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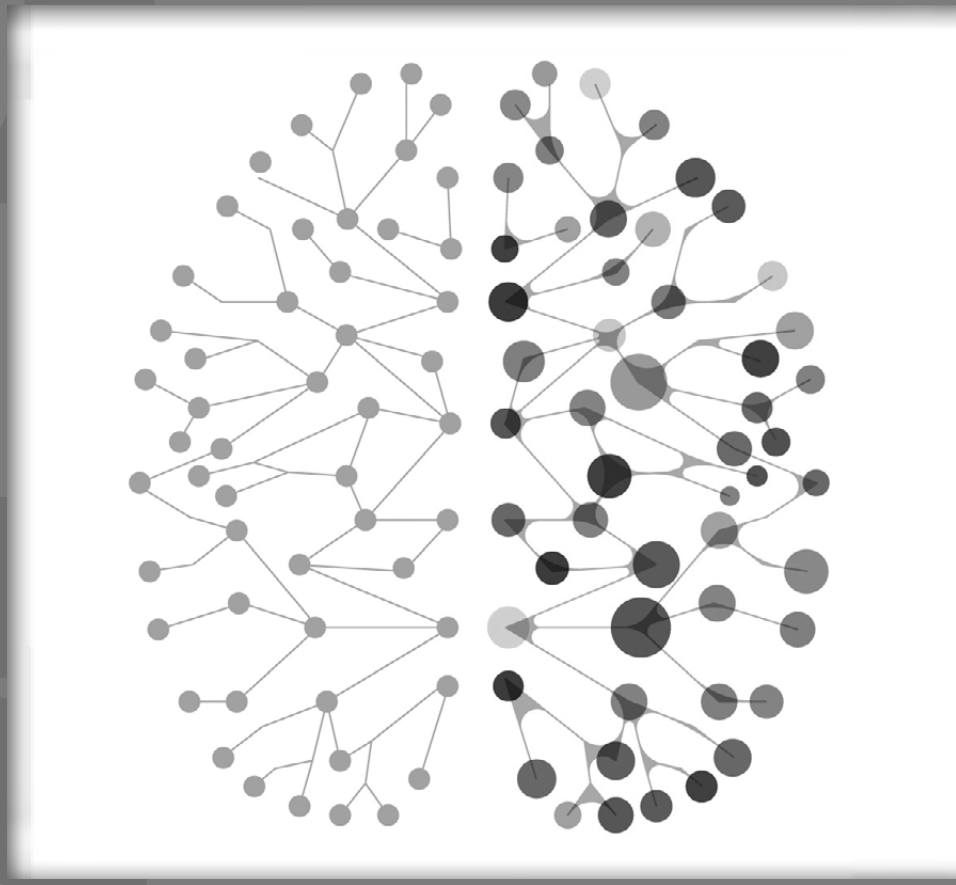

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PREFACE

SHUT DOWN THE CRITICS BY PUTTING THEM IN CHARGE

Recent months have seen a succession of angry protests against lockdown restrictions and fossil fuel production in this country. While most people agree on the need for a pandemic-free nation and a reduction in carbon emissions, the measures to achieve these goals require difficult decisions with heavy financial and social implications. However, too many people criticise the government and other decision makers for the difficult calls they must make in complex situations, without being called to contribute to the solution.

Governments should empower these critics, rather than ignore them, by encouraging them to volunteer their ideas and effort in delivering the change they advocate for. Canvasing a wide range of constructive and practical suggestions, gaining consensus for change, and winning 'buy-in' from all stakeholders is the best way to promote and entrench progress for everyone.

In my long career in business, I have learned that if somebody brings me a problem, I do not have to take responsibility for solving it for them. Instead, I always ask, indeed demand, that they produce their own solution, good or bad, rather than merely state the problem or hand it on for someone else to solve.

While Australia likes to think of itself set apart from the rest of the world, COVID-19 and climate change highlight the interdependent nature of the world we live in. The spread of a new variant, or unchecked emissions in another nation, affects us just as surely as anyone else. The pandemic also exposed how deeply we depend on international supply chains for basic staples and each other for public health. A new post-COVID social contract should ensure the benefits, as well as the costs and labour in society, are distributed more fairly.

Politicians will always strive to extend their time in office, and companies to maximise profit for themselves, but these inevitable drives can be harnessed for the good of society, rather than undermine it. While complicated problems often require tough decisions, we can work together on solutions which create a more just society, rather than split it between winners and losers. Using our collective brains and sinews, we can have our cake and eat it too.

The only way to agree and implement solutions which benefit everybody is to work together in new frameworks towards common goals, rather than defend vested interests or an outdated status quo. We will not find answers if all we do is debate the other side to score political points, rather than search for positive solutions.

We must discuss the 'wicked problems' we face with our opponents, as well as our friends. We must listen to and understand the other side's point of view to move forward. However, the adversarial nature of parliament and other political institutions encourage thoughtless discord rather than constructive debate. The ideas of the other side are dismissed without consideration, while colleagues within parties are seen as personal rivals rather than members of a team.

New institutions are required to offer all stakeholders a forum where they can discuss, in good faith and behind the scenes, mutually beneficial solutions. While discussion alone cannot ensure harmony, coalitions of the willing can emerge to tackle issues of mutual concern. Such partnerships may sound like wishful thinking, but over the last 20 years, the Second Track has allowed people from every walk of life to implement concrete change.

The issues faced by the nation today go beyond the current pandemic and even climate change. Australia is an important regional nation, but we are dwarfed on the world stage. We must partner with our allies and work for international consensus to protect global peace and prosperity, in part through Second Track diplomacy, and unite on practical proposals at home.

It is difficult to encourage decision makers to look beyond their personal interests or tribal loyalties. However, agreement can be found where there is space to not only listen to but understand and accommodate legitimate objections. The problems we face are too serious for ideological purity, and we cannot let the perfect be the enemy of the good. We cannot stop society in its tracks to eradicate a virus or bankrupt the economy in the name of environmental purity, but we can work together to protect the health and future of all Australians, and the Second Track holds the key to success.

