring how "multiverse" might be recognized otherwise -- and rendered comprehensible in aesthetic terms, necessarily foreign to the mindset of physics. The framing of physics of "multiverse" does however offer an inspiration to poets, as argued separately (*Being a Poem in the Making: engendering a multiverse through musing*, 2012). In particular the latter argument drew attention to conventional understandings of objectivity and subjectivity and the challenge to those whose experiential reality was necessarily "in between" (*Defining the objective ∞ Refining the subjective ?! Explaining reality ∞ Embodying realization*, 2011; *Living as an Imaginal Bridge between Worlds: global implications of "betwixt and between" and liminality*, 2011).

**Multivocal polyphony?** Of relevance to the focus here on the multiplicity of voices, that argument was developed separately (*Enactivating Multiversal Community: hearing a pattern of voices in the global wilderness*, 2012). The argument exploited metaphorically the coherence of the experience of the diversity of sounds in a "wilderness" -- typically a forest with birds and other animals. This raises the question of the psycho-social contexts in which multivocal polyphony is variously cultivated (*Multivocal Poetic Discourse Emphasizing Improvisation: clarification of possibilities for the future*, 2012).

The clues offered by distinct "voices" in multipart singing and polyphony are especially fruitful in rendering readily comprehensible the possible interplay between a variety of perspectives -- and the emergence of viable patterns of significance of a higher order (*All Blacks of Davos vs All Greens of Porto Alegre: reframing global strategic discord through polyphony?* 2007; *Structuring Mnemonic Encoding of Development Plans and Ethical Charters using Musical Leitmotifs*, 2001).

**Soundscape?** Rather than the use of multiverse as a metaphor, a form of alternative is the use of **soundscape** as an aural complement to visual landscape. This is the acoustic environment as perceived by humans, in context -- as originally coined by Michael Southworth (*The Sonic Environment of Cities, Environment and Behavior*. 1, 1969, 1), and popularised by R. Murray Schafer (*The Soundscape: our sonic environment and the tuning of the world*, 1977). As a consequence a **World Soundscape Project** was launched.

Somewhat ironically this preoccupation has been deemed of relevance to the relief of stress of birds in a laboratory (*Laboratory soundscapes: optimising acoustic environments for avian welfare*, UK Research and Innovation). A conventional framing of soundscape is evident from Luis Hermida, et al (*Assessing Soundscape: comparison between in situ and laboratory methodologies*, *Noise Mapping*, 4, 2017) and from the context and arguments of Nicholas Miller (*Understanding Soundscapes, Buildings*, 2013, 3, 4):

Previous research has addressed both subjective and objective measures of soundscapes, but usually only on the totality of the soundscape and not simultaneously on the subjective, the objective and the individual contributors to the soundscape. The approach described here is intended to examine all three aspects, and provide sufficient quantitative information that traditional noise control methods can be applied to individual sources with the goal of improving the soundscapes people experience.

Despite the potential contribution of birds, arguably missing from this preoccupation with sound (and sound pollution) in the physical world are the distinctive challenges of "noise" in the psychosocial and cognitive worlds, implied to a degree by the focus of Jacques Attali (*Noise: The Political Economy of Music*, 1986). Of greater relevance to the argument above, this "metaphorical" dimension is far more specifically addressed in a compilation by Sarah Kay and Francois Noudelmann (*Soundings and Soundscapes*, 2018). As introduced by the editors:

When we read the philosophical dialogues of antiquity, or the text of a medieval song, or accounts of the hubbub in the streets of Classical or Enlightenment Europe, what we are most often listening out for or think we hear are voices. Whether they be fictional or historical, once we strain our ears to hear the traces of their sound...The mutterings of demons, like the breath of the divine, pass through our ears conveying truths that are both literally unheard and in some sense unspeakable, bearing mystical insights and provoking ecstatic or trance-like states.

Surrounded and pounded by the import of such voices, it can seem all too often, as Lacan liked to quip, that we have ears in order not to hear. Preferring to use our ears to make out only in the sense of to *understand* the intention beyond the voice as such, we need to be reminded how to *listen*. In French, the first language of half the contributors to this volume and a second language of many of the others, the verb *entendre*, which means both 'hear' and 'understand', encapsulates this tendency...

