



laetus in praesens

Alternative view of segmented documents via Kairos

30 August 2021 | Draft

Misleading Modelling of Global Crises

Unquestioned bias in authoritative representations of reality by science?

- / -

Introduction

Modelling approaches of relevance to the global pandemic

Framing the probability of global modelling bias

Cognitive biases potentially distorting global modelling of crises

Integration of probability of bias into global modelling

Credible modes of global model presentation

From secretive single-issue modelling to open-source multi-issue modelling

Complicity of science in miscommunication of the reality modelled

Conformality of global modelling to cognitive appreciation of crises?

Complicity of science in evaluation of modelling via traditional frameworks

"Modelling" through crises versus "Muddling" through crises

Meta-modelling to interrelate a requisite variety of global models

Global model-making as world-making?

References

Introduction

The background to this exploration dates from a conversation in the early 1970s with [John McHale](#), subsequently active in instigation of the [World Futures Studies Federation](#), chairing its meetings, and as a member of the editorial board of the journal *Futures*. As former Executive Director of the *World Resources Inventory*, McHale had collaborated with [Buckminster Fuller](#) resulting in the production of a series of documents, including an *Inventory of World Resources, Human Trends and Needs* (1963). The latter was part of the first phase of the [World Design Science Decade](#) (1965-1975).

The period was witness to the much-cited publication by Paul and Anne Ehrlich (*Population, Resources, Environments: issues in human ecology*, 1970). At the time of the conversation, however, McHale indicated that he was being asked to update the earlier study, but without any consideration of how his own thinking had evolved since then with regard to any such compilation. He had declined. To be clear, this is not to deny that he subsequently addressed resource-related issues in many documents. The learning derived from his having declined to update a pattern of data which no longer corresponded to his thinking.

That period was subsequently witness to the much-publicised study associated with the [Club of Rome](#), namely *The Limits to Growth* (1972). The model from which this was derived was based on five variables: population, food production, industrialization, pollution, and consumption of nonrenewable natural resources. The selection of these variables by a group of academics as being central to such a model was especially striking from the perspective of involvement with the *Yearbook of International Organizations*. This profiled some 3,000 international bodies at that time, whether governmental or nongovernmental, with a spread of preoccupations necessarily far exceeding those which were the focus of that early model.

This contrast framed the initiative to produce a complementary *Yearbook of World Problems and Human Potential* to identify a wider set of "variables", namely preoccupations perceived by the profiled international bodies, in addition to those considered relevant to the *Limits* model. The first edition in 1976 finally included some 2,600 "world problems" interlinked by a network of 58,000 cross-references (*World Problems and Human Potential: a data interlinkage and display process*, *Futures (the journal of forecasting and planning)*, 7, 1975, 3).

As an "open-source", multi-issue model, rather than a single-issue model, its subsequent development online as the *Encyclopedia of World Problems and Human Potential* was partially funded by the European Commission and approved for funding by the World Bank. It now includes some 56,000 perceived "problems". These profiles are notably complemented by a set of 32,000 "strategies" (whether implemented or not) articulated by international constituencies in response to those problems, together with other data sets, including a

set of 600 human values. Its development was a feature of the [First Global Brain Workshop](#) (*Simulating a Global Brain: using networks of international organizations, world problems, strategies, and values*, 2001).

The acceptance by the Club of Rome of the *Limits* methodology merits recognition in the light of the dynamics in relation to the rejection as "too humanistic" of a more comprehensive counter-proposal articulated as a "prospectus" by [Hasan Ozbekhan](#), [Alexander Christakis](#), [Erich Jantsch](#), and [Aurelio Peccei](#) (*The Predicament for Mankind: Quest for Structured Responses to Growing World-wide Complexities and Uncertainties*, 1970).

Aspects of the subsequent history are noted in [Club of Rome Reports and Bifurcations: a 50-year overview](#) (2018). The continuing degree of credibility of the *Limits* approach has been noted more recently ([Donella H. Meadows](#), et al, *Beyond The Limits To Growth*, 1992; [Ugo Bardi](#), *The Limits to Growth Revisited*, Springer, 2011). That of Christakis and Ozbekhan has also been revisited ([A Retrospective Structural Inquiry of the Predicament of Mankind: prospectus of the Club of Rome](#), 2006). Especially evident in the many reports to the Club is the avoidance of any integration of their many single issue perspectives.

As a reaction to the restrictive focus of the *Limits* approach, and in the light of general systems theory, the systems diagram by which it was characterized was used experimentally at that time as a template to suggest the possibility of modelling a more comprehensive system (*World Dynamics and Psychodynamics: a step towards making abstract "world system" dynamic limitations meaningful to the individual*, 1971).

Since that period, the focus of global modelling has become ever more specialized into sectoral preoccupations. Potential exceptions with respect to global simulation and world modelling include [World3](#), the European [FuturICT](#) project, and the [Joint Simulation System](#). The latter has seemingly now morphed, via the secretive [Total Information Awareness](#) program, into the [Sentient World Simulation](#) (SWS). This is intended as a "synthetic mirror of the real world with automated continuous calibration with respect to current real-world information" with a node representing "every man, woman and child" ([Towards a History of World Futures Studies -- focusing on collective initiatives](#), 2010). The latter noted a number of methodological concerns of relevance to this argument. The multi-issue [interactive transformation maps](#) central to the controversial [Great Reset](#) initiative of the World Economic Forum merit particular attention in this respect (*Transformation maps -- as "strategic mandalas"?* 2020).

The vast investment in global modelling of climate change as a single-issue focus is now the primary outcome of modelling, as evidenced by the current report of the IPCC (*Sixth Assessment Report, Climate Change 2021: The Physical Science Basis*, August 2021). Notable in that respect is the focus on the "physics" of climate change offering virtually zero insight into the psychosocial context. Understood as "[anthropogenic global warming](#)", there is however no effort at complementary modelling of the "climate of world opinion" from which it is assumed that any remedial strategies might emerge sustainably.

Consequently the currently scheduled [COP-26 UN Climate Change Conference](#) (Glasgow, 2021) will focus on the need for global governance "to do something" urgently regarding global warming (framed by the sense of a "Red Alert"). There is little understanding of why such warnings have proven to be naive in the absence of commensurate psychosocial insights into the variety of perceived problems with which different constituencies identify as urgent (*Recognizing the Psychosocial Boundaries of Remedial Action: constraints on ensuring a safe operating space for humanity*, 2009; *Coping Capacity of Governance as Dangerously Questionable: recognizing assumptions and unasked questions when facing crisis*, 2019; Michael S. Wogalter, *Handbook of Warnings*, 2006).

The argument here is however provoked by the current single-issue modelling of the global pandemic and the unprecedented consensus to which it has given rise regarding universal vaccination as "doing the right thing" and "for the benefit of all" -- with zero consideration of alternative possibilities. Not only are these alternatives absent from public discourse, but any efforts at their articulation are reframed as misleadingly associated with misinformation -- therefore requiring vigorous suppression, and censorship of those promoting such methodological consideration.

Given appreciation of the engendered consensus by authorities, there is every expectation that the mainstream narrative will be applied *mutatis mutandis* to the "elephant in the living room" (*Application of Universal Vaccination Narrative to Climate Change: implications for biodiversity, human equality and anti-otherness*, 2021). An unfortunate indication of this pattern is the constraint on articulation of [climate change denial](#) (*Wikipedia deletes "List of scientists who disagree with the scientific consensus on global warming" in astonishing act of censorship*, *Electroverse*, 7 March 2020).

Expressed otherwise, **the focus of the following argument is on the lack of self-reflexivity of global modelling regarding its own probable cognitive biases** and how these affect what is included or excluded from any single-issue focus. **In the absence of multi-issue modelling, how does global modelling deal with contrasting perspectives** -- and any crisis of crises? What of the probability of the emergence of other models in the future following the failure of those that have been previously favoured -- as is only too evident from a historical perspective? Of considerable importance in this respect is the manner in which vested interests bias the selection of what is considered authoritatively relevant -- and the uncritical complicity of academia in this process -- as being in its own best interest.

The argument follows from recognition that the pandemic is equally significant as a memetic disease (*COVID-19 as a Memetic Disease - an epidemic of panic*, 2020).

Modelling approaches of relevance to the global pandemic

As noted by [Wikipedia](#), [mathematical models of infectious disease](#) can project how infectious diseases progress to show the likely outcome of an epidemic and help inform public health interventions. Models use basic assumptions or collected statistics along with mathematics to find parameters for various infectious diseases and use those parameters to calculate the effects of different interventions, like mass vaccination programmes. The modelling can help decide which intervention(s) to avoid and which to trial, or can predict future growth patterns, etc.

The argument is usefully introduced by the following indications:

- C. Jessica E. Metcalf, et al: *Mathematical models to guide pandemic response* *Science*, 369, 2020, 6502,

The ongoing coronavirus disease 2019 (COVID-19) pandemic has put mathematical models in the spotlight. As the theoretical biologist Robert May wrote: "the virtue of a mathematical model...is that it forces clarity and precision upon conjecture, thus enabling meaningful comparison between the consequences of basic assumptions and the empirical facts" R. M. May, *Science* 303, 790 (2004).

- Colizza V, Barrat, et al: *Modeling the Worldwide Spread of Pandemic Influenza: baseline case and containment interventions* (*PLoS Med* 4, 2007, 1)
- Christian Yates: *How to model a pandemic* (*The Conversation*, 26 March 2020)
- Ling Zhong: *A dynamic pandemic model evaluating reopening strategies amid COVID-19* (*PLoS ONE*, 16, 2021, 3)
- Shearer FM et al: *Infectious disease pandemic planning and response: Incorporating decision analysis* (*PLoS Medicine* 17, 2020, 1)
- Andrew Czyzewski *Modelling an Unprecedented Pandemic: the vital role of team-based, collaborative epidemiology and disease modelling in managing pandemics* *The Forum* (Imperial College)
- Pandemic Influenza Outbreak Research Modelling Team: *Modelling an Influenza Pandemic: a guide for the perplexed* (*CMAJ-JAMC*, 181, 2009, 3-4)

For Tim Rhodes, et al: *Modelling the pandemic: attuning models to their contexts* (*BMJ Global Health*, 5, 2020, 6):

The evidence produced in mathematical models plays a key role in shaping policy decisions in pandemics. A key question is therefore how well pandemic models relate to their implementation contexts. Drawing on the cases of Ebola and influenza, we map how sociological and anthropological research contributes in the modelling of pandemics to consider lessons for COVID-19. We show how models detach from their implementation contexts through their connections with global narratives of pandemic response, and how sociological and anthropological research can help to locate models differently. This potentiates multiple models of pandemic response attuned to their emerging situations in an iterative and adaptive science. We propose a more open approach to the modelling of pandemics which envisages the model as an intervention of deliberation in situations of evolving uncertainty. This challenges the "business-as-usual" of evidence-based approaches in global health by accentuating all science, within and beyond pandemics, as "emergent" and "adaptive".

For Aniruddha Adiga, et al: *Models for COVID-19 Pandemic: a comparative analysis*. *Journal of the Indian Institute of Science*, 100, 2020).

We end the discussion of the models above by qualitatively comparing model types. As discussed in the preliminaries, at one end of the spectrum are models that are largely data driven: these models range from simple statistical models (various forms of regression models) to the more complicated deep learning models. The difference in such model lies in the amount of training data needed, the computational resources needed and how complicated the mathematical function one is trying to fit to the observed data. These models are strictly data driven and, hence, unable to capture the constant behavioral adaptation at an individual and collective level. On the other end of the spectrum SEIR, meta-population and agent-based network models are based on the underlying procedural representation of the dynamics -- in theory, they are able to represent behavioral adaptation endogenously. But both class of models face immense challenges due to the availability of data...

That comparative study concludes by usefully addressing the following issues:

- *Were some of the models wrong?* Specifically in response to the cited comment by Vikram Patel (Harvard School of Public Health)

Crowning these scientific disciplines is the field of modelling, for it was its estimates of mountains of dead bodies which fuelled the panic and led to the unprecedented restrictions on public life around the world. None of these early models, however, explicitly acknowledged the huge assumptions that were made

The study disputes that assessment by arguing that most of the good models tried to be very explicit about their assumptions. The difficulty is that the institutional and academic dynamics of global modelling ensure that every model is claimed to be good. Furthermore, given the degree of secrecy associated with their algorithms as a protection for intellectual property it is questionable where, how and to whom such assumptions are rendered explicit

- *Use of models for evidence-based policy making:* Specifically in response to the danger of complex models providing a false sense of certainty in justifying policy decisions, as argued by John Kay and Mervyn King (*Radical Uncertainty: decision-making beyond the numbers*, 2020).