The world, like every one of its human inhabitants, is full of contradictions, but there is far more to unite us than divide us in the face of common threats to our health, environment, security and prosperity. It is in everyone's interest to discuss

these issues honestly, and solve them, as best we can, together.

If we want to live harmoniously and prosper in the future, we need to embrace new methods to resolve conflicting interests to generate net gain for everyone. Both courage and compromise are required, and both have space to flourish in the Second Track environment, a proven model of constructive engagement that can work for everyone.

I am looking forward to further discussions on the subject.

Peter Fritz AO
Sydney, May 2022

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ARTICLE

HOW INDIGENOUS WISDOM CAN SUSTAIN HUMANITY

Dr Shann Turnbull & Prof Anne Poelina

Ancient self-governing practices of Indigenous Australians demonstrate how modern society can achieve sustainable wellbeing for the environment and humanity. No other existing culture has a longer record. Governance scientist Dr Shann Turnbull and human and earth rights advocate Prof Anne Poelina explain how Indigenous practices can contribute to a new model of corporate governance to benefit all stakeholders.

INTRODUCTION

The ancient decision-making practices of Indigenous Australians can provide a way for modern society to learn how to achieve sustainable wellbeing for our environment and humanity.[1] Aboriginal Australians have created ways to nurture and sustain both their environment and themselves through intimate symbiotic relationships for over 65,000 years. This is more than any other culture in the world. Indigenous knowledge and practices of self-regulation and self-governance involve cultural landscapes, biodiversity, transdisciplinary sciences, wisdom and high culture.[2]

There is much to learn from these Indigenous practices, yet they are not taught in modern educational institutions. This represents an intellectual void in universities' teaching management, public administration and business. There is much to learn if universities are willing to understand, synthesise and distribute proven Indigenous relationist practices.[3] That this void needs to be filled urgently is clear from Richards and Pierce's article 'Climate change is the most important mission for universities in the 21st century',[4] which emphasises the importance of sustainability education.

1. Poelina, 2020
2. Lim, 2016
3. Ostrom, 1990; Redevers et al., 2020
4. Richards and Pierce, 2020

Incorporating Indigenous wisdom requires a significant shift in thinking for social sciences. While engineering students are educated in how to design, build and operate self-regulating and self-governing automobiles and spacecraft, social science educators centre their teaching and research around a socially constructed concept not found in natural systems described as 'economic value'. But what does economic value mean? Astoundingly, neither economists nor accountants have established a standard unit of value. Instead, the relative value of currencies is determined on a subjective speculative self-referential basis concerned with the expected relative strengths of the relevant national economies. Value is not defined by any one or more specified goods or services. Prices represent a social construct not defined by anything real in the natural world. This makes prices – and value – disconnected from the wellbeing of individuals, humanity and/or the environment.

It is unbelievable to Indigenous Australians that modern society is governed by such a disconnected social construct. It makes no sense. It is especially mysterious that markets can still be accepted as a governance mechanism when market failure is endemic. Back in 1937, Ronald Coase[5] explained that firms exist because markets fail to produce complex components. In 2009, Lord Stern[6] reported that 'Climate change was the result of the biggest market failure the world has even seen'. From an Indigenous perspective, modern society is sleepwalking into what Bradshaw[7] describes as a 'ghastly future'.

This article builds on the work of Nobel Prize winner Elinor Ostrom and her design principles for creating self-governing 'common pool resources'. It discusses how these principles can be enhanced and applied to ameliorate the 'ghastly future'.

Specifically, it outlines how the design principles can be enhanced to also:

1. recognise Indigenous wisdom, relationships and practices;
2. apply to incorporated organisations to create a new model of corporate governance to provide benefits for all stakeholders that could then be distributed globally;
3. introduce features revealed by systems science that allows creatures to become self-regulating, self-managing and self-governing;
4. identify a politically compelling tax incentive for shareholders to adopt stakeholder self-governance with the incentive cost paid by tax payments from stakeholders, reducing welfare payments and the cost of government regulation.[8]

The principles create a basis on which to introduce a universal wellbeing income from corporate dividends. Corporations would provide benefits for all stakeholders by becoming agents for reducing environmental and existential risks for humanity.

The article also examines a barrier to the widespread application of the design principles. This is an education barrier, in that graduate schools are educating our most gifted leaders of the future to lead centralised command-and-control hierarchies adopted by political dictators. This approach undermines democracies and explains why the number of democratic nations in the world is reducing.[9]

Contrast this to the organising principles of Indigenous society. Imagine any group of individuals using modern technology to organise a festival lasting over a week, without any, script, musical scores, or dance choreography, and involving more than 500 individuals speaking many

5. Coase, 1937
6. Stern, 2009
7. Bradshaw, 2021
8. Turnbull, 2021e
9. Zelinsky, 2021

different languages without rehearsals. Corroborees of this complexity were organised without newspapers, mail, phones, faxes or internet despite participants needing to know months in advance to undertake weeks of travel to arrive at the right time at the right place and then self-organise their catering and accommodation. Activities were determined by relationships based on language, Country, kinship, skin, moiety, totems and nature of the ceremony. The nature of the ceremony also determined the relevant songlines, stories, trade, hunting and food sharing.

Indigenous co-author Anne Poelina has participated in sharing the wisdom of such complex events through travel guided by celestial and seasonal environmental signs to find the ceremonial location at the specified time. Poelina has witnessed the processes of self-management based on the art of both diplomacy and sometimes retribution. The processes involved assigning areas for camping, hunting, ceremony or other activities.

Biological researchers routinely observe that all forms of life are self-organising. There are countless ways animals, plants and other forms of life become self-regulating[10] and self-governing without any centralised system of communications, control and decision making. However, these possibilities for social organisations are typically beyond the comprehension of management scholars.