The relevance to the argument here is evident from a panel discussion on *The Sense of Sound: political and social soundscapes* (YouTube, 25 October 2017) and, to a degree, from the arguments of Konca Saher (*Music and Performance as Sonic Acts of political struggle: counter-political soundscapes in urban*, *Sociology*, 6, 2016, 6)

**Third ear: "hearing beyond the sounds"?** Whilst the value of "reading between the lines" is well recognized, any need to "hear beyond the sounds" is not widely recognized as such -- although readily comprehensible. What is to be heard "beyond" the often ugly sounds of interaction between politicians -- or more generally -- those of different persuasion, whether ideological, strategic or religious? Given the inspiration offered by birds, could their "duetting" be rendered more harmonious and insightful -- or is their comparison with the raucous cries of howler monkeys to be recognized as the best that humans can achieve in protecting their cognitive territories? Are there "songlines" yet to be acknowledged otherwise, as speculatively argued (*From Information Highways to Songlines of the Noosphere, Futures*, 1998).

One aspect of the process of "transcendence" was originally named from a particular perspective in the influential argument of [Theodor Reik](#) (*Listening With the Third Ear: the inner experience of a psychoanalyst*, 1948). This describes how psychoanalysts intuitively use their own unconscious minds to detect and decipher the unconscious wishes and fantasies of their patients:

One of the peculiarities of this third ear is that it works in two ways. It can catch what other people do not say, but only feel and think; and it can also be turned inward. It can hear voices from within the self that are otherwise not audible because they are drowned out by the noise of our conscious thought processes. The student of psychoanalysis is advised to listen to those inner voices with more attention than to what "reason" tells about the unconscious.

Reik's argument has been the subject of criticism (M. Grotjahn, *About the "third ear" in psychoanalysis: a review and critical evaluation*, *Psychoanalytic Review*, 37, 1950, 1). By analogy to reference to the "third eye", the understanding has been elaborated otherwise by [Joachim-Ernst Berendt](#) (*The Third Ear: on listening to the world*, 1992) -- as well as subject to other adaptations.

## Enabling meaningful engagement in climate change discourse through sonification

As with many challenges to the governance of crises, there is very heavy dependence on very lengthy documentation -- more than discouraging to many -- variously accompanied by lengthy verbal presentations which are typically alienating in other ways. For the many called upon to engage in climate change discourse, there is a strong case for exploring other modes through which insights communicated in that way can be rendered comprehensible in a more succinct, attractive and memorable manner.

In this respect, the potential of [sonification](#), namely the use of non-speech audio to convey information or perceptualize data, has long been recognized -- as a means of circumventing high orders of information overload to enable pattern recognition. This has been promoted by the [International Community for Auditory Display](#) which prepared a seminal report on the field for the US National Science Foundation (*Sonification Report: Status of the Field and Research Agenda*, 1997). The possibility has been summarized separately with regard to the feasibility of "capturing" and "compressing" information so that the patterns of content can be more easily apprehended (*Technical feasibility of musical sonification*, 2009; *Technical facilitation of insight capture and processing*, 2019)

Various technical possibilities have been summarized in a recent report (*Converter from Text to Poetry, Song or Music: computer-assisted aesthetic enhancement of treaties, declarations and agreements*, 2007; *Conversion of Global Hot Air Emissions to Music: aesthetic transformation and instrumentalization of vaporware*, 2009). The feasibility of such initiatives is now widely recognized through rapid development, and widespread use, of applications such as:

- [Speech recognition](#) (also known as automatic speech recognition or computer speech recognition) converts spoken words to machine-readable input. The term "voice recognition" is sometimes used to refer to speech recognition where the recognition system is trained to a particular speaker -- as is the case for most desktop recognition software,
- [Screen readers](#) which attempt to identify and interpret what is being displayed on the screen. This interpretation is then re-presented to the user with text-to-speech, sound icons, or a Braille output device. Screen readers are a form of assistive technology (AT) potentially useful to people who are blind, visually impaired, illiterate or learning disabled, often in combination with other AT, such as screen magnifiers.
- [Music visualization](#), a feature found in some media player software, generates animated imagery based on a piece of recorded music. The imagery is usually generated and rendered in real time and synchronized with the music as it is played.

A topical example is offered by the recent analysis of the tweets of President Trump (Michael D. Shear, et al: *How Trump Reshaped the Presidency in Over 11,000 Tweets*, *The New York Times*, 2 November 2019). Stored electronically, such data now lends itself to sonification in order to enable wider pattern recognition, as previously argued (*Sonification of Twitter Leadership at the G20: a surprising musical opportunity for Donald Trump to sound a new note*, 2017).

Given the vast resources devoted to interpretation between languages in conferences such as COP25, and the efforts to summarize the points made, there is a case for exploring the possibility of converting the topics evoked into melodic form to render the pattern connecting them more widely comprehensible and memorable -- especially with respect to climate change.