The study argues that this can be addressed by viewing the problem from the lens of control theory (so that forecasts are made only to control the deviation from the desired path) and not insisting on exact numbers but general trends. The study reinforces the appreciation of Kay and King that the value of models, especially in the face of radical uncertainty, is more in exploring alternative scenarios resulting from different policies. Unfortunately, however, has highlighted in the argument here, it is precisely

the alternative scenarios which tend to be designed out of modelling as presented to decision-makers who then precede to ensure their suppression from public discourse.

- *Supporting science beyond the pandemic*: Specifically in response to criticism that research funding on pandemics is withdrawn as soon as the pandemic is under control -- leaving fundamental questions unanswered. The study argues that building long term research capacity is essential. Missing from that recommendation however is any effort to incorporate into the modelling process the parameters indicative of the manner in which the modelling is inherently unsustainable, or at least potentially so under present circumstances. Expressed otherwise, as a form of conceptual contract, should global models incorporate some explicit form of "sunset clause"?

Framing the probability of global modelling bias

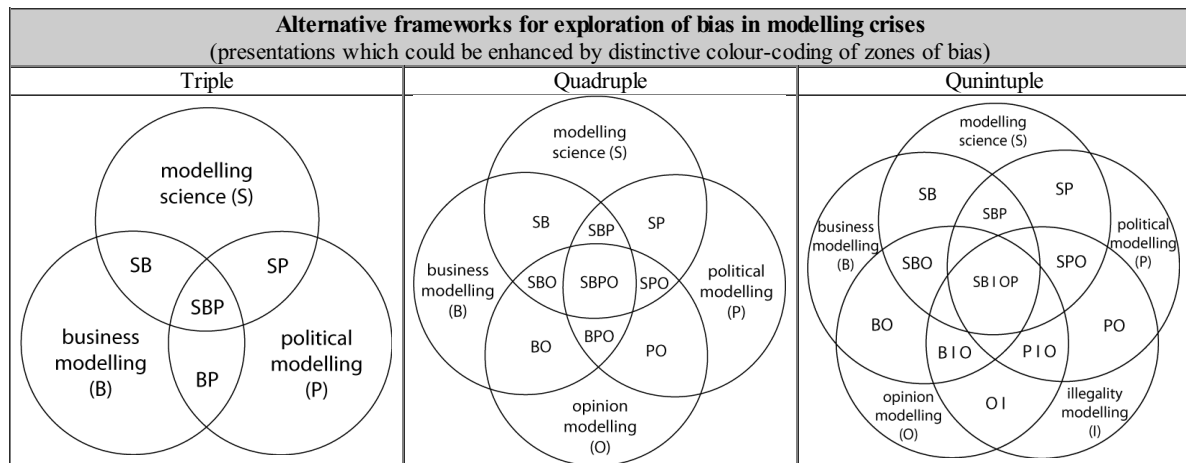
Venn diagrams: One approach to recognizing the probability of bias is to juxtaposition the various conditions under which modelling takes place within a **Venn diagram**. The simplest example is that on the left below. This positions a condition in which scientific modelling (S) would like to perceive itself as independent of governance-political interests (P) and of business-corporate interests (B).

This ideal is of course far from the reality in which science is highly dependent on government-political (SP) or corporate-business (SB) interests -- if only for funding, but potentially for pressure regarding avoidance of unwelcome research themes and conclusions. It is difficult to imagine institutional conditions under which independent modelling could be undertaken without some degree of massaging of data as a result of such pressures (NeilViner, et al, *Institutionalized biases in the award of research grants: a preliminary analysis revisiting the principle of accumulative advantage*, *Research Policy*, 33, 2004, 3).

It could be argued that richly endowed universities and think tanks could be seen as fulfilling conditions of independence -- except that use of endowments typically has constraining strings, as variously explored (*Tank Warfare Challenges for Global Governance*, 2019). Distinguishing S, B and P in this way is of course simplistic -- for purposes of illustration, as with the other categories distinguished below.

The complexity of the situation is appropriately represented by the central condition (SBP). Other than the ideal condition (S), the remaining zones constitute conditions of bias whose relative significance could be represented by changing the size of the zones and their degree of overlap -- perhaps dynamically. The depicted boundaries between the zones are necessarily porous -- conforming to the reality recognized by the **revolving door** transfer of individuals between them.

This triple format bears comparison with the **triple helix model of innovation**. This refers to a set of "interactions" between academia (the university), industry and government, to foster economic and social development, as described in concepts such as the knowledge economy and knowledge society. Although framed creatively, "interactions" could be recognized as implying a degree of bias. The Venn diagram could then be understood as a view along the axis of the helix (extending into the page). Some bias in relation to the triple helix model has been identified is offered (David Emanuel Andersson, et al., *The Impossibility of the Triple Helix*, *Prometheus*, 36, 2020, 3).



A more complex version of the Venn diagram is presented with the addition of opinion modelling (O), as was characterized by the techniques basic to the highly publicised **Facebook–Cambridge Analytica data scandal**. As represented in the central image, this frames various forms of bias determined by financial priorities (BO) and political priorities (PO), or their combination (BPO). Opinion modelling could of course be reframed to include that of belief systems, given the degree of influence of religions on governance, for example. Of relevance is of course the question as to the forms of bias implied by the triple representation when such considerations of public opinion are ignored.

The limitations of the central diagram are noteworthy in failing to position those forms of bias associated with overlap with modelling by science (SO) and overlap between governance and business (PB). The circles could be positioned differently in relation to one another to remedy this, although the difficulty of comprehensive visualization is perhaps indicative of the ease with which one or other form of bias can be ignored or denied. Rather than circles in 2D, representation in 3D as spheres could be envisaged (Peter Rodgers, et al, *Introducing 3D Venn and Euler Diagrams*, 2012).

An even more complex variant of the Venn diagram adds a notion of modelling criminality-illegality (I), as it might relate to the four other forms of modelling. The category of criminality-illegality could of course be framed otherwise to include the preoccupations of the

security services with policing conformity -- extending into issues of surveillance and unauthorised invasion of privacy. Again the overlap with science (SI) is not shown because of the limitations of the visualization -- other than in the central zone (SBIOP). Also omitted, for the sake of clarity are the 5 fourfold forms of bias (SBIO, SBIP, SIOP, SBOP, BIOP). Of relevance again is of course the question as to the forms of bias implied in the triple and quadruple representations when considerations of illegality-criminality are ignored. Science has a tendency to be especially naive in its failure to allow for this dimension in any modelling.

The articulation of the triple helix model has in fact been extended to a quadruple and a quintuple model whose relevance could be explored in clarifying the forms of bias (*Quadruple and quintuple innovation helix framework*). Appreciation of them as models of "interactions" frames valuable questions as to the relation between "interactions" and the complex integration of "biases" that such interaction might constitute.

With respect to the pandemic, the probability of the different forms of bias (in which modelling by science has a tendency to be complicit) is indicated by:

- SB: complicity of science with the priorities of the pharmaceutical industry, for example
- SP: complicity of science with the political priorities of governance and strategic implementation of universal vaccination, masking, etc
- SO: complicity of science with manipulation of public opinion through crafting a mainstream narrative and its denial of alternative perspectives
- SI: complicity of science with degrees of illegality, especially given the degree of non-transparency considered essential by various parties
- SBP: complicity of science in combinations of SB and SP, evident in the case of [sole source](#) and [non-competitive procurement provisions](#)
- SBO: complicity of science in combinations of SB and SO
- SBI: complicity of science in combinations of SB and SI
- SBIO, SBIP and SIOP: complicity of science in combinations of SBP, SBO, SOP, SIP, and SBI
- SBIOP: complicity of science in combinations of SBIO, SBIP, SIOP

Whereas the helical models continue to be the subject of active exploration with respect to innovation, their relevance to recognition of bias remains to be explored, notably with regard to modelling of crises by science. The overlaps identified frame the question as to whether innovation is in fact possible without bias -- namely in the "advancement of human knowledge" as a primary slogan of science.

Far more problematic is the failure of science to model explicitly the potential for bias indicated by the zones of the various Venn diagrams -- to the point of ignoring them or even denying their relevance in the modelling of crises. Such denial could even be explored as a requirement for "creative ignorance" to enable innovation.

It is of the course the case that "science" is vigorous in its denial of any responsibility for how its methodology may be abused in the interests of other domains -- as exemplified in the case of the development of weapons of mass destruction. Responsibility for the development and use of vaccines by science may in future be defined according to such principles, as with the modelling which has given rise to lockdowns, masking regulations and the quest for herd immunity.

The complexification offered by the helical models is suggestively consistent with mathematical understandings of braiding, notably as they apply to juggling -- frequently recognized with respect to the strategic juggling of priorities which the various zones can also be understood to represent (*Governance as "juggling" -- Juggling as "governance": Dynamics of braiding incommensurable insights for sustainable governance*, 2018).

The "interactions" of science with the other sectors, to the extent that they bias and distort any modelling in times of crisis, suggest the possibility that they might be fruitfully visualized in 3D, as explored separately (*Psychosocial Learnings from the Spiral Form of Hurricanes: Implications of the triple helix and the 3-fold triskelion as "cognitive cyclones"?* 2017; *Visualization in 3D of Dynamics of Toroidal Helical Coils*, 2016).

The question to be raised, and the point to be stressed, is whether (and to what extent) modelling of crises (and the pandemic in particular) take explicit account of the range of such biases -- and of the probability of their denial. Token indication of this would appear to be limited to qualifying statements of conflicts of interest which may be appended to scientific papers. Unfortunately such statements are not supported by the kinds of "hard evidence" most valued by the methodology of science -- and are readily challenged by critics (as could itself be readily predictable in any model).

Cognitive biases potentially distorting global modelling of crises

The following is slightly adapted from a section on *Future blindness and the deaf effect as cognitive biases* -- a section of a discussion of *Group of 7 Dwarfs: Future-blind and Warning-deaf* (2018). Global modelling of crises could be understood as a vital tool in alleviating such "future blindness". However it could be asked whether global modelling initiatives are themselves vulnerable to "future blindness" to an unexplored degree.

In a quest for insight into "future blindness" it is somewhat extraordinary to note the far greater proportion of references to the future of blindness and to blindness in the future -- notably given the eventual possibility of enabling the blind to see. Especially interesting therefore is the brief checklist by [Morne Mostert](#) (*Future Blindness: an index of bias for leaders*, University of Stellenbosch, 15 October 2015) and the thesis of [Arno Nuijten](#) (*Deaf Effect for Risk Warnings A Causal Examination applied to Information Systems Projects*. Erasmus University Repository, 2012).

Reference to information systems is a reminder of the extent in which global society is now readily defined as a knowledge-based

information society. Arguably the [Group of Seven](#) (G7) has responsibilities for society understood as a global information system -- or would make that claim. The focus on the "deaf effect" in institutional information projects is also a reminder of the focus for which Stafford Beer has been renowned (*Brain of the Firm*, 1981). How indeed is the "global brain" to be rendered appropriately attentive to the future? What are the implications of Beer's subsequent work on viable system theory?

Cognitive biases: are systematic patterns of deviation from norm or rationality in judgment, and are often studied in psychology and behavioral economics. It is unclear whether they have been a focus of attention with respect to the Group of Seven or the "international community". As noted by *Wikipedia* with respect to [cognitive biases](#), although the reality of these biases is confirmed by replicable research, there are often controversies about how to classify these biases or how to explain them. Some are effects of information-processing rules (i.e., mental shortcuts), termed *heuristics*, that the brain uses to produce decisions or judgments. Biases have a variety of forms and appear as cognitive ("cold") bias, such as mental noise, or motivational ("hot") bias, such as when beliefs are distorted by [wishful thinking](#). Both effects can be present at the same time.