Management research and education is almost exclusively based on hierarchies. Carucci[11] described how they can create a 'toxic culture'. An endemic problem of hierarchies is that they lack reliable systemic feedback for 'building trust'.[12] Turnbull and Guthrie[13] argue that 'hierarchies can only manage complexity incompletely' because they 'lack reliable communication and control channels'. The problems of hierarchies were identified by Dee Hock, the founding Chief Executive Officer of the stakeholder-controlled VISA corporation. Hock designed the corporation to possess hundreds of boards within a single legal entity to create what Ostrom[14] describes as 'polycentric governance'. Polyentric governance allows a requisite variety of decision-making centres, communication and control channels to be introduced to allow the governance architecture of organisations to become consistent with the laws of nature.[15] These laws supports the views of Hock:[16]

> **Industrial Age, hierarchical command-and-control pyramids of power, whether political, social, educational or commercial, were aberrations of the Industrial Age, antithetical to the human spirit, destructive of the biosphere and structurally contrary to the whole history and methods of biological evolution. They were not only archaic and increasingly irrelevant; there was a public menace.**

There is no word for 'hierarchy' in the hundreds of Aboriginal languages – there is no need for one. There were no 'Lords' ruling Aboriginal people to extinguish what Lilienthal and Ahmad[17] describe as 'allodial' title. Rather 'land owns people' in a reciprocal relationship.[18] Here Aboriginals are 'ownees' of the land,[19] a concept that makes explicit that Country is not just what Ostrom and other modern scholars refer to as a common pool resource to be exploited but a relationship that

10. Turnbull, 2008a, 2014a
11. Carucci, 2018
12. Fritz, 2019, p. 18
13. Turnbull and Guthrie, 2019, pp. 60, 63
14. Ostrom, 2009
15. Turnbull, 2002b, 2008a, 2014b; Turnbull and Guthrie, 2019
16. Hock, 1995, p. 7
17. Lilienthal and Ahmad, 2018
18. Turnbull, 1986
19. Turnbull, 1980, pp. 163, 164

introduces non-negotiable obligations to care for Country. In a *Global Review,* Voss[20] states: 'Local residents conceive of their relationship to land in terms of heredity: land is related to their forebears, themselves and their children yet unborn'. This deep relationship need not frustrate sharing other types of property rights – it is consistent with what Ostrom identified in her principles to facilitate modern self-governance of natural resources.

This is because Indigenous Australians are taught and governed in a symbiotic relationship with nature. Their governing laws are based on their Dreaming songs, language stories, environmental totems, moiety, skin, tribe, clan and customary law of obligation to protect human and non-human entities co-existing with their ancestral Country. These natural realms of governance are not recognised in modern societies,[21] just as hierarchies are alien to Indigenous Australians.[22] The bottom-up decision-making processes by the ownees of Groote Eylandt were recognised in a report to the Australian Parliament.[23] The report noted that: 'Aboriginals of Groote Eylandt are reputed to be some of the most firmly committed to their traditional culture' and 'the conduct and discussions at the meeting provided unequivocal evidence that Aboriginals who are committed to traditional ways are equal to if not superior to white communities in managing their money'.

However, economists have educated modern humans to discount the future to maximise their undefinable totem of 'economic value'.[24] This narrow view makes it impossible to account for the wellbeing of future generations, unlike Indigenous societies, who are known to consider the wellbeing of their seventh generation.[25] But times are changing and there is now a growing awareness among leading economists of the shortcomings of economic metrics – a promising alternative approach has been developed by the Organisation for Economic Co-operation and Development,[26] which has developed metrics of individual wellbeing.

Humans who survive future centuries will find it difficult to explain how our current society failed to apply its profound knowledge to maintaining the health and wellbeing of our home, the planet, instead allowing the poisoning of soils, water and atmosphere to such an extent as to reduce biodiversity and the ability of the environment to support its inhabitants. The degradation of the global environment has many interconnected complex relationships that can only be countered by addressing them together. Simplifying such complexity reliably, quickly and comprehensively requires all members of humanity to become involved.

Life cannot exist without knowing how to survive, thrive and reproduce in complex, dynamic environments. For most modern individuals, these complexities mean different ways of understanding, feeling, hearing and participating are required. Albrecht[27] highlights that the English language 'speaks out' about nature and environments as if these concepts are separate from people. Indigenous languages, on the other hand, describe complex networks of relationships that are place-connected, lawful, spiritual, physical, cultural and intuitive.[28]

20. Voss, 1975
21. Whyte, 2017
22. Turnbull, 1980, p. 9
23. Turnbull, 1980, p. 15
24. Turnbull, 2019b
25. Warner, 2015
26. OECD, 2021
27. Albrecht, 2019
28. Poelina, 2021

By embracing these complex 'systems thinking' approaches,[29] we can develop solutions to society's big problems together.[30] These problems include overpopulation, economic inequality, biodiversity loss and the pollution of oceans, the atmosphere and soils. Such problems require transformative learning that recognises humans as part of multi-species ecosystems, from early childhood and throughout education from primary school to university and lifelong unlearning and learning.

An important contribution of this article is in identifying how Aboriginal practices can become literally 'incorporated' into modern corporations to reduce planetary problems for humanity. This also creates a compelling way to respect and protect Aboriginal 'laws and culture', as promoted by Stoianoff[31] and her work with the Indigenous Knowledge Forum.[32] We do so by finding a new way of talking about governance, consistent with the language of the US Vice President Al Gore, who in 1996 recognised the efficacy of natural forms of governance that we describe as 'ecological'.[33] Gore[34] suggested that governments should be 'imprinting the DNA' of society and that: 'evolution could offer insight into our social structures. But at the moment, we lack the vocabulary even to begin such discussions'.

A vocabulary has now developed with words such 'holon', 'holarchy' and 'tensegrity', described by Turnbull and Guthrie.[35] These systems science words are used in the third section of this article, where we identify 'alternative to hierarchies' for designing organisations. Before that, we outline the operational problems of hierarchical organisations. We go on to discuss how tax incentives can be used to transform existing corporations to adopt 'ecological governance' in section four, with section five outlining the consequences of introducing ecologically governed institutions into modern society.