Sonification suggests the possibility of associating musical tones (if not voices) with the range of topics which typically feature in political discourse: (un)employment, security, food, environment, health, industry, and the like -- namely topics constituting the focal mandates of particular government agencies. Any address by a government minister then lends itself to representation as a pattern of tones, variously played. A distinctive speech would then be one in which a new melody was detectable -- one that was attractively memorable, rather than monotonous. The challenges of governance, and the expertise demonstrated, could then be appreciated through musical organization -- appropriately recalling the role of the instrument (the pipe organ) from which the term derived, and the skill associated with it, as speculatively discussed separately (*Global brain as an organ: playable, playful or neither?* 2019).

## Landscape, soundscape, resonance: a place to be?

**Landscape as a metaphor?** The cognitive implications of soundscape, as emphasized here, derive from landscape which has always been more evocative of such implications than preoccupation with the physical qualities of the land alone. Most obvious is the struggle associated with territory however subtle those implications in terms of individual and collective identity. Those subtleties clearly extend into matters relating to intellectual and cultural property.

The [sense of place](#) has been used in many different ways. It is a multidimensional, complex construct used to characterize the relationship between people and spatial settings. Great importance may be attached to [possession of a sense of place](#).

Indicative references of relevance with respect to the landscape include:

- Nik Mastura, et al: *A Sense of Place within the Landscape in Cultural Settings* (*Procedia - Social and Behavioral Sciences*, 105, 3 December 2013)
- J. A. Agnew and J. S. Duncan: *The Power of Place: bringing together geographical and sociological imaginations* (Unwin Hyman Publishers, 1989)
- Don Gayton: *Landscape of the Interior: re-explorations of nature and the human spirit* (New Society Publishers, 1996)
- Flurina M. Wartmann: *Exploring links between landscape perception and sense of place as a cultural ecosystem service through interviews and user-generated content* (*From Pattern and Process to People in Action*, 2017)
- D. M. Mark, et al: *Landscape in Language: transdisciplinary perspectives* (John Benjamins, 2011)
- Edward S. Casey: *Getting Back into Place: toward a renewed understanding of the place-world* (Indiana University Press, 1991)
- Merlin Coverley: *Psychogeography* (Pocket Essentials, 2006)
- Christopher Day: *Spirit and Place: healing our environment, healing environment* (Architectural Press, 2002)
- George Seddon: *Sense of Place: a response to an environment* (University of Western Australia Press, 1972)
- Phil Smith: *Mythogeography: a guide to walking sideways* (Triarchy Press, 2010)
- James A. Swan: *The Power of Place: sacred ground in natural and human environments* (Quest Books, 1991)
- Yi-Fu Tuan: *Topophilia: a study of environmental perception, attitudes, and values* (Columbia University Press, 1990)
- Liz Wells: *Sense of Place: European Landscape Photography* (12 July 2019)
- Sam Haselby: *It's not easy to make landscape a place: you have to feel it* (*Aeon*, 7 November 2016)

Of particular relevance is the exploration of the "quality without a name" which characterizes a "place to be" by Christopher Alexander (*A Pattern Language: towns, buildings, construction*, 1977).

**Soundscape as a metaphor?** As noted above, the sense of soundscape has been borrowed from landscape. This raises the questions as to the extent to which the preoccupations with landscape are conflated with the implications of a soundscape in framing a "place to be". and its associated "vibes".

There are many references to "political landscape", suggesting that "landscape" has long been suggestive of a non-physical pattern of meaning:

- Eurobarometer: *Report on the developments in the political landscape* (European Parliament, 2019)
- R. A Clay: *A look at the political landscape* (*American Psychological Association*, 43, 2012, 5)
- Byron E. Shafer and Richard H. Spady: *The American Political Landscape* (Harvard University Press, 2014)
- Adam T. Smith: *The Political Landscape: constellations of authority in early complex polities* (University of California Press, 2003)
- *The Guardian view on the 2019 election result: a new political landscape* (*The Guardian*, 13 December 2019)

If "vision" is widely used in a socio-political context, it is clear that increasing use of "optics" forms part of the same metaphorical nexus. This is then understood as the practice of deliberately managing the spread of information between an individual or an organization (such as a business, government agency, or a nonprofit organization) and the public (*Optics*, *The New York Times*, 7 March 2010). It is increasingly used as a shorthand for "the way things look" (Mark Nichol, "*Optics*" *Is in the Eye of the Beholder*, *Daily Writing Tips*). The manner of its interpretation is however controversial (Wendy L. Patrick, *The Optics of Politics: appearances are not always reality*, *Psychology Today*, 1 November 2014).