There are also controversies over some of these biases as to whether they count as useless or irrational, or whether they result in useful attitudes or behavior. For example, when getting to know others, people tend to ask leading questions which seem biased towards confirming their assumptions about the person. However, this kind of [confirmation bias](#) has also been argued to be an example of [social skill](#): a way to establish a connection with the other person. *Wikipedia* clusters the biases as follows:

- [Decision-making, belief, and behavioral biases](#) (111 biases)
- [Social biases](#) (28 biases)
- [Memory errors and biases](#) (49 biases)

Future blindness: The following is an adaptation of Mostert's "index of bias" for leadership, most notably supplemented with links to relevant literature. Seemingly the list necessarily encompasses many of the biases which feature in Nuijten's study of the "deaf effect" with respect to recognition and acknowledgement of warning signals. The checklist of 30 raises valuable questions in relation to any "cognitive dwarfism" potentially characteristic of the Group of Seven.

Checklist of biases framing future blindness (summary of Morne Mostert , <i>Future Blindness: an index of bias for leaders</i> , 2015)	
<ol style="list-style-type: none"> 1. Psycho-dynamic bias, including: Transference, Projection, Attribution 2. Status quo bias 3. Confirmation bias 4. Personal optimism bias 5. Boundary bias 6. Similarity bias 7. Paradigmatic bias (Simmelweis reflex), including: Axiological bias, Ontological bias, Epistemological bias, Doxastic bias 8. Selection bias 9. Dominance bias 10. Bottom-line bias 11. Novelty or recency bias 12. Structural bias 13. Causal bias, including: Singular cause bias, ?Original cause bias 14. Proximity bias 15. Control illusion 	<ol style="list-style-type: none"> 16. Schematic bias 17. Availability bias 18. Positivism (vividness bias) 19. Provenancial bias 20. Loss aversion 21. Upside bias 22. Halo effect 23. Fundamentalism bias 24. Recurrence bias 25. Cure-based diagnosis 26. Anchoring 27. Sunk-cost bias 28. Passion bias 29. Personal interest bias 30. Randomness bias

The literature indicates other efforts to cluster biases in the range 25-30:

- P. Croskerry: *The importance of cognitive errors in diagnosis and strategies to minimize them* (*Academic Medicine*, 78, 2003, 8, pp. 775-780), indicating that researchers have identified more than 30 cognitive biases, but most are believed to operate without conscious awareness, making it unrealistic to ask physicians which biases influence their judgment, how often, with which patients, and whether those biases lead them toward suboptimal decisions.
- Rory Fryer: *The behavioural link between economics and marketing* (25 October 2017), indicating that there are about 25-30 cognitive biases that play the largest part in behaviour and all have different relevance dependent on the context of the situation.

Other authors produce clusters of 20:

- Jennifer M Wood: *20 Cognitive Biases That Affect Your Decisions* (*Mental Floss*, 17 September 2015)
- Patrick Allan: *This Graphic Explains 20 Cognitive Biases That Affect Your Decision-Making* (*LifeHacker*, 16 September 2015)

Some authors reduce the cognitive biases of significance to an even smaller number::

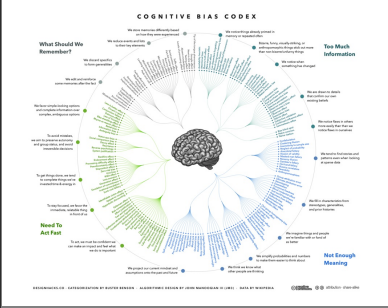
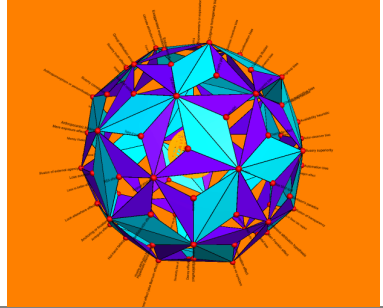
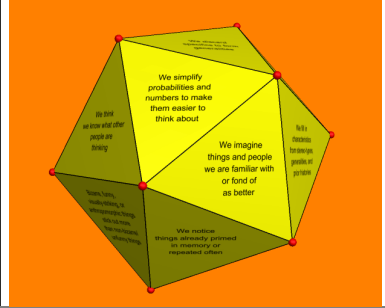
- *15 Cognitive Biases that Prevent Us From Thinking Rationally* (*Reflected*, 26 March 2014)
- *12 cognitive biases that prevent you from being rational* (*IO9*, September 2009)
- *12 Cognitive Biases that Lead Hiring Managers to Make Bad Decisions* (*Business Insider*, 26 November 2013)
- *10 Cognitive Biases that Mess up your Daily Decisions* (*Economic Times*, 4 September 2015)
- *10 Cognitive Biases that Distort your Thinking* (*VeryWellMind*, 23 November 2017)

For Chris Weller: *The 5 Biggest Biases That Affect Decision-Making* (*NeuroLeadership Institute*, 9 April 2019):

- Similarity Bias: We prefer what is like us over what is different
- Expedience Bias: We prefer to act quickly rather than take time
- Experience Bias: We take our perception to be the objective truth
- Distance Bias: We prefer what's closer over what's farther away
- Safety Bias: We protect against loss more than we seek out gain

Cognitive Bias Codex: The cognitive biases indicated by *Wikipedia* are accompanied by the following configuration of 180+ biases (below left) designed by John Manoogian III -- incorporating the majority listed there. Centered on the depiction of a human brain, the configuration raises the question as to how this pattern might be taken into account in the design of any global model. Of particular interest, in the light of the extensive role envisaged for artificial intelligence, is the extent to which such biases may be inadvertently embodied in algorithms with implications for governance.

As an exercise towards a coherent memorable representation, the larger set of cognitive biases can be tentatively configured as follows (centre and right), necessarily raising the question of how they may be clustered and interrelated in any such mapping.

Representations of Cognitive Bias Codex (view enlargements in separate browser windows)		
<i>Cognitive Bias Codex: design by John Manoogian III categories and descriptions; implementation by Buster Benson</i>	Animation of tentative mapping of biases on 180 vertices of truncated truncated icosahedron	Animation of tentative mapping of clusters of biases on 20 faces of icosahedron
		
<i>An Extension of the work of John Manoogian by Brian Morrisette [CC BY-SA 4.0], from Wikimedia Commons</i>	Animations prepared using <i>Stella Polyhedron Navigator</i>	

Comprehension challenges of complexity: The very question as to "how many" biases merit recognition is a reminder that there are constraints on human comprehension, reinforced by preferences, as discussed separately (*Comprehension of Numbers Challenging Global Civilization: number games people play for survival*, 2014). The explores the matter through the following sections:

Enabling disaster through basic mathematical operations
Numbers in play in psychosocial organization
Conceptual clustering and cognitive constraints
Pattern memorability between symbolic mystification and "stretching"
Imaginative depiction of the cognitive challenge

Requisite complexification of imagery to embody greater significance
Creative pretence dissociating numbers from sexuality
Significance of "encompassing" the numbers required for meaningful governance
Boundary pushing by sport, religion and governance
Reframing boundaries to engage with patterns of collapse

Cognitive bias reinforced via the media: Much has been made of media bias, whether on the part of the mainstream media or various social media. This is readily understood in terms of information warfare and memetic warfare. This is notably evident on how problems are reframed to expose or protect particular strategies and the bodies promoting them, as discussed separately (*Vital Collective Learning from Biased Media Coverage: acquiring vigilance to deceptive strategies used in mugging the world*, 2014). The latter explores the following aspects:

Biased coverage of controversy by news media
Clues to possible vigilant interpretation of media coverage
Strategic leadership as a "shell game"?

Acquiring vigilance through recognition of media bias
Elaboration of a system of media "con codes"
Future credibility of media presentations by authority

Information and memetic diseases: An alternative to use of "warfare", as a framing metaphor for the cultivation of biases, is the use of "disease" -- potentially as an analogue to biochemical warfare. This approach is discussed separately (*Memetic and Information Diseases in a Knowledge Society: speculations towards the development of cures and preventive measures*, 2008) in terms of the following aspects:

Approaches to information-related diseases
Classification of information diseases (and memetic diseases)
Excesses in the information diet
Deficiencies in the information diet
Alternative and complementary models of information health and death
disease
Supplements to an information diet and inexplicable information needs

Emergence of "social diseases" in association with "social networking"?
Public health
Potential implications of "causes of death" for "information"
Sensory deprivation and Insight enhancement?
"Knowledge diseases" and "Wisdom diseases"?
Value and ethical diseases and disorders?

Understood as "diseases", the memetic implications can be explored as an analogue to lifestyle diseases (*Cognitive Implications of Lifestyle Diseases of Rich and Poor: transforming personal entanglement with the natural environment*, 2010).

Integration of probability of bias into global modelling

Constraints on science? As a valued feature of the scientific method, it is appropriate to note considerations of the constraints of that method in engaging with global crises.

One approach to this took the following form (*Challenges of Science Upheld as an Exclusive Mode of Inquiry: pseudorelevance of science to global crises?* 2021). This included sections on:

Existence of "science"?	Human factor?
Scientism	Gender bias in science
Questionable quality of evidence-based science	Questionable priorities
Complicity of science in its politicisation and misuse	Lack of self-reflexivity
Constrained capacity to deal with diversity	Pseudorelevance to the pandemic

This is a generalization of the argument considering the *Vulnerability of collective initiatives to memetic diseases* (2021) in a discussion of misinformation processes in which science is potentially complicit (*Towards a Science of Misinformation and Deception: the challenge of an information pandemic -- a COVID-19 infodemic*, 2021).

The questions raised follow from an earlier exploration (*Knowledge Processes Neglected by Science: insights from the crisis of science and belief*, 2012) which included the following sections:

Unquestioning preoccupation with explanation	Methodological dependence on questionable engagement with society
Undue preoccupation with validation	Uncritical belief of science in the appropriateness of its own process
Selective appreciation of creative imagination	Institutionalized incoherence and disagreement
Unexamined preoccupation with professional reputation and recognition	Ill-considered recognition of constraints and opportunities of an information-based society
Deprecation of alternatives and anomalies challenging conventional models	Self-referential inadequacy of "metascience"

Bias in crisis modelling? It is indeed the case that there is a degree of concern with biases in global modelling of crises like the pandemic -- if only in defensive response to critics. Examples include:

- Jake Silberg and James Manyika: *Tackling bias in artificial intelligence (and in humans)* (McKinsey Global Institute 6 June 2019) which claims to provide an overview of where algorithms can help reduce disparities caused by human biases, and of where more human vigilance is needed to critically analyze the unfair biases that can become baked in and scaled by AI systems.
- Cindy L. Bruyère, et al: *Bias corrections of global models for regional climate simulations of high-impact weather* (*Climate Dynamics*, 43, 2014) which notes that all global circulation models (GCMs) suffer from some form of bias, which when used as boundary conditions for regional climate models may impact the simulations, perhaps severely.
- Zohaib Yousaf, et al: *Avoiding Anchoring Bias in the Times of the Pandemic* (*Case Reports in Neurology*, 12, 2020, 3)

The focus in the latter on **anchoring** is especially significant to bias in data collection. As noted:

COVID-19 has a broad spectrum of clinical presentations, including central nervous system manifestations that are not uncommon. The high pretest probability of COVID-19 in pandemic can lead to anchoring.... Anchoring to the diagnosis of COVID-19 may deter clinicians from considering other concurrent diagnoses and a poor outcome consequently.