OPERATING PROBLEMS OF HIERARCHICAL ORGANISATIONS

Methodology

Coase[36] pioneered a theory of firms, limiting his analysis to organisations established as 'an authority system', like an employee ~ employer relationship, to form a hierarchy. Coase argued that firms arise when markets fail to communicate qualitative information to construct complex items. Williamson[37] extended the work of Coase but limited his analysis of firms to 'markets and hierarchies'. Williamson introduced Transaction Cost Economics (TCE) as his method of analysis. As noted above, economic value – and so costs – cannot be defined in terms of any one or more tangible thing. Difficulties in defining transactions compound the lack of rigor of TCE.[38] TCE was subsumed and extended by Transaction Byte Analysis (TBA) introduced by Turnbull.[39] As bytes are perturbations in energy and matter that make a difference, TBA established 'The Science of Governance'[40] and 'The Science of Corporate Governance'[41] to ground elements of social science in the natural sciences. In this way, TBA extended the remit of cybernetics to the universe and all its systems.[42] It subsumes and extends the remit of

29. Turnbull, 2021d
30. Yunkaporta, 2019
31. Stoianoff, 2021
32. Indigenous Knowledge Forum, 2014, 2018
33. Turnbull, 1992, 2014b, 2015, 2018, 2020, 2021d
34. Gore, 1996
35. Turnbull and Guthrie, 2019
36. Coase, 1937
37. Williamson, 1975
38. Barney and Ouchi, 1986, p. 8
39. Turnbull, 2000b
40. Turnbull, 2008a
41. Turnbull, 2002b
42. Turnbull, 2021d

TABLE 1: COMPARISON OF TCE AND TBA BOUNDARIES[43]

A FRAMEWORK OF ANALYSIS	TCE (COASE/WILLIAMSON)	TBA (DEVELOPED BY TURNBULL)
1. Type of social institution	For-profit firms, not labor managed	Within and between all forms of life, including any type of firm
2. Subject of analysis	Transactions and their costs	People and the quanta (bytes) of data they process
3. Relationship of people	Master/servant or competitive	Any e.g., family, cooperative, competitive, associative, etc.
4. People behaviour	Self-interest	Any e.g., altruistic, self-interest, etc.
5. Objectives	Economizing costs	Anything (for firms, economizing the transaction of bytes with errors correction)
6. Basis for objective	Normative	Physiological limits in transacting bytes
7. Modes of governance	Markets, hierarchies and hybrids of both	Any combination of clans/communities, associations, hierarchies, or markets
8. Communication and control through:	Markets and hierarchies	Senses, semiotics, language and numbers
9. Firms exist because:	Markets fail to provide information	Two or more people can reduce 'bounded rationality' and allow specialization in skills and/or knowledge

the Williamson methodology from hierarchical organisations to any type of social organisation for any form of life (see Table 1).

TBA provides an alternative theory of any type of firm.[44] It also provides a methodology for grounding the analysis of decision making, communication and control within and between any forms of life, including plants or physical processes in the universe. Plants highlight how the architecture of their growth and behaviour described by Wohlleben[45] can be governed by changes in the shape and configurations of their cellular parts, as identified by Ingber.[46]

Systemic Problems of Hierarchies

At least four systemic dysfunctional physical problems are identified in simple centralised command-and-control hierarchies:

1. 'bounded rationality'[47] with data overload by centralised decision makers without error correction mechanisms that lead to the delegation and the implementation of decisions to subordinate levels to form a hierarchy and additional problems outlined below;
2. data losses, biases and distortions from subordinate level feedback without error correction processes;[48]

43. Adapted from Turnbull, 2000b
44. Turnbull, 2000b, 2022
45. Wohlleben, 2017
46. Ingber, 1998
47. Simon, 1972
48. Shannon, 1948

3. discretionary interpretation by subordinates in determining the details of how to implement superior level communications without error correction processes;[49]
4. absence of systemic external feedback channels to detect mismanagement, misconduct and malfeasance independently of those responsible.[50]

In addition, at least five behaviour problems are identified as arising from the power relationships inherent in simple centralised command-and-control hierarchies. As noted by Hayne,[51] institutions act unlawfully 'because they can', and this arises as 'there is always a striking asymmetry of power and information'. These problems arise from the following:

1. centralised decision making introduces absolute power[52] for the decision-making individuals to identify and manage their conflicts of interest to corrupt themselves, their organisation, its stakeholders, and society;
2. blind obedience to authority by subordinates creates 'groupthink',[53] to deny the adequate variety of reliable feedback;
3. excess exploitation of subordinates to alienate them as loyal cooperators and so reliable communication and control agents;
4. behavioural tensegrity by employees and agents is suppressed, inhibited, prohibited and punished to frustrate discovery of superior operating processes;
5. behavioural tensegrity by the organisation is denied, frustrating the identification of novel ways to adjust to complex dynamic environments.

The use of authority as described above creates 'toxic' relationships, as identified by Carucci,[54] to aggravate systemic dysfunctional physical data processing. There are several ways the exploitative characteristics of hierarchies can be mitigated or eliminated. These are considered next.

Alternatives to Hierarchies

There are various alternatives to hierarchies to consider. These include Viable Systems Model,[55] Syntegrity,[56] Sociocracy,[57] Second Track,[58] Holacracy,[59] Heterarchy,[60] polycentric governance,[61] Holarchy,[62] Ecological governance[63] and various hybrids forms. Each describes some form of decentralisation and bottom-up decision making. All can provide valuable alternatives and adjuncts to simple hierarchies.