Given the arguments for recognition of a socio-political soundscape, and the role of soundbites and tweets, it might then be asked whether "sonics" might be used as an analogous shorthand. The possibility is anticipated by the argument of Robin James (*The Sonic Episteme: acoustic resonance, neoliberalism, and biopolitics*, 2019). This examines how twenty-first-century conceptions of sound as acoustic resonance shape notions of the social world, personhood, and materiality in ways that support white supremacist capitalist patriarchy. Drawing on fields ranging from philosophy and sound studies to black feminist studies and musicology, James shows how what she calls the sonic episteme -- a set of sound-based rules that qualitatively structure social practices in much the same way that neoliberalism uses statistics—employs a politics of exception to maintain hegemonic neoliberal and biopolitical projects. As indicated in an extract (*The Sonic Episteme*, *The New Inquiry*, 23 October 2019), James argues that in using sound as a tool for theorizing and realizing a more just world, we can't merely reform Western modernity; we must do something else entirely

Understood as "choreosonics", James discusses the use of vibratory sound as a model for "aphilosophical" theoretical practice by Ashon Crawley (*Blackpentacostal Breath: the aesthetics of possibility*, 2016). For James:

Choreosonic methods of abstraction are "aphilosophical" because they tune into parts of the spectrum of existence that philosophy's methods of abstraction perceptually code out of scholarly attention. For example, though Crawley treats "philosophy and theology as abstractions against which Blackpentacostal aesthetics evade"..., he repeatedly emphasizes that the practices of evasion he studies are "ongoing otherwise possibilities. I do not say new"... and that evasion, "rather than a turn to the new, is the production of otherwise ... possibilities already enacted, already here". Choreosonic and centrifugitive abstractions descriptively model practices with long histories. Their practitioners understand themselves not as replacing or progressing past white intellectual norms but as inhabiting parts of the spectrum those norms perceptually code out of scholarly conversation.

Crawley's study has been the focus of a symposium with a complex of commentaries (*Credo: By Way of Introduction*, *Syndicate*, 16 October 2017).

**Resonance?** James develops his arguments in chapters showing how various constituents of the sonic episteme use acoustic resonance

as the foundation for theories of the market, political ontology, materialist ontology, and subjectivity or personhood. In a concluding chapter titled *Social Physics and Quantum Physics: acoustic resonance as the model for a "harmonious" world* James argues:

This last chapter focuses on constituents of the sonic episteme that appear in pop science accounts of social and cosmological physics. They appeal to concepts of musical harmony to translate the math behind the physics into layperson's terms. In both big data-style social physics and string theory, these appeals to acoustic resonance naturalize the very same mathematical relations neoliberal biopolitics uses behind an apparently apolitical concept of "harmony". The connection between these two disciplines isn't just in the name "physics" or in their shared ontology. They are genealogically related: social physics comes from astrophysics.

Given the appeal of "resonance" through jargon reference to "vibes", there is a case for acknowledging the amazing extent to which biological life is fundamentally based on resonance as evident in the molecule essential to organic structures, namely the so-called benzene molecule (Linus Pauling, *The Concept of Resonance, The Nature of the Chemical Bond*, 1960). Its unusual structure derives from the fact that it is a [resonance hybrid](#) as succinctly clarified and illustrated (Dwayne M. Deevona, *What is a resonance hybrid? Socratic Q and A*, 29 April 2014; *What is resonance, and are resonance structures real? Chemistry Stack Exchange*, 2017). The integrity of the structure derives from its alternation between several distinct patterns of bonding -- namely from the "resonance" between them.

The challenging dynamics between distinctive psychosocial structures suggests that resonance (appropriately generalized) may offer a key to an integrative reframing of them -- respectful of their variety -- especially given the irony that the integrity of biological life is mysteriously based on resonance -- a "place to be" *par excellence*. Arguably humans, and their modes of organization, could be understood as resonance hybrids.

## Patterns of resonance and their characteristic experiential challenges

Arguably there is far greater need for both visual and aural indications of patterns of resonance as they may relate to psychosocial situations and the challenges of governance (*Cognitive dimensions of governance: 2, 3, 4, 5, 6, 7, 8?* 2016). Games with distinctive numbers of competing participants are suggestive of clues to comprehension of resonance. Other clues are offered by the treatment of "tuples" in mathematics, computer science, relational algebra, linguistics, and philosophy.