Another criticism of a particular bias is noted with respect to the influential modelling by the **Doherty Institute** -- a project of the University of Melbourne (whose mission is explicitly expressed in terms of the "Triple Helix" of research, learning and teaching and knowledge transfer):

Critics say national cabinet roadmap appears 'risky' with Doherty Institute only considering best strategy for next six months... National cabinet's pandemic exit strategy only considered modelling for the "transition" phase over the next six months, with the Doherty Institute yet to consider how relaxed restrictions will affect transmission in the community. (Sarah Martin, *Australia's pandemic exit plan modelling doesn't examine what happens after restrictions are eased* *The Guardian*, 3 August 2021)

Systemically comprehensive set of biases? As indicated by the Cognitive Bias Codex above, rather than any particular selection of biases, of far greater relevance is how a comprehensive set of biases is taken into account in global modelling -- if only in terms of the probability of their incidence, whether or not they can be detected. As suggested by the checklists above, examples might then include:

- influence of whoever is paying for development of the model (directly or indirectly) and the nature of their agenda

- existence of pressures to "massage" the data included or the results, if only support of any hypothesis
- existence of pressures to include or exclude certain factors or dimensions ("cognitive gerrymandering")
- pressures to achieve originality in competition for funding with other institutions, potentially ignoring the value of other insights
- pressures to ignore or deprecate the methods and results of other modelling initiatives, potentially associated with other ideologies
- pressures to ignore the insights and parameters considered significant by other disciplines, especially those readily deprecated as "unscientific"
- failure to compensate for the psychological and behavioural needs of those involved in model building
- focus on assertion of singular conclusions rather than presentation of a range of scenarios
- cultivation of a degree of secrecy inhibiting appreciation by others of the strengths and limitations of the model
- reliance on institutional, cultural or linguistic dominance to demean alternative insights and their publication
- insensitivity to the psychosocial and economic impacts of policies guided by the model (reframed as a form of [collateral damage](#), according to the principles of [just war theory](#))

Such biases frame the question as to how the associated cognitive biases might be appropriately integrated as possibilities (if not probabilities) into the design of resilient global models. Of relevance in this respect are:

- the extent to which the global model is intentionally designed to deceive in some way as a feature of memetic warfare, as considered separately (*Towards a Science of Misinformation and Deception: the challenge of an information pandemic -- a COVID-19 infodemic*, 2021).
- any need to preserve credibility over time by "shifting goal posts", purportedly in the light of new data, whether or not this is a reflection of a failure of the model as originally conceived
- obfuscation or denial of the incidence of conflict of interest in the elaboration of the model and promotion of its value

Of particular interest in the case of pandemic modelling has been the precautionary diffidence in consideration of issues otherwise the subject of major controversy, namely [overcrowding](#) and [overpopulation](#). The former is especially evident in unrealistic requirements for social distancing, as argued separately (*Social Distancing under Conditions of Overcrowding? Weaponising mass distraction from overpopulation denial?* 2020; *Local Reality of Overcrowding -- Global Unreality of Overpopulation*, 2019).

Whether either is a determining factor in the disastrous consequences of a global crisis is seemingly a focus of censorship in the mainstream narrative (*Prohibition of Reference to Overcrowding*, 2019; *Prohibition of Reference to Overpopulation of the Planet*, 2018). The issue has been variously evident in the [granularity](#) of modelling and the administrative decisions to which it has given rise, especially with the later transition of focus from country-level data to "clusters" and "hot spots".

Credible modes of global model presentation

Of potential relevance to the wider credibility of any global model is any excessive reliance on a particular mode of presentation (notably text and equations), thereby avoiding any concern with the need of others for comprehensible visualization or [sonification](#) of data. As stressed by [Harold Lasswell](#), many valuable participants in decision-making need audio-visual displays to encompass the quantitative and abstract analytical insights so that "*an immediate sense of time, space and figure is retained*" (*The transition toward more sophisticated procedures*. In: Davis B. Bobrow and J. L. Schwartz (Ed.), *Computers and the Policy-making Community; applications to international relations*, 1968, pp. 307-314).

With respect to audio-visual representation of global modelling by science, it is appropriate to ask whether it is misleadingly assumed that the communication biases of science exhaust the possibilities and advantages of communication as a guidance to governance (*Aesthetics of Governance in the Year 2490*, 1990; *A Singable Earth Charter, EU Constitution or Global Ethic?* 2006).

The question goes to the heart of the problematic interplay between the "[two cultures](#)" of the sciences and the arts, ironically embodied to a high degree in the preoccupations of the futures research of John McHale, otherwise renowned for his work in the arts. It is now most creatively addressed by the [Bridges Organization](#). This oversees the annual Bridges conference on mathematical connections in art, music, architecture, and culture. As yet, however, the only reference to COVID in the archive of the conferences relates to development of an insight into braiding (mentioned above in relation to juggling) from dance by Karl Schaffer (*Dancing Topologically, Bridges 2021 Conference Proceedings*). There is however some irony to the fact that the widespread nursery rhyme *Ring-a-Ring-o'-Roses* has been explained (controversially) to derive from the [Great Plague](#) (England, 1665), or from earlier outbreaks of the [Black Death](#).

It is remarkable to note the very particular tone-of-voice through which the guidance provided by global modelling is communicated by politicians and propagandists to the general public in the case of the pandemic -- with the assumption that that mode will not be in itself alienating to many, irrespective of the content (*Varieties of Tone of Voice and Engagement with Global Strategy*, 2020). The latter notes with regard to [nonverbal communication](#), that it has been estimated that 7 percent of meaning is communicated through the spoken word, 38 percent through tone of voice, and 55 percent through body language.

With what tone-of-voice will the urgency of a response to climate change be communicated, as a result of the modelling by IPCC? Is there some danger that politicians and propagandists -- for any global strategy framed as a war -- invite unfortunate comparison with [Lord Haw-Haw](#), [Tokyo Rose](#), [Hanoi Hannah](#) or [Pyongyang Sally](#)?

It is appropriate to note the manner in which "modules" with distinctive functions are used in translation-interpretation software to interrelate otherwise incommensurable languages. This suggests the relevance of interrelating global models with contrasting emphases, especially given the neural learning possibilities of artificial intelligence, in order to derive more coherent and comprehensible policy guidance.

The progress of the pandemic has successively revealed vulnerable economic and social functions -- in addition to exceptionally

vulnerable people. This suggests the need for recognition of an equivalent to [indicator species](#) in the biological environment. As with the traditional caged canary in a mine, these are individual species, or a group of species, whose function, population, or status can reveal the qualitative status of the environment. Possibilities in the socio-economic environment obviously include the elderly, the disabled, the mentally or emotionally vulnerable, the (computer) illiterate, and the socially dependent -- all of which have been "unexpectedly" affected to an undue degree by the pandemic and the cumbersome strategic responses.

From secretive single-issue modelling to open-source multi-issue modelling

It is an evident characteristic of many global models that they are the work of a small group of academic specialists within an institution - possibly recognized as a think tank. The funding and other constraints of any such context reinforce tendencies to secrecy as a protection of intellectual property, of the career path of the individuals, and of the promotion of the prospects of the institution. The efforts to protect intellectual property can be understood as a major constraint on requisite global strategic resilience, as argued separately (*Future Coping Strategies: beyond the constraints of proprietary metaphors*, 1992). The algorithms creatively developed may well be a particular focus of concern. The secrecy considered necessary may well inhibit vital corrective feedback.

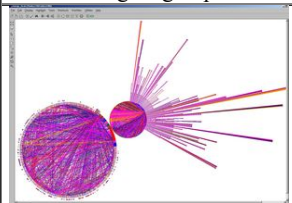
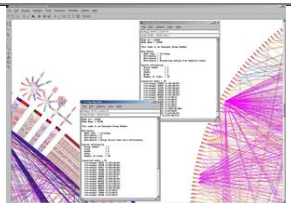
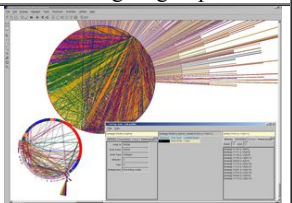
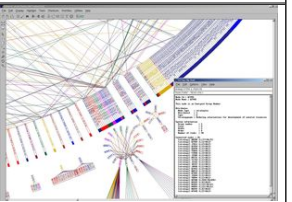
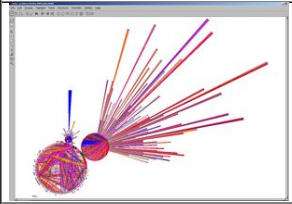
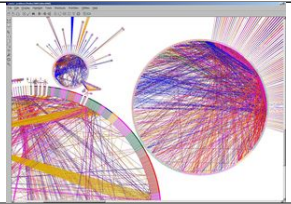
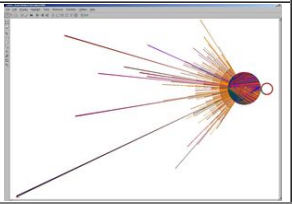
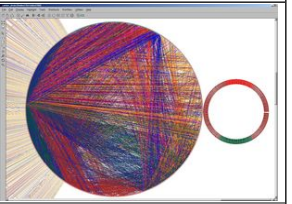
In order to fund such an initiative it is necessarily framed to appeal to foundations and other bodies which are themselves concerned with ensuring the specificity and topical relevance of any model. Funding is typically ensured within a contract of short-term nature. It is therefore difficult to envisage model construction exploring a multiplicity of issues, especially those of seemingly limited relevance to potential clients, and more especially to allow for the possibility of unforeseeable emergent issues. These factors can all be recognized as operating as biases in model design.

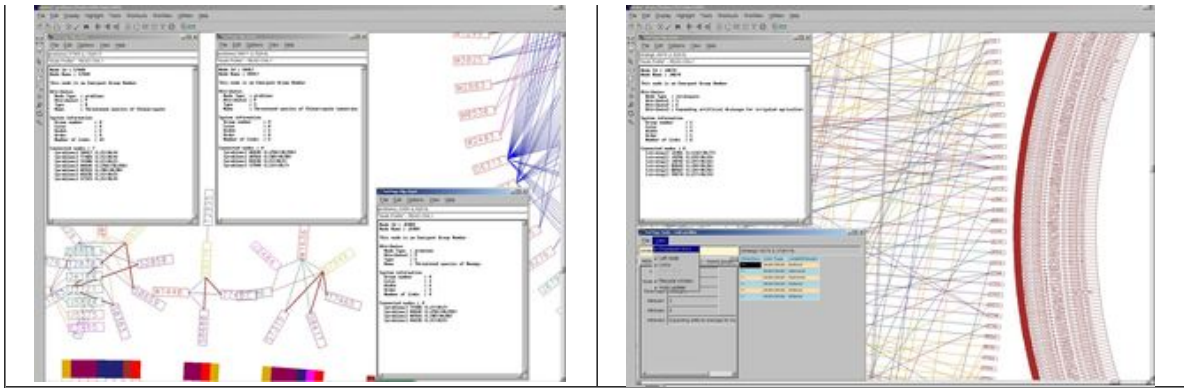
It is therefore of value to consider approaches which go to the other extreme, namely in favouring multi-issue profiling in a sustainable open-source context. Such extremes are associated with other challenges, notably the extent to which they may be usefully recognized as "models" from a conventional perspective.

An obvious example is provided by the remarkable appeal of *Wikipedia* -- especially in the light of the highly problematic edit wars for which it provides a context (Róbert Sumi, et al, *Edit wars in Wikipedia*, 9 February 2012). In contrast with conventional single-issue models, its value can be readily challenged in terms of its predictive limitations -- however many of its entries may be indicative of current and emergent challenges. As a model, even as a source of data, it is readily deprecated from an academic perspective and the priorities which that cultivates.

Another example is the *Encyclopedia of World Problems and Human Potential* (noted above), given the integration of its data sets with the *Yearbook of International Organizations*. Although assiduous in responding to the variety of extant international perspectives on problems and advocated strategies, it is especially attentive to their placement within a systemic context -- in contrast to the approach of *Wikipedia*. However its entries draw directly and automatically on *Wikipedia* profiles where complementary information can be found. The linkages integrate entries into multiple hierarchies and causal chains.

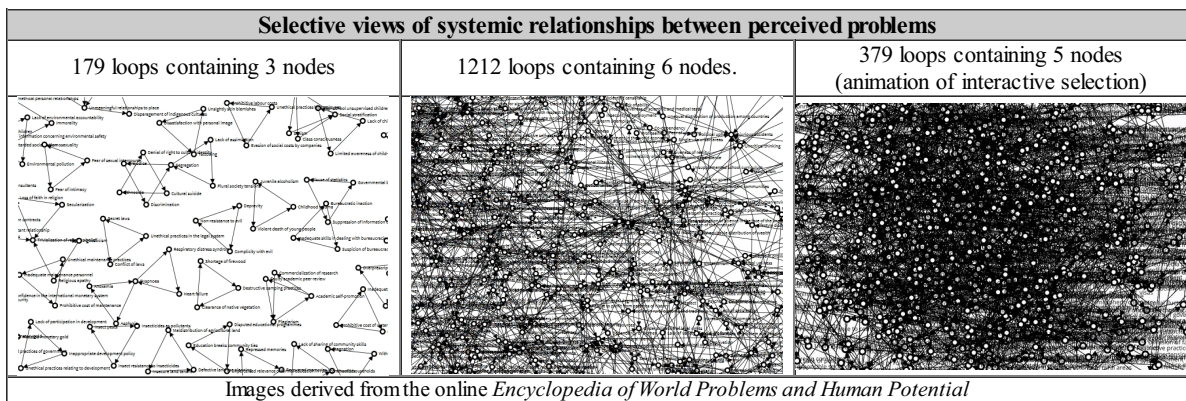
Rather than excluding perceptions as "wrong", **the profiles provide for both potentially exaggerated claims as to their relative importance and/or their irrelevance as otherwise perceived.** This enables inclusion of a very wide variety of perspectives, whether or not they are considered dangerously misleading from some other perspective, however authoritative it may claim itself to be. This enables the real-world dynamics between claims and counter-claims to be explored using network analytic tools (*Preliminary NetMap Studies of Databases on Questions, World Problems, Global Strategies, and Values*, 2006).