Syntegrity operates at the smallest scale, involving typically up to 30 individuals, VSM, Sociocracy and Second Track, at a larger scale. Heterarchy and

49. Ashby, 1956; Downs, 1967
50. Ashby, 1956
51. Hayne, 2018
52. Acton and Fears, 1985
53. Fink, 2018
54. Carucci, 2018
55. Beer, 1995
56. Beer, 1994
57. Rau, 2021
58. Fritz, 2021
59. Kettering, 2020
60. McCulloch, 1945
61. Ostrom et al., 1961
62. Mathews, 1996
63. Turnbull, 2015

polycentric governance are applicable for associating several organisations or entities. Holarchies, by definition, are a network of almost self-governing 'sub-systems'[64] that Smuts[65] described as 'Wholism', Koestler[66] described as 'Holons', and Hock[67] described as 'Chaords'. Simon[68] was describing holons when referring to 'nearly decomposable systems in which the interactions among sub-systems are weak, but not negligible', 'the existence of stable intermediate forms',[69] and what Turnbull[70] described as 'almost self-governing components'.

While Mathews[71] does not use the word tensegrity, he recognises its existence and describes its various contrary ~ supplementary behaviours. He identifies these as defining features of holons and their holarchies. This makes holarchies radically different from all the other alternative forms of organisations. Likewise, Ingber[72] does not use the words holon or holarchies but recognises their existence by referring to holons as 'systems' and holarchies by pointing out that our bodies are 'organised hierarchically as tiers of systems within systems'.

Crucially, Ingber notes that the 'rules of self-assembly' allow new emergent properties to arise that do not exist in the parts of the whole. In this way, he considers tensegrity as the design rules for creating and building various life forms to support the title of his article as 'The architecture of life'.[73] This provides another reason why holarchies are radically different from other forms of organisations.

Five case studies of polycentric governance are presented by Turnbull.[74] Two are US-based, the plywood cooperatives and the American Cast Iron and Pipe Company, another two are UK-based, the Scott-Bader Commonwealth and the John Lewis Partnership (JLP), and one from Spain, the Mondragón Corporacion Cooperativa (MCC). Other examples recognised were a Japanese Keiretsu and VISA Inc in the US. Bernstein's[75] global study of cooperatives suggested that unless distributed decision making of polycentric governance was introduced, stakeholder governed firms would not survive.

The JLP, MCC and VISA cases provide evidence of polycentric governance's resiliency, competitiveness and operating advantages. They all survived several business cycles over the last half century. Their existence also demonstrates that no change in public law is required, only changes in the private law of corporate constitutions.

Initiatives for Change

We describe below how shareholders who change their corporate constitutions to adopt an ecological form of polycentric governance could be provided with self-financing tax advantages.[76] A distinguishing feature of ecological governance is that it introduces dynamic time limits on property rights to reduce overpayments to investors and free carried interests from owning, *but not using rights*, to land, buildings, enterprises and/or currencies.[77]

64. Simon, 1962
65. Smuts,1926
66. Koestler, 1967
67. Hock, 1999
68. Simon, 1962, p. 474
69. Ibid., p. 472
70. Turnbull, 2000b, p. 130
71. Mathews, 1996
72. Ingber, 1998, p. 30
73. Ingber, 1998
74. Turnbull, 2000b
75. Bernstein, 1980
76. Turnbull, 2021a, c
77. Turnbull, 2018

The tax incentive to change corporate constitutions would allow Ostrom's design principles to be enhanced to become an ecological form of polycentric governance as found in nature to:

1. explicitly recognise the need to follow Indigenous practices of bottom-up distributed decision making;[78]
2. apply polycentric governance design principles not just between organisations but also *within* incorporated organisations by amending their constitutions;
3. introduce the need to establish systemic contested decision-making processes to introduce tensegrity to generate a requisite variety of decision-making centres and associated communication and control channels to allow self-regulation, self-management and self-governance as found in nature;
4. introduce dynamic property rights to limit
   a. the ability of investors to become overpaid with 'surplus profits'[79] in a way accounting doctrines do not report because they do not recognise investor time horizons, and
   b. the size of organisations to human scale.

The above enhancements allow polycentric governance to mimic nature's process of 'use it or lose it' to establish an ecological form of governance. Indigenous Australians did not create artificial corporate bodies that over-rule nature with rights of perpetual succession. British sovereigns used these rights to privatise the building of the British empire.[80] As an integral component of nature, they naturally obtained non-negotiable heredity obligations of perpetual succession.

In this way Australian Aboriginals were taught and governed intimately by nature through their Dreaming relationships,[81] songs, language stories, Country, totems, skin groups and moieties. Governance was celebrated and self-regulated through reciprocity, songlines, trade, ceremony and marriage exchange.[82] Rather than possessing land rights, Indigenous societies saw themselves as being from and of the Country in their Dreaming songlines. These created collective obligations, values, ethics, and responsibility for caring for Country.

First Nations people had a much more powerful and non-negotiable relationship with Country than any British 'Lord' or Sovereign could claim, recognise or grant to any individual in Britain, let alone in any other place. Aboriginal relationship to and for the land is more than 'allodial' as described by lawyers Lilienthal and Ahamd.[83] They were constrained by the limits of their English language that did not contain the word 'ownee'. However, in the last paragraph of their article, Lilienthal and Ahamd[84] conclude that introducing a foreign legal custom to a new land would fail for lack of prescription. This view supports the superior relationship of Indigenous people with the Country of their birth.

As pointed out by Mary Graham:[85]

> **Because the land brought us into being and continues to keep us alive and protected, we're forever obliged to look after it, but it is more than a duty, it's brought us into the sacred *relational*, the embedding of ethics, morality, empathy in us, that is, acquiring the condition of being worthy of what is proper.**
>
> **Foundational Principle. To the extent that the Land is the source of the Law, Aboriginal Australia said to the people: "co-operate,**

78. Thurston and Fernández-Götze, 2021
79. Turnbull 2000a, p. 403
80. Turnbull, 1973, 1975, 1991b, 1998, 2002a, 2003b, 2014a, 2020
81. Lilienthal and Ahmad, 2018
82. Woolltorton et al., 2020
83. Lilienthal and Ahamd, 2018
84. Ibid.
85. Graham, 2009

> don't compete; share, don't hoard; attend the consensus; extend your relationships; look after Land and Honour your Sacred sites". It is a Law, which requires an a historical view of time."
>
> The idea and practice of Obligation gives to human society a greater return, for observance and adherence to the tradition, such as – nourishment / health, meaning, a flourishing society, security, protocols and above all, well-being assurance for future generations.