Clues to the cognitive experience of such resonance between alternatives are to be found in the challenges of "dilemmas", potentially to be understood as *Cognitive glass ceilings impeding integrative comprehension* (2019). The latter discussed the more elusive nature of [trilemmas](#), [tetralemmas](#) (quadrilemmas) and [pentalemmas](#) (quintalemmas). These are also discussed separately (*Decision-making capacity versus Distinction-making capacity: embodying whether as weather*, 2015) with respect to enhancing strategic discourse systematically using climate metaphors (*Five-fold ordering of strategic engagement with time; Five-fold cognitive dynamics of relevance to governance?*). That discussion mentions the even rarer use of [hexalemma](#) and [heptalemma](#), although an [octalemma](#) is seemingly recognized by Edward Anderson (*Problem of Time in Quantum Gravity*, 2012). The Euthyphro "dilemma" is restated as an [octalemma](#) by Richard Goode (*Nothing Is Permitted: an argument for moral eliminativism*). Consideration could therefore be given to *Strategic Octalemmas* (2009).

**N-tuple resonance:** The following articulation draws particular attention to the reinforcement associated with use of the "strategic pillar" metaphor -- potentially dangerously dysfunctional when understood statically in a dynamic evolving context. It has been adapted from a separate presentation (*Framing Cyclic Revolutionary Emergence of Opposing Symbols of Identity*, 2017).

- **2-voice resonance (binary):** The case was made above for insights that might be obtained from the duets in birdsong. These can be understood as contrasting with the relatively simplistic insights associated with competition in politics, sport, business and otherwise -- and their focus on triumphant defeat of the opposition in zero-sum games (*Transcending Simplistic Binary Contractual Relationships*, 2012; *Destabilizing Multipolar Society through Binary Decision-making*, 2016). Alan Washburn *Two-Person Zero-Sum Games*, 2013).

Such resonance could be considered as framing the question as to how variety is sustainably engendered in a 2-person relationship -- given the aspiration of one or other to hegemony, with only singular dominance. The paradox might be explored through the classical koan of the [sound of one-hand clapping](#).

- **3-voice resonance (ternary / triple / triadic):** The following animation is suggestive of the pattern of bonding in the case of a triple resonance, notably with respect to its application to the Triple Helix model of innovation: academia (universities), business and government. Of related interest is its relevance to the [three pillars of sustainability](#) -- economic, social, environmental -- as most recently recognized by the [2005 World Summit on Social Development](#). This contrasts with the [three pillars of the European Union](#), defined in institutional terms. The [Three Pillars of the United Nations](#) are human rights, peace and security, and development.

Of interest is the possible audio resonant form of a 3-fold [Borromean ring](#) linkage (of which a molecular form is reproduced below centre from *Wikipedia*), as discussed separately (*Borromean challenge to comprehension of any trinity?* 2018). One musical rendering is illustrated by the image below right (Robin Hayward and Christopher Williams, *Reidemeister Move plays Borromean Rings*, Corvo, 2016). As described (with reviews), performing Borromean Rings might be compared to playing a board game such as chess. Notation is used to define a field of possible moves for navigating within harmonic space. Unlike chess however the idea is not to overcome the other player, but rather to challenge them to explore continually fresh avenues within the harmonic framework laid out by the score [Excerpts (mp3): [I](#), [II](#), [III](#)].

Animation of 3-fold bonding pattern	Molecular Borromean link	Musical rendering?

There is clearly an extensive variety of understanding of the way that musical and sung **trios** form a pattern of resonance.

- **4-voice resonance (tetrad / quaternary / quadruple)**: Various possibilities merit consideration in relation to the pattern of resonance bonding, notably as discussed separately (*Alternatives to "2-stroke democracy" suggested by 4-sided ball games*, 2016). Especially intriguing is the challenge of any relationship to the Christian cross and to the extremely charged symbol of the swastika in its different orientations. The animations on the right were developed in a separate argument which notably referred to the pattern of Knight's moves in chess across a matrix of 3x3 cells (*Swastika as Dynamic Pattern Underlying Psychosocial Power Processes: implicate order of Knight's move game-playing sustaining creativity, exploitation and impunity*, 2012). (*Alternation exemplified in 4-fold pattern*, 2010)

Animations of 4-fold bonding pattern		
Quadrangular	Left-facing Swastika	Right-facing Swastika

Clearly there is an extensive variety of understanding of the way that musical and sung **quartets** form a pattern of resonance.