Indication of the visual displays of selected Encyclopedia data using Netmap			
Study of Energy Strategies (represents 1472 strategies and 4790 links; click on image for larger version)		Strategies responding to Violence (represents 2367 strategies and 6740 links; click on image for larger version)	
emergent groups	detail	emergent groups	detail
			
Study of Water-related Problems (represents 1690 problems and 4115 links; click on image for larger version)		Study of Water-related Strategies (represents 1506 and 5730 links; click on image for larger version)	
emergent groups	detail	emergent groups	detail
			



It is therefore as a network of relationships that the interrelated data sets constitute a contrasting model, as mentioned above (*Simulating a Global Brain: using networks of international organizations, world problems, strategies, and values*, 2001).

Particular consideration is given to the detection and visual representation of complex causal loops between problems or strategies, as indicated by the following images showing selections resulting from the interactive extraction of loops of different sizes using a force-directed layout technique, as developed and described by Tomáš Fülöpp (*Loop Mining in the Encyclopedia of World Problems*) prepared for the 17th International Futures Conference (*Tackling Wicked Problems: where futures research, education and action meet*, Turku, 2015).



This approach is contrasted separately with the transformation maps currently promoted by the World Economic Forum:

Transformation maps -- as "strategic mandalas"
Missing "halves" of the Global Reset mandalas?
Learning from other social change initiatives -- past and present

Knowledge cybernetics: the self-referential requirement of any viable reset

In the case of the online *Encyclopedia* initiative, extensive [commentaries](#) are available on the methodology employed, including:

"Problems"

Overview / Summary
Constraints on a problem-focused approach
Framework for interrelating incompatible perspectives
Problem inclusion / Problem exclusion
Patterning the problematique

"Strategies"

Overview / Summary
Conceptual processes summarized
"Positive" vs "Negative" strategies
Integrating constraint and opposition
Patterning the resolutique

Specific commentaries focus on: [Biases](#), [Strengths and weaknesses](#), [Criticism](#), [International organizations as a source](#), [Global modelling perspective](#), as well as considering [Future possibilities](#). Given the emphasis on perceptions of problems, the data could be considered to constitute a global compilation of collective biases.

Criticism of the *Encyclopedia* initiative offers useful pointers to critical appreciation of global modelling of crises more generally, as argued separately (*Flatulence is a Problem Aired: resmelling the stench of past undertakings*, 2013). Given that air pollution is but one of many problems to which people are sensitive, it frames the question of how crises could be more appropriately modelled and for whom - a question which critics fail to address.

Complicity of science in miscommunication of the reality modelled

Much has been made of the level of misinformation and disinformation regarding the pandemic, as discussed separately (*Reframing Fundamental Belief as Disinformation? Pandemic challenge to advertising, ideology, religion and science*, 2020; [Identifying information specifically held to be misinformation](#), 2021). Much has also been made of the miscommunication by authorities regarding the response to the pandemic in terms of frequent changes of recommendations and regulations regarding lockdown, masking and vaccination. Noted above was the unpreparedness of those with modelling skills, exacerbated by the low level of transparency with regard to the assumptions made and the data selected as relevant.

The pattern is variously evident in the case of earlier crises -- and presumably to be expected with respect to implementation of any future global response to climate change. One example is offered by the BP [Deepwater Horizon Oil Spill](#) (2010) in the Caribbean, acknowledged as the greatest recent environmental disaster, as discussed separately ([Enabling Collective Intelligence in Response to Emergencies: illustrated by the case of deep oil spill containment](#), 2010):

Expertise and arrogant assumptions	Wiki-model for eliciting strategic responses to urgent issues
Enabling timely gathering of remedial collective intelligence	Unforeseen disasters and unheeded warnings
Mistaken intelligence gathering assumptions in a knowledge society	Geoengineering: a disaster in waiting
Extreme considerations in intelligence gathering	Technological negligence as environmental terrorism?
Illustrative examples	

Another example is offered by the disaster the following year arising from the [Tohoku earthquake and tsunami](#) in Japan (2011), as discussed separately ([Anticipating Future Strategic Triple Whammies: in the light of earthquake-tsunami-nuclear misconceptions](#), 2011):

Multi-whammy preparedness: a Strategic Whammy Scale?	Systemic neglect -- of warnings
Transcending the obvious	Identifying strategic options characterized by marginalization of warnings
"Acts of God"?	

A third example, potentially of greater relevance to future responses to climate change, is offered by the unusual [flooding in Europe in 2016](#) ([Disastrous Floods as Indicators of Systemic Risk Neglect: implications for authoritative response to future surprises](#), 2016):

Systemic analogues to "flooding"	Surreptitious juggling of periods of testing, responsibility and liability in relation to risk
Impact of flooding understood generically	Flood control: the reality
Response by authorities to "flooding" or "dearth"	"Flood control": exemplified by "governance" of road traffic
Assessment of risk	Insights into "flood navigation" from road signs?
Systemic risk level	Psychoactive hazards in recognizing and engaging with risk
Decision-making within misleading periods of risk	

The themes discussed in each case raise questions about the complicity of science in exacerbating emergency unpreparedness -- especially in the light of massive investment in other priorities ([Challenges More Difficult for Science than Going to Mars](#), 2014). Given the communication confusion associated with the pandemic, it is appropriate to ask in what single location is to be found descriptions of the extant models relating to the pandemic, as previously advocated ([Wiki-model for eliciting strategic responses to urgent issues](#), 2010).

Why is the research justifying lockdowns, masking, sanitising and the advantages (and disadvantages) of particular vaccines not assembled in a public accessible facility -- whether or not this could be appropriately managed by the World Health Organization? Why is it currently inconceivable that authoritative arguments challenging aspects of such research should be assembled in the same location and appropriately cross-linked to facilitate debate -- and challenged in its turn?

Irrespective of the viciously perverse handling of any challenge to vaccination itself, how is the justification of the research regarding worldwide social distancing to be discovered, as explored with respect to 1.5 meters. As with the arbitrary identification of a 1.5 degree threshold for global warming, such figures are all the more puzzling when crudely converted into other scales, as with the Biblical 6 feet requirement for the separation from lepers ([Humanity's Magic Number as 1.5? Dimensionless constant governing civilization and its potential collapse](#), 2020).

More puzzling, in a period when governments and model-makers are surprised by "mysterious" breakthrough cases of COVID-19, is the failure to take account of potential transmission of infection by the exposed eyes -- following the mandatory covering of nose and mouth ([COVID-19 Infection via the Eyes and Mask Protection Misinformation](#), 2021). Why indeed were potential threats of this nature not documented in the same facility for the benefit of those required to where masks -- especially when front-line health workers have been recommended to protect their eyes?

Given widespread use of slogans to the effect that "we are all in this together", "do the right thing", and "it is for the benefit of all", why have such calls for participation not been matched by the development of facilities whereby the public can explore variations in the parameters in models from which arbitrary regulations are currently derived by anonymous experts? Has science proven itself to be too arrogantly self-confident to enable the masses to use internet technology to game the parameters of a crisis -- despite having been invited to do so with respect to protein folding (through [Foldit](#)) and astronomy in collaboration with AI (Kevin Pimblet, [Across the Zooniverse: keeping an eye on citizen astronomy](#), *Phys.org*, 19 April 2013).

The case for widespread engagement will become ever more relevant with the disastrous consequences of global warming. A valuable insight in this respect is offered separately (A. N. Christakis and M. Kakoulakiby, [Objectifying Intersubjectivity through Inclusion for a Scientific \[R\]Evolution: avoiding polarization by engaging stakeholders for saliency, priority and trust](#), Institute for 21st Century Agora).

Conformality of global modelling to cognitive appreciation of crises?

It is curious to note the manner in which a very evident crisis -- a hurricane -- is used as a meaningful metaphor to describe other crises, as in the case of financial disasters. For example, there were some 10,000 web references to "financial hurricane", 8,000 to "financial maelstrom", 90 to "financial cyclone", some 40,000 to "financial tsunami" in October 2008 (Larry Elliot, [Surviving the hurricane](#), *The Guardian*, 10 October 2008; Carter Dougherty, Global plan sought to quell maelstrom, [International Herald Tribune](#), 11 October 2008).

At the time this suggested the possibility that metaphors from nature offered an unexpected set of resources of relevance to modelling of

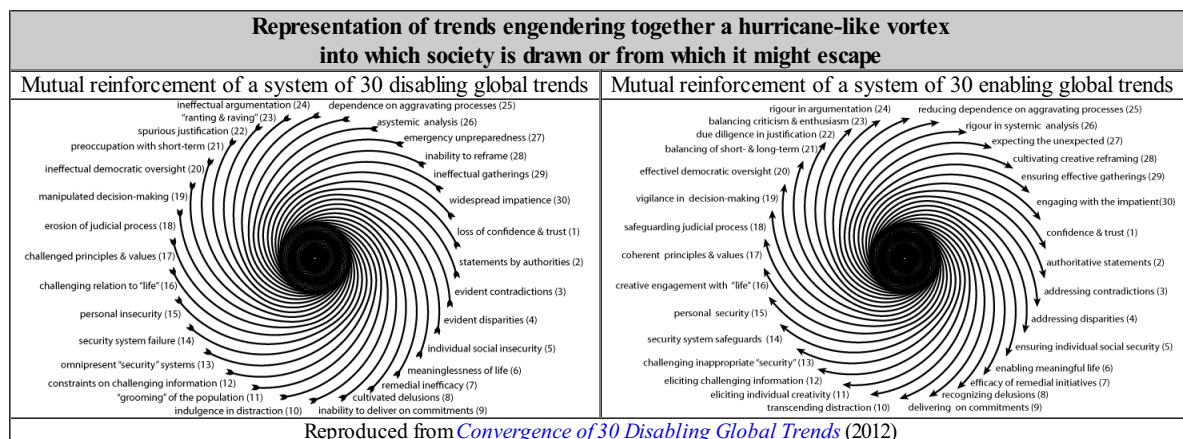
crises (*Systemic Crises as Keys to Systemic Remedies: a metaphorical Rosetta Stone for future strategy?* 2008), framed in the following terms:

- | | |
|--|---|
| Systemic crises | Interplay of metaphors as an integrative system of correspondences |
| Dangerous neglect of underlying patterns | Cross-system strategic "puzzles": enabling a different form of connectivity |
| Metaphorical descriptions of systems | Credibility |
| Interplay of metaphors in strategic discourse | Modelling credibility crises of the future |
| Systemic insights to be derived from the financial system crisis: an example | Archetypal hope-mongering |
| Systemic challenge: opportunities (hopes) vs threats (fears) | Avoidance of responsibility |
| Self-reflexivity in systems representation | |

Given widespread familiarity with the patterns of nature, there is the possibility that the weather may offer an unexpected means of engaging with the complexity which it is to be expected that modelling would encompass (*Enabling Governance through the Dynamics of Nature: exemplified by cognitive implication of vortices and helicoidal flow*, 2010; *Weather Metaphors as Whether Metaphors*, 2015). That possibility could prove to be consistent with the triple, quadruple and quintuple helical forms noted above (*Psychosocial Learnings from the Spiral Form of Hurricanes: implications of the triple helix and the 3-fold triskelion as "cognitive cyclones"?* 2017)

- | | |
|---|---|
| Achieving perspective on a vortex through triadic framing | Reconciling triskelion and triple helix: a topological transformation |
| Contrasting the implications of "triple helix" -- cognitive and otherwise | Suggestive representation of dynamics of a "cognitive wormhole" associated with a quintuple helix |
| Systemic closure: fourth helix -- and beyond? | Attribution of significance: considering meaningful pattern mapping |
| Relevance of any helical model to global governance? | From global weather patterns to global whether patterns? |

The question is whether the conception and design of global models should "conform" in some way to the helical forms through which they are framed in nature. This contrasts with other approaches to any mind map of potential civilizational collapse (*Mind Map of Global Civilizational Collapse: why nothing is happening in response to global challenges*, 2010). The spiralling characteristic recognized -- if only experientially -- in crises of crises -- then suggests depictions such as the following in anticipation of any "perfect storm", reproduced from a detailed discussion with related animations (*Convergence of 30 Disabling Global Trends: mapping the social climate change engendering a perfect storm*, 2012).