Aboriginals obtained their law from nature that included Country described in their Dreaming songlines and all other living things with the voice of reason and logic.[86] The jaybird provides an example of how Aboriginals follow the practices found in nature. It 'eats acorns and beechnuts but buries a multitude of them as it does so, ensuring that the trees can multiple more efficiency with it than without it'.[87] This place-based efficiency with Country continues to be managed by seasons in deep relationships, connectedness, ecological learnings and meaning and is a lesson for sustaining lifeways from nature.[88]

Ostrom[89] recognised different types of property rights, but her design principles did not because property rights were not relevant to common pool resources. Ostrom and scholars use the term common pool resources to describe the *passive* resources of nature. This is why recognising and incorporating common pool resources introduces a new dynamic in global risk management. It means all humanity must recognise their environmental obligations.

Corporations as Agents of Change

Corporations could become a crucial means for residents 'amplifying regulation'[90] that would also allow them 'regulating the very large system'[91] that is the planet. These two cybernetic processes are crucial because 'The law of Requisite Variety, like Conservation of Energy, absolutely prohibits any direct and simple magnification, but it does not prohibit supplementation'[92] to regulate complexity. Corporations can magnify regulation by engaging with a requisite variety of supplementary co-regulators. There is an insufficient number of governments in the world to provide a requisite variety of co-regulators to manage the complexities of the interrelated varieties of environmental degradations comprehensively and reliably without a requisite variety of supplementary co-regulators.

To provide an example of how corporations can be agents of change, as a business entrepreneur, Turnbull designed the constitutions of several public companies that included elements of polycentric[93] and/or ecological governance.[94] Separate decision-making centres were established in the constitutions of two firms to illustrate a first step in creating polycentric governance. One of these ventures, and two others, illustrated an element of ecological governance by limiting investor property rights to 15 years or less. Each raised millions of dollars, with two becoming publicly traded.

Turnbull[95] also introduced polycentric governance when he incorporated the controlling body of skiing in Australia in 1978. The unincorporated national body was a federation of self-governing state councils. Federating the self-governing components formed polycentric self-governance

86. Nangan and Edwards, 1975
87. Wohlleben, 2017, p. 72
88. Woolltorton et al., 2020
89. Ostrom, 2009
90. Ashby, 1956, p. 265
91. Ashby, 1956, p. 244
92. Ashby, 1956, p. 268
93. Guthrie and Turnbull, 1995; Turnbull, 1995, 2002c, 2014b, 2021c; Turnbull and Guthrie, 2019; Turnbull and Myers, 2017
94. Turnbull, 2000a, 2002a, 2014a, 2015, 2018, 2020, 2021c
95. Turnbull, 2020, p. 7

at the state level. Each self-governing state organisation represented a 'holon' that competed in ski races but cooperated administratively to form the national body. State councils were made up of self-governing clubs that competed against each other and cooperated to create a three-level holarchy. The national body likewise represented a holonic component, extending the holarchy through to the international controlling body of the sport that federated with other international controlling sporting bodies of other sports to create the Olympic Committee. This five-level holarchy from the local to the global level was made up of self-governing components. The component holons did not have to invoke the need for 'markets and states', as Ostrom[96] noted in her Nobel Prize acceptance speech.

In 1978, Turnbull[97] created polycentric governance at the national level when he amended the constitution of the non-profit Company Directors Association of Australia. It had been incorporated with a single board in 1967. The new constitution likewise created a federation of polycentric self-governing chapters in each geographic state or territory of Australia. In 1990, the association became the Australian Institute of Company Directors. It maintained a watered-down version of polycentric governance but still attracted a far greater membership than the centrally controlled sister organisations in the UK and the US that have much larger populations to service.

There are numerous professional, trade, community service, civic, and even some religious, organisations that illustrate bottom-up polycentric self-governance. Problems arise when constituent organisations grow to form command-and-control hierarchies to become internally hybrid organisations.

Until universities begin educating governance architects to custom design polycentric self-governance, this paper restricts itself to a tax incentive that only introduces a hybrid form of ecological self-governance. Details of this are outlined in the next section.

INTRODUCING AN EQUITABLE, SUSTAINABLE ECONOMY

Tax Incentive

This section explains how a tax incentive can be used to begin turning the existing corporate 'pyramids'[98] of power upside down to create an equitable, eternally sustainable democratic society. Shareholders are provided tax advantages on the condition that they make three changes to their corporate constitutions, as explained below. The changes introduce an ecological form of polycentric governance to 'benefit all stakeholders'.[99] Stakeholders obtain a voice to become bottom-up co-regulators to enrich democracy.[100] However, shareholder primacy is maintained because all stakeholders can automatically become shareholders as part of transforming corporations to promote the common good for all citizens. As noted above, this makes corporations a 'common pool resource'.

The tax incentive provides shareholders with a more significant, quicker profit with less risk in return for them endowing a small fraction of their equity each year to a new class of 'stakeholder' shares.[101] Institutional investors would obtain a legal obligation to support arrangements that increased their returns.