- **5-voice resonance (quintuple / pentangular)**: In arguing for recognition of 5-fold resonance, it is somewhat ironic to note the correspondence between fundamental traditional understandings of East and West, as exemplified by the pentagrams of **Hygiea** and **Wu Xing** discussed separately (*Five-fold cognitive dynamics of relevance to governance?* 2015). The following images were reproduced from an earlier discussion (*Cycles of enstoring forming mnemonic pentagrams: Hygiea and Wu Xing*, 2012). The image on the right derives from *System Dynamics, Hypercycles and Psychosocial Self-organization: exploration of Chinese correlative understanding* (2010).

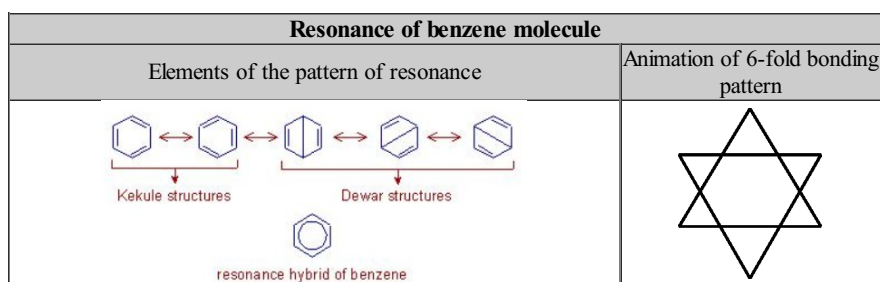
Pentangular bonding patterns			
Hygiea ( <i>Hugieia</i> ) Pentagram of Pythagoreans	Animation of 5-fold bonding pattern	Chinese 5-phase <i>Wu Xing</i> cycle	Hypercycle representation
Reproduced from <a href="#">Hygiea entry in Wikipedia</a> (G. J. Allman <i>Greek Geometry From Thales to Euclid</i> , 1889, p.26) <b>with labels added</b>		Adapted from <a href="#">Wu Xing entry in Wikipedia</a> <b>Interaction arrows:</b> black=generating white=overcoming	Reproduced from entry in <a href="#">Principia Cybernetica</a>

Concerns with strategy and principle might be usefully reframed in terms of resonance between any conventional static references to "strategic pillars", as with the **Five Pillars of Islam** or the **Five Pillars of US cyber security**. The fundamental principles of *Wikipedia* are summarized in terms of "five pillars". OECD distinguishes **five pillars of effective development action**. UNFPA distinguishes **five pillars of population and development**. Of relevance is the widely appreciated distinction by **Peter Senge** (*The Fifth Discipline: the art and practice of the learning organization*, 1990). The strategic significance attributed to *The Book of Five Rings* is noted below.

As with the quartet, there is potentially an extensive variety of understanding of the way that musical and sung **quintets** form a pattern of resonance.

- **6-voice resonance (sextuple / hexangular)**: As suggested above, the molecular structure of benzene offers an archetypal insight

into the significance of 6-fold resonance. The image on the left is derived from the commentary by Arusa Ehmet (*Why is benzene stable?* [Socratic.org](http://Socratic.org), 8 April 2018). The animation below right is suggestive in that respect.

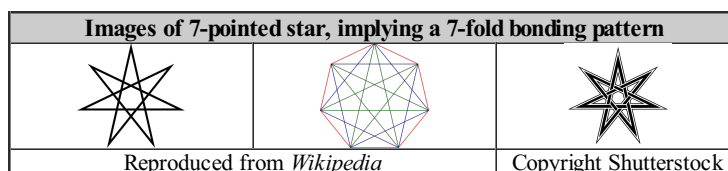


Of relevance to bonding explorations, a more rigorous interactive approach to the **6 pointed star** is offered under a pseudonym in the GeoGebra environment. A detailed mathematical description is provided by Harvey Heinz (*Order-6 Magic Stars*, 2003). Understood in terms of 6 pillars, examples include: *The Six Pillars of Self-Esteem* (1995) articulated by Nathaniel Branden; *The Six Pillars of Character*; *Six Pillars of Knowledge Economics*; *Six Pillars of Peace*. As argued by David Grebow, missing from the above-mentioned "fifth discipline" articulation is a learning technology required to teach and continuously support the other five disciplines (*The Sixth Discipline*, Brandon Hall Group, 2013).

The framing offered by **Edward de Bono** could well be recognized in terms of a 6-fold pattern of voices variously evident (*Six Thinking Hats*, 1985; *Six Action Shoes*, 1991; *Six Frames For Thinking About Information*, 2008).

As with the quartet and quintet, there is potentially an extensive variety of understanding of the way that musical and sung **sextets** form a pattern of resonance.