The case for conformality, as a means of bridging between contrasting modes of discourse in relation to global modelling, is most fruitfully made in the much-cited study by Gareth Morgan (*Images of Organization*, 1986). This offers the following frameworks through which organizations can be perceived: machines, organisms, brains, cultures, political systems, psychic prisons, flux and transformation, and instruments of domination.

Through how many such images can the organization of a crisis of crises be perceived, as discussed separately (*Interrelating Multiple Ways of Looking at a Crisis: beyond the pandemic discipline of the one right way*, 2021). Arguably global modelling is faced with a "cyclopean" challenge (*Transcending One-eyed Global Modelling Perspectives: incorporating under-currents into global circulation of value*, 2010; *Cyclopean Vision vs Poly-sensual Engagement*, 2006).

Another approach to the case for conformality is the sense in which every distinctive global crisis can be understood as a distinctive "question" to global civilization. With the quest for a remedial response then to be understood as an "answer", the relation can be explored in terms of the conformality of question to answer, as explored separately in the light of catastrophe theory (*Conformality of 7 WH-questions to 7 Elementary Catastrophes: an exploration of potential psychosocial implications*, 2006). Can global crises be usefully categorized in terms of the mathematics of elementary catastrophes?

The quest for an elusive remedial response to a complex crisis has a tendency to be framed through the metaphor of the quest for the Holy Grail (*Trust: Holy Grail of Governance?; Confidence: Holy Grail of Finance?* 2011). That metaphor -- as indicative of the ultimate global model -- can be speculatively explored in relation to the topological form of a catastrophe (*Interrelating Cognitive Catastrophes in a Grail-chalice Proto-model*, 2006; *In-forming the Chalice as an Integrative Cognitive Dynamic: sustaining the Holy Grail of global governance*, 2011).

Complicity of science in evaluation of modelling via traditional frameworks

The clarification of the context of potential bias offered above (using Venn diagrams) indicated the potential role of opinion. Reference was made in that regard to belief systems and more specifically to religion as a constraint on the development of global models by science. Science is vigorous in defending its evidence-based approach and in dissociating itself from the traditional beliefs it claims to have superseded through its methodology.

Traditional frameworks: Such claims are however called into question when the framing of any modelling initiative, or its results, are determined to some degree by traditional perspectives or filtered through them. This is most obvious when the primary value of the modelling is to provide guidance to decision-makers and the people who may have elected them. Religious beliefs of scientists may well be an unexplored influence on model-building as well as on the appreciation by decision-makers of the guidance provided. Such influences can be readily inferred in the following cases:

- provision of funding for model development by bodies subject to religious influence, most obviously foundations with religious mandates financing academic institutes (or think tanks) with a specifically religious agenda or inspiration
- model development by individuals with particular religious convictions
- evaluation of the results of the modelling by decision-makers (especially politicians) with strong religious convictions -- potentially taking into account both their own convictions, those of religious institutions, and those of the electorate

Such contexts may be significant in determining what factors are taken into account in the model, or what weight is given to them. This would be most evident where the religion has particular beliefs -- as in the case of family planning, eugenics, triage, or potentially with respect to just war theory.

It is striking to note that both the oaths of office of political leaders, and the oaths sworn prior to the presentation of scientific evidence in legal proceedings, may require particular reference to deity -- and the assistance expected from that source ("so help me God"). Daily parliamentary proceedings may be preceded by an "opening prayer" (*Opening Prayer Archive, Office of the Chaplain, United States House of Representatives*). A [Presidential Prayer Team](#) is a supporting feature of legislative processes in the USA. Analogous processes may well be evident in countries where other religions are dominant.

Irrespective of such formalities, it is of course the case that political leaders may be of a particular faith -- and required to be so to ensure election. It is completely unclear how this affects appreciation of any global modelling provided, or provision of the funding for its development. How, for example, would the pattern of daily prayers in The White House affect such decision-making -- when that is precisely their intention (Josh Delk, *Pence: 'There's prayer on a regular basis in this White House'*, *The Hill*, 5 March 2018; *Trump and Prayer in The White House*, *ApocalypseNowMedia*, 5 February 2017; Gary Demar, *Media Show their Ignorance over Prayer Meeting with Trump at The White House*, 15 July 2017).

It is potentially significant to note that the presentation of evidence to intergovernmental assemblies is not framed by any such formalities -- especially oath swearing with regard to truth. This could be seen as fundamental -- given the misleading presentation by [Colin Powell](#) (US Secretary of State) to the UN Security Council (5 February 2003) justifying the original intervention in Iraq. It is of course the case that major world leaders of the time (acting on such evidence) were strongly committed Christians -- faced with a challenge from countries whose people and leadership were strongly inspired by the deprecated Islamic faith.

Of particular significance with respect to policy-making regarding the pandemic in Australia, for example, are the fundamental Christian beliefs of the Prime Minister [Scott Morrison](#) as a Pentecostalist whose global intentions are framed by the *Seven Mountains Mandate*, based on the ideology of [dominionism](#), as variously discussed by the *Australian Independent Media Network*:

- *Australia's Pentecostal Extreme World Makeover Exposed* (13 February 2020)
- *Pentecostalism: the decline, infiltration and fall of Australian democracy* (1 February 2020)
- *Dominionism: nothing to see here?* (16 April 2021).
- *Demons, Demagogues and Evil: the possession of the Australian Government* (29 October 2020)

A direct consequence is clarified with regard to the appointment of Lieutenant General [John Frewen](#) as Coordinator General in the National COVID Vaccine Taskforce on 4 June 2021 (Daniel Hurst, *Letter reveals what Scott Morrison told John Frewen when he gave him vaccine role*, *The Guardian*, 1 September 2021).

Based on the biblical *Book of Revelation*, the *Mandate* is recognized as a plan to seize control of every aspect of the US; government, law and media and has been fundamental to the evangelical support for Donald Trump, as variously reported (Jamie Seidel, *The 'Seven Mountain' prophecy*, *News*, 20 December 2018).

Historically valued frameworks: Framed in this way, there is a case for exploring the role of other traditional approaches to policy guidance ([Susantha Goonatilake](#), *Toward a Global Science: mining civilizational knowledge*, 1999). Whereas they may be deprecated by science (as with the role of prayer), their value as guidance may be of fundamental importance to policy-making in practice. A striking example is provided by the role of astrology, most notably as it influenced an earlier president of the USA, namely Ronald Reagan, in timing his breakthrough encounter with Mikhail Gorbachev at the Reykjavik Summit (Mary Kay Linge, *How Ronald Reagan's wife Nancy let her astrologer control the presidency*, *New York Post*, 10 April 2021; Joan Quigley, *What Does Joan Say?: My Seven Years as White House Astrologer to Nancy and Ronald Reagan*, 1990; *Joan Quigley and the Reagans' Use of Astrology*, 8 March 2016).

It is of course the case that there is a long history of the use of astrology in decision-making relating to matters of state in many countries of the world (Gustav-Adolf Schoener, *Astrology: Between Religion and the Empirical*; Debra Kelly, *10 Influential Astrologers That Shaped History*, *Listverse*, 11 October 2016; Philip Ball, *How astrology paved the way for predictive analytics*, *The Guardian*, 12 January 2020).

Readily understood as forms of predictive global modelling, extensive use of a variety of techniques was common in the Mediterranean civilizations, and most strikingly in the Roman Empire. For example, birds were of considerable significance at that time with respect to prediction of the strategic future through [augury](#). Undertaken by an [augur](#), this was the practice from ancient Roman religion of interpreting omens from the observed flight of birds. This included whether they were flying in groups or alone, what noises they made as they flew, direction of flight, and what kind of birds they were. The process was known as "taking the auspices". Irrespective of modern deprecation, the process was valued by an empire that lasted centuries longer than any of more recent times. One can only speculate on how the widespread disappearance of birds, as a consequence of anthropogenic climate change, would be interpreted from that perspective

With comparisons now made between the potential collapse of the current civilization and that of Imperial Rome, there is then a case for learning from the imaginative ways in which that culture, and others, endeavoured to engage with the netherworld (*Designing Global Self-governance for the Future: patterns of dynamic integration of the netherworld*, 2010; *Engaging with the Future with Insights of the Past: consulting the dead, sacrifice, bone-cracking and divination*, 2010).

Chinese frameworks: Of current significance, an alternative source of insight is offered by the frameworks favoured in Eastern cultures as intimately related to the art of *feng shui* or geomancy, as applied to physical topography and strategically appropriate placement. The seriousness with which this is taken in developed Chinese societies is evident in contemporary building construction, urban planning and environmental design, notably in Singapore and Hong Kong. Its value is recognized in education (cf Renée Heiss, *Feng Shui for the Classroom: creating a focused learning environment*, 2004).

Feng shui is now being applied to the design of virtual environments. This is illustrated by a keynote presentation to an ACM Symposium on Virtual Reality Software and Technology (Seoul, 2000) by [Michael Heim](#) (*The Feng Shui of Virtual Environments*, 2000) that emphasizes its value in understanding flow, notably in group dynamics. It is recognized that corporations worldwide are now employing *feng shui* consultants to give them a competitive edge in responding to changing and challenging times (cf T. Raphael Simons, *Feng Shui Strategies for Business Success*, 2005). It is valued in relation to investment strategies. Although its value for ordering "physical space" is widely recognized, far less evident is how this might apply to the ordering of "[knowledge space](#)" -- to [knowledge architecture](#) (Andrew Gent, *What is Knowledge Architecture*, 18 March 2008).

Given increasing appreciation of the role of China in world affairs, it is somewhat surprising to note the seeming lack of recognition of a traditional Chinese approach to global modelling. This is curious given the importance attributed to the role of the *Yi-Jing* (*I Ching*) over centuries, as noted by [Xiaoying Qi](#):

This text, and the philosophical ideas in it, has had a significant influence in shaping all subsequent Chinese teachings, including Confucianism and Daoism, as well as other schools. (*Paradoxical Integration: globalised knowledge flows and Chinese concepts in social theory*, 2011, p. 190)

The author cites [Chung-ying Cheng](#) (founder of contemporary Chinese management philosophy and author of *C Theory: the Yijing philosophy of management*, 1995) to the effect that the major trends in the development of the history of Chinese philosophy have been:

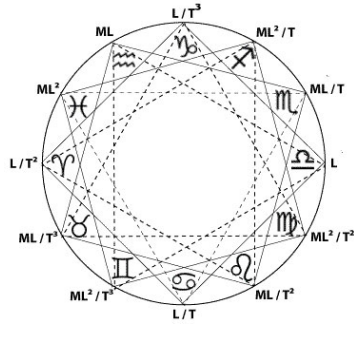
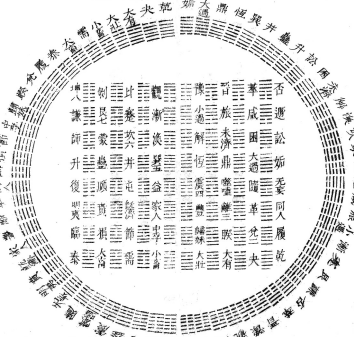

... guided, inspired, sustained, and enriched by this primary model of onto-cosmological and ontohermeneutical thinking, knowing, understanding, and interpretation in the *Yi-Jing* (*Inquiring into the Primary Model: Yi-Jing and Chinese Ontological Hermeneutics*, *Journal of Chinese Philosophy*, 2003)

Xiaoying Qi continues:

It is in this work that the influential early statement of the ways in which the opposite elements of yin and yang is given expression, to explain how they do not exclude each other but work in collaboration. This relationship is described... as one in which yin and yang "*are ... complementary in the sense that they are interdependent, interactive, intertransforming, and interpenetrating ... they enjoy equal metaphysical status to the extent that neither could exist without the other and neither is absolutely dominant over the other*". This characterisation of the relations between yin and yang is effectively the template for understanding the relations of opposites in all of the Chinese teachings or philosophies, and within the Chinese intellectual heritage more generally (p. 190).