Unlike leveraged employee share ownership share plans (ESOP), stakeholder shares would not require debt financing. This simplifies their creation and

96. Ostrom, 2009
97. Turnbull, 2021c, p. 7
98. Berger, 1974
99. Fink, 2018
100. Givens, 1991; Turnbull, 2021e
101. Turnbull, 1975, 2002a, 2003b, 2014a, 2018, 2020, 2021c

allocation to only voting citizens. Stakeholder shares would be funded by the corporate constitution, automatically endowing a specified small fraction of shareholder equity each year by a book entry to stakeholder shares. This illustrates the concept of 'dynamic' property rights proposed by Turnbull[102] that creates a way for *Democratising the Wealth of Nations*.[103] Dynamic property rights also provide a simpler way to privatise socialism to create a stakeholder economy. For this reason, Turnbull was invited to Prague in 1990 and 1991 and to Beijing in 1991.[104] Translations of his papers were published as Turnbull.[105]

Simplifying and Expanding Existing Processes

The endowment of stakeholder shares could also be used to simplify the creation of ESOPs. Over 10% of US nongovernment employees own shares in their employers valued at $1.4 trillion.[106] This citizen ownership of shares has been promoted by tax incentives. However, the incentive for political leaders to create stakeholder shares is many times greater. This is because *all* citizens become eligible for benefits, not just those employed in ESOP companies. The possibility exists that the current loss of revenues from promoting employee share plans could be more than offset by introducing stakeholder endowment incentives.

This possibility arises because citizens can pay tax at higher rates than corporations to allow governments to raise more revenue than the cost of the incentive. In any event, a process is established for distributing wealth with less taxes and less welfare payments to shrink the size and cost of government. These additional savings could provide additional ways to finance the tax incentive. Stakeholder governance also provides a way to privatise the cost of regulation to further reduce the size and cost of government.[107] A compelling incentive is created for political leaders because all their constituents could obtain rights to a universal wellbeing dividend income.[108]

The amended corporate constitutions would introduce 'A new model for corporate governance',[109] as suggested 16 years later by Larry Fink.[110] Fink is the CEO of BlackRock, which manages around 10% of the value of all publicly listed corporations worldwide. BlackRock is the world's largest asset manager, with over $9 trillion in assets under management as of July 2021. Fink is a shareholder of corporations employing the CEOs of the Business Round Table.[111] As stakeholder shares can only be issued to citizens, a process is also created for increasing local ownership of foreign businesses. In this way, local economies become richer by reducing alien ownership. Penrose[112] noted that foreign investment creates 'the acceptance of an unlimited, unknown and uncontrollable foreign liability'. They create 'surplus' profits for investors that accountants cannot report because they do not identify investor time horizons.[113]

Stakeholder shares can localise the ownership and control of corporations into the regions hosting their stakeholders and being endowed with their equity. This improves corporations'

102. Turnbull, 1973
103. Turnbull, 1975, p. 83
104. Turnbull, 1991a
105. Turnbull, 1990, 1991b
106. NCEO, 2021, https://www.nceo.org/articles/employee-ownership-by-the-numbers
107. Turnbull, 2008b, 2021b, c
108. Turnbull, 1975
109. Turnbull, 2002a
110. Fink, 2018
111. BRT, 2019
112. Penrose, 1956, p. 235
113. Turnbull, 2000a, p. 403

accountability and ability to protect and nurture their host environments, as is also wanted by Fink and predominantly Indigenous Australians. Besides serving all stakeholders, Fink[114] wants corporations 'to engage with shareholders like BlackRock and bring other critical stakeholders to the table'. This makes good business sense as it provides a way to improve business operations, as identified by Porter.[115] Also, as Von Hippel[116] reports, stakeholders can provide a way to add value from customer suggested innovations. This approach could be extended to all stakeholder constituencies to obtain continuous constructive feedback to add mutual value and avoid harms.

Notably, the formal establishment of self-elected stakeholder advisory committees and qualified advocates creates a process for introducing self-regulation to reduce the role and intrusiveness of government regulators. To encourage the privatisation of regulation from stakeholder regulation, corporate constitutions could make provisions to form, resource and recognise the voice of stakeholder committees.[117] US-based Citizen Utility Boards, which have operated for generations, illustrate this process because they add value.[118] Further, the cost of resourcing stakeholders' voices could be recovered many times over by reducing fines from regulators. These are hundreds of million of dollars per year, except in financial services, which incur billion-dollar fines per year.[119] Stakeholder committees would also eliminate the cost and questionable integrity of internal corporate customer advocates and ombudsmen. So many corporations now employ internal ombudsmen that they now have an International Association.[120]

Fink also wants corporations that are 'less likely to succumb to groupthink and miss new threats'. New severe threats are now emerging from the degradation of global soils, water and atmosphere and losses in biodiversity. These threats have introduced risks to the global commons. Stakeholder committees and their advocates provide a loyal opposition to any groupthink by management. They can also act as 'the canary in the coalmine', sounding the alarm about both the state of known knowns, known unknowns, and the existence of unknown unknowns, such as may be arising from emerging environmental degradation.

To achieve the objectives of Fink[121] and the US Business Round Table[122] and to follow the bottom-up governance practices of Indigenous Australians, the tax incentive would be conditional upon shareholders introducing three changes to corporate constitutions. Shareholders would need to approve the following:

1. Establish a class of stakeholder shares that can only be issued to citizens recorded on electoral rolls of the host tax precincts of the firm. The shares automatically become endowed with equity according to the tax incentive provided with their negotiability subjected to stakeholder engagement and other conditions.
2. Establish a board of governors to simplify directors' duties significantly. This is achieved by replacing the need for directors to be exposed to personal conflicts of interest by being members of specific committees, such as nomination, remuneration and audit committees, and not having any creditable way of managing any other sources of personal conflicts.

114. Fink, 2018
115. Porter, 1992, pp. 11, 16, 17
116. Von Hippel,1986
117. Turnbull and Guthrie, 2019; Turnbull, 2019a, 2020
118. Given, 1991
119. Violation Tracker, 2021, https://violationtracker.goodjobsfirst.org/parent/jpmorgan-chase
120. International Ombudsmen Association, 2021, https://www.ombudsassociation.org/
121. Fink, 2018
122. BRT, 2019

Personnel conflicts arise when a director chairs, and so controls annual meetings of shareholders, whose purpose is to hold directors to account by presenting their accounts.