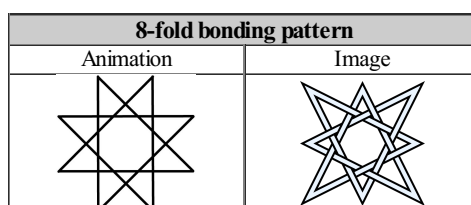
- **7-voice resonance (septuple / heptangular):** Importance is conventionally attached to the effective size of decision-making groups, notably in relation to information processing capacity (**George A. Miller**, *The Magical Number Seven, Plus or Minus Two: some limits on our capacity for processing information and size*, *Psychological Review*, 63, 1956). Patterns of bonding in such contexts therefore merit consideration. As noted above, this raises distinctive problems in the case of the great circle approach advocated here and the related absence of symmetrically regular spherical polyhedra. Of interest is the recent elaboration of a "ritual of the heptagram" in the neopagan tradition -- specifically noting forms of relationship within the pattern which can be understood as distinctive forms of bonding.



A detailed mathematical description is provided by Harvey Heinz (*Order-7 Magic Stars*, 2003). It is potentially appropriate to note that the wrapping of DNA around the nucleosome core results in 7-fold compaction of DNA (N. Ramaswamy, et al, *Structure of D-DNA: 8-fold or 7-fold helix?* *The EMBO Journal*, 1983). With respect to recognition of any set of "seven pillars", many examples exist. Most memorable is perhaps the *Seven Pillars of Wisdom* (1926), as articulated by T. E. Lawrence, but featuring in *Proverbs 9:1* (Henry M. Morris. *The Seven Pillars of Wisdom*, Institute for Creation Research). Other examples include the *The Seven Pillars of Life* (*Science*, March 2002) articulated by Daniel E. Koshland, the *Seven Pillar of Ecosystem Management* (*Landscape and Urban Planning*, 1998) articulated by R. Lackey, and the *Seven Pillars of Democratic Governance* (*Synergy Associates*, 2009) by Mel Gill.

Miller's argument usefully highlights the experiential mystery of the relation between a 7-fold and 8-fold pattern of voices. This is curiously evident in the set of notes in an **octave** -- given that the 8th such note is a feature of the subsequent octave. However this is to be explained in logical terms, this experiential relationship is a natural phenomenon that has been referred to as the "basic miracle of music", the use of which is "common in most musical systems".

- **8-voice resonance (octuple / octangular):** The following animation is suggestive of the pattern of bonding in the case of an eight-fold helix.



Of relevance to bonding explorations, a more rigorous interactive approach to the [8 pointed star](#) is offered under a pseudonym in the GeoGebra environment. A detailed mathematical description is provided by Harvey Heinz (*Order-10 Magic Stars*, 2003). Expressed in terms of pillars, the Dali Lama and Archbishop Desmond Tutu have articulated [Eight Pillars of Joy](#). Google allegedly operates in terms of [Eight Pillars of Innovation](#). Extensive reference is made to the articulation of *Eight Pillars of Prosperity* (2011) by John Allen.

Further clues to the nature of such a 8-fold pattern are offered by the insights into a coaction cardioid presented by [Edward Haskell](#), as discussed separately (*Cardioid Attractor Fundamental to Sustainability: 8 transactional games forming the heart of sustainable relationship*, 2005).

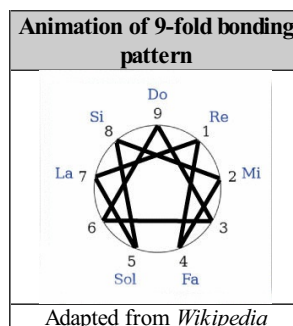
The resonance inherent in any such 8-fold pattern can also be explored through the encoding offered by the Chinese *BaGua* system -- especially given the nature of the transformation between its 8 conditions to which the encoding gives precision, as indicated in the animations below-left. The animations below-right are reproduced from a discussion of *Transformation pathways in multivocal discourse* (2016) featuring the Lauburu pattern. The latter featured in an experimental depiction of 8-fold, 16-fold and 24-fold patterns (*24-fold Pattern Implied by Dynamics of the Lauburu in 3D: visualization of the interplay of sets of voices in discourse*, 2016)

Use of 8-fold BaGua to suggest the resonant dynamic relationships between voices			
Alternative experimental animations indicative of transformations between BaGua "voices"		Experimental rotation of alternative Lauburu patterns over alternative BaGua patterns	
Later Heaven (King Wen) pattern of transformations	Earlier Heaven (Fuxi) pattern of transformations	Anti-clockwise over Later Heaven (King Wen) pattern	Clockwise over Earlier Heaven (Fuxi) pattern

Any resonance within the *BaGua* patterns is of particular interest in that each of the 8 trigrams is associated metaphorically with a climate-related natural phenomenon, as discussed separately (*Cognitive implication in a Chinese system articulated through weather-related metaphors*, 2015; *Enhancing Strategic Discourse Systematically using Climate Metaphors: widespread comprehension of system dynamics in weather patterns as a resource*, 2015; *Weather Metaphors as Whether Metaphors*, 2015).