Given the total dependence of the science of Western-inspired global modelling on the use of computers, there is considerable irony to the fact that their binary coding was partially inspired through exposure of [Gottfried Leibniz](#) to that of the *Yi-Jing* in 1701, as discussed separately (*Framing Cognitive Space for Higher Order Coherence" toroidal interweaving from I Ching to supercomputers and back?* 2019).

Traditional global models deprecated by science (despite a degree of popular credibility greater than the global models of science)		
Zodiac (with associated "measure formulae")	Shao Yong circle of hexagrams as communicated to Leibniz (1703)	Geomantic compass (Luopan)

		
<p>Following the attributions of Arthur Young (1976)</p>	<p>By Unknown - Perkins, Franklin. <i>Leibniz and China: a commerce of light</i>. Cambridge UP, 2004. 117., Public Domain, Link</p>	<p>Pcae18 at the English Wikipedia, CC BY-SA 3.0, via Wikimedia Commons</p>

"Modelling" through crises versus "Muddling" through crises

In an interview in the light of Australian pandemic modelling by the Doherty Institute, [Stuart Robert](#) (Australian Minister for Employment, Workforce, Skills, Small and Family Business) indicated:

Minister: So many things have changed, but that's why we have a framework called the National Plan from which we can plan... anything could change next week... We could have not just the Delta but the Epsilon variant, and I'm not saying there's any indication of that. But the whole point is to have a plan as a framework. We've got it, we should stick to it...

Speers: So, just so I'm clear: We should have a framework and stick to it, but it might shift and we might need to change it?

Minister: Well, of course plans change ([Interview on ABC Insiders with David Speers](#), Ministers' Media Centre, Department of Education, Skills and Employment, 5 September 2021)

By contrast, the Australian National University has highlighted the challenge of [Muddling through Misinformation and Myths](#) (ANU, 12 July 2021). That understanding also features in the argument of Erik Hollnagel of the Australian Institute of Health Innovation ([The Necessity of Muddling Through](#), Macquarie University, 2021).

A degree of legitimacy has been given to muddling through by Nobel Laureate [Charles Lindblom](#) (*The Science of "Muddling" Through*, *Public Administration Review*, 19, 1959, 2; [summary](#); John Kay, *History vindicates the science of muddling through*, *Financial Times*, 15 April 2009). In contrast with modelling, Lindblom was one of the early developers and advocates of the theory of [incrementalism](#) in policy and decision-making. His view (also called [gradualism](#)) takes a "baby-steps", "Muddling Through" or "Echternach Theory" approach to decision-making processes, as described by Leslie Pal in a critique of rational decision-making ([Lindblom's Incrementalism and Muddling Through](#), *Atlas of Public Management*). For Lindblom:

... in a world of convergence, internationalization and decentralization -- we will be faced with patchwork like structures and muddling-through like decision-making ([NGH101x Governance Challenges, Part 1](#), YouTube, 28 January 2021)

As discussed by [Hans de Bruijn](#), muddling through is characterized by:

- A small and limited set of options are considered.
- Options are only marginally different from an existing situation.
- Options are considered by comparing actual consequences.
- Try an option incrementally and then observe the consequences.
- If the consequences are fine, then use a little more of that specific option.
- If consequences are negative, then back off and try something different.
- Focus is on outcomes and trial and error. ([Web lecture 'Muddling through'](#), TUDelft, OpenCourseWare)

The use of [information and communication technology](#) (ICT) during the current pandemic has been the focus of a professional gathering (Shengnan Yang, et al, *The use of ICT during COVID-19*, *Proceedings of the Association for Information Science and Technology*. 57, 2020, 1). This included a paper by Shijuan Li, et al. on *Muddling through an infodemic: ICT acceptance and utilization under the COVID-19 health crisis*. For Mark Sujun:

Muddling through can be understood in terms of the trade-offs healthcare workers make in response to tensions and contradictions in their everyday work. ([Muddling through in the intensive care unit](#), *Safety Assurance of Artificial Intelligence in Healthcare*, 2021)

There is a charmingly significant irony to the fact that for many (and especially for those of mother-tongue other than English) the distinction between "modelling" and "muddling" (as between "tourist" and "terrorist") merits recognition in terms of [Words with similar pronunciation and spelling but different meaning](#), as described by Andrew Ambrosius.

Meta-modelling to interrelate a requisite variety of global models

As noted by *Wikipedia*, a meta-model (or metamodel) is a model of a model, and [meta-modelling](#) is the process of generating such meta-models. Thus meta-modelling is the analysis, construction and development of the frames, rules, constraints, models and theories applicable and useful for modelling a predefined class of problems. As its name implies, this concept applies the notions of meta- and modelling in software engineering and systems engineering. Metamodels are of many types and have diverse applications.

Given the number and variety of global models, it may then be asked whether there is a case for developing a meta-model to interrelate extant models -- and to frame the possibility of other global models. To facilitate learning (given varying degrees of comprehension), there is the further case for integrating models variously considered obsolete or "wrong". A meta-model framework would then serve as a means through which different models could draw on data and algorithms from other models.

A relevant question with respect to global modelling of potential future crises is why the design of such a framework is not envisaged. Clearly with the rapid development of artificial intelligence, the possibility of an AI-managed integration of disparate models could be anticipated, as discussed separately (*Governance of Pandemic Response by Artificial Intelligence*, 2021).

This raises the question of the criteria of value in the design of such a meta-model. An early, and necessarily naive, reflection took the following form (*Criteria for an Adequate Meta-model: preliminary list*, 1971). It discussed:

Complexity	Comprehensiveness	Problem relevance
Simplicity	Justification of superseded perspectives	Extra degree of freedom
Ordering of a dimension	Self-prediction	Non-threatening
Open-ended	Integrative power	Unoriginality
Dynamic and evolutionary	Personal	Implementation criteria
Progressive unification		

A potentially far more sophisticated and fundamental approach to the matter could be usefully inspired by [M-theory](#), as separately discussed (*Models: M-theory as indicative of meta-modelling potential?* 2015). This notably considered the strategic reality of climate change:

The obvious difficulty arises from the multiplicity of systemically unrelated models, the elusive significance of any potential meta-model, and the challenging complexity of the models deemed to be the most adequate for purposes of explanation.

Beyond the complexity of the many models now elaborated -- including the [TRAK approach to meta-modelling](#) -- there is the ultimate meta-model of physics known as M-theory, notably elaborated from 1995 by [Edward Witten](#). This followed a period in which physicists looked to eleven-dimensional [supergravity](#) in the hope that it might provide an elusive superunified theory superseding the focus on supergravity. M-theory notably describes supermembranes and superfivebranes, subsuming string theories, with 11-dimensional supergravity as a lower limit (M. J. Duff (Ed.), *The World in Eleven Dimensions: supergravity, supermembranes and M-theory*, 1999). It claims to unify all consistent versions of [superstring theory](#).

Framed in such terms, it might then be asked **why is it assumed that the challenges faced by global governance are of a far simpler nature than those faced by fundamental physics in recognizing the need for descriptions involving 11 or 26 dimensions?** Of related interest is the need of physics to explain how such complexity and its [extra dimensions](#) must necessarily be reduced to the 3 or 4 dimensions which the human mind can readily grasp -- a reduction termed [compactification](#). Arguably it is just such an explanatory reduction which is required to render global strategic thinking comprehensible in practice.

From the perspective of physics, "model" acquires a special significance in its use with respect to the [Standard Model](#) of fundamental particles and its [mathematical formulation](#). Arguably the world is perhaps fortunate in not having a "standard model of crises" -- or has it? -- given the manner in which it would tend to serve as guidance for an overly simplistic set of strategic responses, under the aegis of the United Nations. Ironically the particle physics extreme can be provocatively complemented by the metaphysical quest for an appropriate "model" of God, as argued by [Sallie McFague](#) (*Models of God: theology for an ecological, nuclear age*, 1987). Indeed it is from "God" that many expect remedies in times of crisis.

Such complementarity invites speculation on the possibility that the tortuous explorations of complexity by physicists (in explaining the Universe) and the ineffectual strategic preoccupations of global governance (in response to a crisis of crises) may both be indicative of cognitive avoidance of epistemological panic in the face of an emerging memetic singularity (*Beyond the Standard Model of Universal Awareness: being not even wrong?* 2010).

To the extent that different global models reflect different ways of looking at one or more crises, it might then be asked how these distinctive ways of looking might be fruitfully interrelated through a meta-model, as discussed separately (*Interrelating Multiple Ways of Looking at a Crisis: beyond the pandemic discipline of the one right way*, 2021). By contrast, this concluded with a discussion of the prevalence of *Effective strategic commitment to oversimplification and subtlety*.

Clearly, as in the case of physics, the question is **in how many ways does the potential for global crisis -- and a crisis of crises -- need to be viewed?** Such a notion of [requisite variety](#) is fundamental to control theory. How indeed is the set of such disparate perspectives to be integrated (*Dynamics of N-fold Integration of Disparate Cognitive Modalities*, 2021; *Global Coherence by Interrelating Disparate Strategic Patterns Dynamically*, 2019; *Framing Cognitive Space for Higher Order Coherence*, 2019; *Reconciling disparate strategic frameworks*, 2020). Such a preoccupation is in complete contrast to the dangerous satisfaction with a simplistic global consensus in response to the pandemic or to climate change.

With respect to the pandemic, it is appropriate to note the arguments of Jordana Cepelewicz (*The Hard Lessons of Modeling the Coronavirus Pandemic* (*Quanta Magazine*, 28 January 2021) [with comments added]):

In the fight against COVID-19, disease modelers have struggled against misunderstanding and misuse of their work. They have also come to realize how unready the state of modeling was for this pandemic. [Arguably their approaches have contributed to this misunderstanding and misuse. Why indeed was global modelling unprepared for the pandemic, and for any crisis of crises?]

Researchers expect to be dissecting what happened during the COVID-19 pandemic for years to come. They will comb through the massive numbers of models that were generated and try to account for what worked, what didn't and why. [A meta-modelling approach to interrelating the models produced would be valuable in this task, rather than the conventional tendency to compare them separately in the absence of any contextual framework]

But there are key lessons they are already taking away from the experience in preparation for the inevitable next pandemic. One is that they should take advantage of new, potentially rich streams of data from cell phones and other sources, which can provide detailed information about people's real behaviors. [This desire is provocatively naive in the light of the high level of controversy associated with invasive use of "people's real behaviors". It suggests the need for models capable of reflecting such opposition as constituting one of the "real behaviors" -- as with opposition to vaccination]

Another is that certain kinds of problems are most easily conquered by dividing them up among teams, sometimes spanning several disciplines.... [This classic approach serves to frame the question of why such division into specialized approaches has merely served to highlight the methodological inadequacies of their integration, especially when the approaches are framed by different disciplines -- potentially incommensurable in nature]

But the other crucial lesson of COVID-19 has been that epidemiologists need to communicate the proper uses and limitations of their models more effectively to decision-makers and the public -- along with an appreciation of what the uncertainties in those models mean. [Indeed. However this frames the question as to why the models developed by such disciplines systematically fail to reflect the factors determining proper and improper use of such models -- and of their incomprehension by many, if not most]

The frustrating challenge is that researchers are often already offering these explanations, but the public and its representatives tend to want more certainty than science can provide. [Why is it that the models are presented in such a way that degrees of certainty are not made apparent. For those needing to operate at a higher level of certainty what indications can be more fruitfully offered?]

And when governments decide to disregard researchers' best counsel and clutch instead at specious but popular policies, it isn't clear what scientists can do about it. [Plaintive though this is as a conclusion, why does the development of models not reflect the probability that governments and populations may opt in preference for relatively simplistic policies?]

Global model-making as world-making?

Global model-making can be recognized as one understanding of "world-making" -- at least in cognitive terms. An exercise in global modelling, most evidently when it is used to justify government strategy -- and consensus at the global level -- is effectively a process of designing a reality in which people may be expected (or ordered) to believe. It can be understood as a preoccupation articulated by the [Global Sensemaking](#) network in providing tools for dialogue and deliberation on wicked problems.

Any such understanding of world-making can be contrasted with the considerable participative development of [virtual worlds](#), namely [computer-simulated environments](#) potentially populated by many users. They may be closely associated with [massively multiplayer online games](#) or online virtual world such as *Second Life*.

Such distinctions can be explored in the light of the extensive speculation on the probability of living experience being engendered by a simulation of some form (*Living within a Self-engendered Simulation: re-cognizing an alternative to living within the simulation of an other*, 2021).

World-making: Especially with the increasing dependence on virtual reality and the construction of virtual worlds, the variety of approaches to world-making merit comparison and juxtaposition:, as argued separately (*World making, diasporas and virtual communities*, 2019).

The theme has been variously explored:

- Nelson Goodman: *Ways of World Making* (1978)
- Mikhail Epstein: *The Art of World-Making* (*Philosophy Now*, 95, 2013)
- Jerome Bruner: *Self-Making and World-Making* (*The Journal of Aesthetic Education*, 25, 1991, 1)
- Mario J. Valdes: *World Making: the literary truth-claim and the interpretation of texts* (1992)
- Pete Mandik and Andy Clark: *Representing and World-Making* (*Minds and Machines*, 12, 2002, 3)
- Peter Lamarque and Stein Haugom Olsen: *Truth-Making and World-Making* (1996)
- Kathy G. Short: *Story as World Making* (*Language Arts*, 90, 2012, 1)
- Luke Dickens: *World Making, Critical Pedagogies, and the Geographical Imagination* (*Antipode*, 49, 2017, 5)
- Kenneth J. Gergen: *From Mirroring to World-Making: research as future forming* (*Journal for the Theory of Social Behaviour*)
- Barrie Axford: *The World-Making Power of New Media: mere connection?* (2017)
- Mark-David Hosale, et al: *Worldmaking as Techné: participatory art, music, and architecture* (2018).

- David Delaney: *The Spatial, the Legal and the Pragmatics of World-Making: nomospheric investigations* (2010)
- Nathalie Karagiannis and Peter Wagner (Eds.): *Varieties of World Making: beyond globalization* (2007)

As described by [Marie-Louise Von Franz](#), in his later years the work of Carl Jung suggested that the seemingly divergent sciences of psychology and modern physics might, in fact, be approaching a unified world model in which the dualism of matter and psyche would be resolved. Jung believed that the natural integers are the archetypal patterns that regulate the unitary realm of psyche and matter, and that number serves as a special instrument for man's becoming conscious of this unity. (*Number and Time: reflections leading toward a unification of depth psychology and physics*, 1974).

Model-making and hypotheses as "world-making": As implied above, an obvious connotation of world-making is the manner in which construction of a conceptual model or hypothesis can constitute a "world" -- one which the like-minded may share and effectively "inhabit" to the extent they find it credible. A belief system can be understood in this light. To that extent a model may constitute a "bubble" -- which may well be engendered by search algorithms as a consequence of profiling, as in the case of a so-called [filter bubble](#) (Eli Pariser, *The Filter Bubble: What the Internet Is Hiding from You*, 2011).

This frames the question as to the extent to which global models of crises -- and notably the pandemic -- effectively create a filter bubble beyond which it becomes difficult to perceive, whether for individuals, the media, or decision-makers (Vera Q. Liao, et al, *Beyond the filter bubble: interactive effects of perceived threat and topic involvement on selective exposure to information*, *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems – CHI '13*: 2359; Harald Holone, *The filter bubble and its effect on online personal health information*, *Croatian Medical Journ, al.* **57**, 2016, 3).

Engagement with that world may be cultivated through creating an organization for that purpose -- or simply through the organization of occasional or periodic meetings. Such contexts may call conventional assumptions into question in a quite unconventional and radical manner. This may be held to justify the confidentiality of such contexts -- even the secret of their existence or of the nature of the world which is cultivated. Clearly many cults may be understood from this perspective.

As noted by *Wikipedia*, the concept of a filter bubble has been extended into other areas, to describe societies that self-segregate according to political views but also economic, social, and cultural situations. Less evident is how the bubble engendered globally by a global model may be "burst" (*Pricking the Bubble of Global Complacent Complicity: hyperdimensional insights from the physics of bubble blowing, bursting and collapse?* 2017).

Collusion with the pharmaceutical industry? The argument can be taken further in reframing the model-making proclivity of academia and think tanks -- especially in their use of the laboratory and workshop metaphors -- as characterizing the elaboration of "designer pills". Model-making from a cognitive perspective can be understood as "pill design", as argued separately *Academic model-making as "pill production"?* within the context of a more general argument (*Psychosocial Transformation by "Pill Pushing"? Model-making, strategic advocacy and the myth of the "red pill"*, 2017)

There it was suggested that under the guise of the "advancement of knowledge", there is clearly a sense in which such models are designed as "pills" to be presented to the collective and consumed by society as a means of its transformation. As might be expected, as with "designer drugs", those involved in the process aspire to benefits in terms of career advancement, recognition and awards -- epitomized by the Nobel Prizes.

Especially intriguing is the resemblance of such models to psychoactive substances. Arguably an implicit ambition is to transform the paradigms within which society collectively operates cognitively -- exemplified by aspirations to the elaboration of an ultimate [Theory of Everything](#) by which all will be subsumed. The academic process can of course be recognized as having been long-preceded by that of the various religions and their theological models -- each identified with a "Big Pill" which people are invited to swallow. Ironically the ambitions associated with such a cognitive "mega-pill" call for careful dissociation from those of a "universal panacea" -- with all its "snake-oil" connotations.

Engendering and sustaining subunderstanding: There is a degree of familiarity with the process of [dumbing down](#), understood as the deliberate oversimplification of intellectual content in education, literature, and cinema, news, video games, and culture. As a consequence of media coverage of fatal ties, real or fictional, dumbing down can be understood as associated with the process of [psychic numbing](#) (Paul Slovic, *Psychic Numbing and Genocide, American Psychological Associations*, November 2007; David Hicks and Andy Bord, *Learning about Global Issues: why most educators only make things worse*, *Environmental Education Research*, 2001).

Missing is recognition of the degree to which the design of global models, and the guidance they offer to decision makers, may itself contribute in some way to both dumbing down and psychic numbing -- consequences readily denied.

Some insight is offered through the possibility of bias with respect to the capacity to handle multiple factors, usefully framed by the consequence of "subunderstanding" as articulated by [Magoroh Maruyama](#) (*Peripheral Vision: polyocular vision or subunderstanding?*, *Organization Studies*, 25, 2004, 3, pp. 467-480). The matter is especially important in that some forms of viable system failure are due to inadequate comprehension and inattentiveness -- typically framed as "human error". The system may indeed be too complex to be managed by ordinary means (*Variety of System Failures Engendered by Negligent Distinctions*, 2016).

References

Richard K. Ashley. The Eye of Power: the politics of world modeling. *International Organization*, 37, 1983, 3 [review]

Australian Institute for Disaster Resilience. Public Information and Warnings. Australian Disaster Resilience Handbook Collection, 2018 [text]

Ugo Bardi. *The Limits to Growth Revisited*. Springer, 2011

Michele Boldrin and Devid K. Levine. *Against Intellectual Monopoly*. Cambridge University Press, 2008

Stuart A. Bremer. *Simulated Worlds: a computer model of national decision-making*. Princeton University Press, 1977

J. Bryant. *Global Simulation Models: a comparative study*. *Journal of the Operational Research Society*, 27, 1976, 1023

Chung-ying Cheng:

- C Theory: Chinese Philosophy of Management [in Chinese]. Xueling Publishers, 1999
- C lilun: Yijing guanli zhexue [C Theory: the *Yijing* philosophy of management]. Dongda Tushu Chubanshe, 1995.
- The "C" Theory: a Chinese philosophical approach to management and decision-making. *Journal of Chinese Philosophy*, 19, 1992, 2 [[abstract](#)]
- Light of Wisdom: the contemporary application of Chinese management philosophy. Chinese Textile University Press, 1997.
- Xunzi as a Systematic Philosopher: toward organic unity of nature, mind, and reason. *Dao Companions to Chinese Philosophy*, 3, 2014 [[text](#)]
- On Yijing as Basis of Chinese Business Ethics and Management. *Philosophical Foundations of Business Ethics*, 2013 [[text](#)]

Alexander N. Christakis. A Retrospective Structural Inquiry of the Predicament of Humankind: prospectus of the Club of Rome. In: John P. van Gigch and Janet McIntyre-Mills (Eds.), *Rescuing the Enlightenment from Itself*. Springer, 2006 [[abstract](#)]

J. Clark and S. Cole. *Global Simulation Models: a comparative study*. John Wiley, 1975

H. S. D. Cole. Models, Metaphors and the State of Knowledge. In: *Systems Analysis in Urban Policy-Making and Planning*. *NATO Conference Series (II Systems Science)*, 12, 1983 [[abstract](#)]

H. S. D. Cole, et al. Thinking About the Future: a critique of 'The Limits to Growth'. *Futures*, 5, 1973

H. S. D. Cole, et al. *Models of doom*. Universe Books, 1973.

Paul R. Ehrlich and Anne H. Ehrlich:

- Population, Resources, Environment. issues in human ecology. Freeman, 1970 [[review](#)]
- The Population Bomb. Sierra Club/Ballantine Books, 1968 [[summary](#)]

R. Buckminster Fuller and John McHale. *Inventory of World Resources, Human Trends and Needs*. Southern Illinois University, 1963 [[text](#)]

Susantha Goonatilake. *Toward a Global Science: mining civilizational knowledge*. Indiana University Press, 1999

Harold Guetzkow and Joseph J. Valadez (Eds.). *Simulated International Processes: theories and research in global modeling*. Sage, 1981

Barry B. Hughes. *World Modeling: the Mesarovic Pestel World Model in the context of its contemporaries*. Lexington Books, 1980.

John Kay and Mervyn King. *Radical Uncertainty: decision-making beyond the numbers*. W. W. Norton, 2020

Sallie McFague:

- Models of God: theology for an ecological, nuclear age. Fortress Press, 1987
- A New Climate for Theology: God, the world and global warming. Augsburg Fortress, 2008

John McHale:

- The Changing Information Environment; a selective topography. Westview Press, 1972
- The Ecological Context: energy and materials. George Braziller, 1970 [[text](#)]
- The Future of the Future. George Braziller, 1968
- World Facts and Trends. Collier-MacMillan, 1972

Donella Meadows, John Richardson, and Gerhart Bruckmann. *Groping in the Dark: the first decade in global modelling*. Wiley, 1982

Donella Meadows, Jorgen Randers and Dennis L. Meadows. *The Limits to Growth: the 30-year update*. Chelsea Green, 2004

Donella H. Meadows and Jorgen Randers. *Beyond the Limits: confronting global collapse, envrioning a sustainable future*. Chelsea Green, 1992

Eli Pariser. *The Filter Bubble: What the Internet Is Hiding from You*. Penguin, 2011

Graham Turner. *Is Global Collapse Imminent? An Updated Comparison of The Limits to Growth with Historical Data*. MSSSI Research Paper No. 4, Melbourne Sustainable Society Institute, The University of Melbourne [[text](#)].

Xiaoying Qi:

- Paradoxical Integration: globalised knowledge flows and Chinese concepts in social theory. University of Western Sydney, 2011 [[text](#)]
- Globalized Knowledge Flows and Chinese Social Theory. Routledge, 2014 [[contents](#)]

Shu Shengyu. *The Relations Between Ancient China's Taoism and Modern Mathematics and Physics*. The Zhong Language Computing Technology Research and Development Alliance, 2015 [[text](#)]

Marie-Louise Von Franz. Number and Time: reflections leading toward a unification of depth psychology and physics. Northwestern University Press, 1974

Michael S. Wogalter (Ed.). Handbook of Warnings. Lawrence Erlbaum Associates, 2006 [[text](#)]



This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](#).

For further updates on this site, [subscribe here](#)