- **9-voice resonance (nonuple / enneagram):** As noted above, the enneagram is a notable feature of a particular school of thought which associates modes of thought and personality characteristics with the vertices of a variant of the 9-pointed star. A detailed mathematical description is provided by Harvey Heinz (*Order-8 Magic Stars*, 2003). Of relevance to bonding explorations, a more rigorous interactive approach to the [9 pointed star](#) is offered under a pseudonym in the GeoGebra environment. Understood in terms of pillars, examples include: Stephen Sideroff (*Nine Pillars of Resilience and Success*, 2015), Gunnar Sevelius (*Nine Pillars of History*, 2010), and the [Nine Pillars of Conservatism](#) of the European Young Conservatives.

Especially relevant to the argument here for increasing the mnemonic characteristics of symbols, musical notes are associated with those vertices -- as presented in an animation in the [enneagram](#) entry in *Wikipedia*. That image is adapted in the following simplistic animation which points to the possibility of associating bonding relationships with complex patterns of memorable chordal relationships through [sonification](#).



In the mathematical disciplines of topology, geometry, and [geometric group theory](#), the Heawood graph is a basic feature in discussion of the subtleties of [orbifolds](#) (for "orbit-manifold"). An orbifold is a generalization of a [manifold](#). It is a topological space (an "underlying space") with an orbifold structure. Seemingly incomprehensible to most, orbifolds have been applied to music theory. As discussed separately (*Musical implications of orbifolds for comprehension of questioning dynamics*, 2014), there is the possibility that the distinctive cognitive feel for logical distinctions and connectivity might be associated with chords -- in the light of the work of [Dmitri Tymoczko](#) (*The Geometry of Musical Chords*, *Science*, 2006; *A Geometry of Music*, 2011):

A musical chord can be represented as a point in a geometrical space called an orbifold. Line segments represent

mappings from the notes of one chord to those of another. Composers in a wide range of styles have exploited the non-Euclidean geometry of these spaces, typically by using short line segments between structurally similar chords. Such line segments exist only when chords are nearly symmetrical under translation, reflection, or permutation. Paradigmatically consonant and dissonant chords possess different near-symmetries and suggest different musical uses.

Another approach to a 9-fold pattern of voices is through the variety of key roles appropriate to the coherence of a fictional plot, as argued by Robert Wood (*How Many Characters Should A Novel Have?* *Standout Books*, 14 January 2014). Such a set of [systemic roles](#) is discussed with respect to one such classic (*Enrolling Winnie-the-Pooh's Companions in Climate Change Discourse: key roles in the environmental psychodrama of Hundred Acre Wood*, 2019). As noted there, the set then invites comparison with the nine Team Roles identified by Meredith Belbin from the manner in which members of teams interacted during business games run at [Henley Management College](#) (*Management Teams*, 1981). This gave rise to the [Belbin Team Inventory](#) (also called the Belbin Self-Perception Inventory), since developed to identify preference for nine Team Roles: [Plant](#), [Resource Investigator](#), [Co-ordinator](#), [Shaper](#), [Monitor Evaluator](#), [Teamworker](#), [Implementer](#), [Completer Finisher](#), and [Specialist](#).

That comparison noted the irony of the [9-fold pattern of political groups within the European Parliament](#) -- readily to be recognized as 9 contrasting voices.

A 12-fold patterning of voices is also suggested by the [circle of fifths](#), namely the relationship among the 12 tones of the chromatic scale, their corresponding key signatures, and the associated major and minor keys.

A quite distinct approach to the experience of resonance is suggested by patterns of movement in dance. This would be consistent with the arguments of [Mark Johnson](#) (*The Meaning of the Body: aesthetics of human understanding*, 2007) with respect to the role of aesthetics in understanding. Cognitively, the emphasis is then placed on an understanding "through" the body and its dynamics by both Johnson and by Maxine Sheets-Johnson (*The Primacy of Movement*, 1999). Arguably forms of resonance of different complexity are experienced in 2-person dances, 3-person dances (such as the [Triangle Dance](#)), or [4-person dances](#), and possibly more.

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