3. Provide for creating and resourcing self-elected advisory committees for each stakeholder constituency and their employment of qualified advocates as described in articles by Turnbull.[123]

OPERATIONS OF ECOLOGICAL CORPORATIONS

Behavioural Changes in Corporations

This section outlines the dynamics of ecological corporations and how globally they can become responsible for managing the complexity of existential risks to society locally. As self-financing self-governing agents, they are able to engage with most people on the planet in most regions of the world. This provides a basis to collectively protect and nurture the complex inter-related integrity of the atmosphere, water, soils and biodiversity.[124] Crucially, stakeholders of ecological corporations can radically change their behaviour to reflect their innate individuality to exhibit and contribute the necessary variety to manage complexity. An outcome as noted above is inhibited, denied and punished in centralised command-and-control hierarchies.

At the local level, ecological corporations could introduce constant change in how corporations operate. Because shareholder equity is gradually diluted with stakeholder endowments, corporations will become highly motivated to distribute all their profits as promptly as possible to minimise diluting shareholder returns on their diluting equity. Cooperatives commonly adopt a total payout of profits. However, unlike cooperatives, corporate investors and their managers have incentives for adding value.

Adding value could be achieved by sponsoring newly incorporated 'offspring' firms' funding by re-investing dividends. Offspring firms provide a way to grow business activities. They also provide continuous opportunities for both investors and management. However, managers become continuously exposed to market forces to perform. This arises from the need to continuously obtain the confidence of their existing shareholders or such new ones that may be required to fund offspring firms to drive growth.

Behavioural Changes in People

A process of constant change is introduced to change power relationships and personal incentives profoundly. Evidence from stakeholder governed firms like JLP and the MCC indicate that this leads to changes in behaviour and culture.[125] Stakeholder voices from various stakeholder constituencies of each firm would become publicly disclosed if corporations provided benefits to all. Disclosure of the identity of all beneficial owners of ecological firms would be continuous. This would make share trading self-regulating to allow firms to trade their own shares. The costs of being listed on a so-called 'public' stock exchange that denies public disclosure beneficial ownership would be eliminated.[126]

In addition, an increasing number of stakeholders would become shareholders to replace investors. Directors and their management would become accountable to key performance indicators (KPIs) set by the board of governors elected on one vote per investor rather than how directors are appointed on one vote per share. Democracy would counter self-serving, self-enriching plutocracy.

Stakeholder voice and advice on KPIs from the bottom-up would protect and strengthen citizens' voices to enrich civic democracy with corporate democratic oversight on how business operations

123. Turnbull, 2019a, 2020, 2021e
124. Turnbull, 2003a; Turnbull and Myers, 2017
125. Aviram, 2003
126. Turnbull, 2021b

are managed top-down. Self-governing stakeholder constituencies[127] would introduce what Ostrom[128] describes as 'polycentric governance' to introduce the self-governance of 'common pool resources'.

One of the most crucial advantages of bottom-up distributed decision making is that it allows individuals to maintain their identities to create self-respect and variety. Ostrom[129] reported how, in the 20th century, economists used simplistic and unrealistic models of how humans behave. By the end of the century, influential scholars like Jensen and Meckling[130] identified five static models of human behaviour. However, as Ostrom pointed out, behaviour is determined by context, so human behaviour is dynamic to make all five models irrelevant most of the time.

The context-dependency of human behaviour had been identified half a century earlier by Wearing, a professor of psychology. Wearing[131] reported that humans: 'Stands in an interactive cybernetic relationship to his/her community and environment and is changed as a result of any interaction', 'Sometimes competitive, sometimes collaborative, usually both' and 'Does not consistently order his/her preferences (i.e., changes his/her mind over time, may prefer A to B, B to C but C to A)'. These comments describe tensegrity.

Neurologists Kelso and Engstrøm[132] reported: 'Experiments show that the human brain is capable of displaying two contradictory, mutually exclusive behaviours at the same time'. Kelso and Engstrøm introduced the '~' notation adopted in this article to indicate the paradoxical dual contrary ~ complementary interdependent relationships of tensegrity present in our brains; they list many other contexts.

Many do not meet the Mathews[133] test of being a holonic. However, Mathews notes 'biological structures are invariable holonic', and that 'evolutionary processes proceed through alternating periods of collaboration (association, symbiosis) and competition (variation and selection)'. In this way, tensegrity becomes the driver of evolution and so needs to be reproduced in any new emerging forms of increasing complexity for evolution to be maintained.[134]

Ingber[135] also expands the relevance of tensegrity to evolution and the universe as included in Table 2. This speculation has also been raised by quantum physicist Bohm.[136] Turnbull[137] uses the law of requisite variety to support this view. The phenomenon of tensegrity may also assist in reducing 'the mysterious neurobiology of human social interactions'.[138]

Ancient Chinese Philosophy used the term Yin ~ Yang to describe how two different and even contrary features can be interdependent with each other, like males ~ females. This is illustrated in Table 2 for the behaviour of humans, organisations and fundamental features of nature and the universe. The last three rows in the Table are an attempt to explain in the English language concepts that are alien to modern humans. As noted above, modern humans possess powerful

127. Turnbull, 1994, 2014a
128. Ostrom, 1990, 2009, 2012
129. Ostrom, 2009
130. Jensen and Meckling, 1994
131. Wearing, 1973
132. Kelso and Engstrøm, 2006
133. Mathews, 1996, pp. 48, 51
134. Turnbull, 2021d
135. Ingber, 1998
136. Bohm, 1980
137. Turnbull, 2021d
138. Fritz, 2021, p. 34

TABLE 2: IDENTIFYING DUAL BEHAVIOUR OF HUMANS/BIOTA/HOLONS/HOLARCHY AND THE UNIVERSE

DOMAIN	TENSEGRITY DRIVES BEHAVIOUR AND EVOLUTION	
Chinese philosophy	Yin ~	Yang
Humans (Representing a holon can become part of a holarchy or a hierarchy that is dysfunctional because it denies tensegrity)	Approach ~	Avoidance
	Cooperative ~	Competitive
	Trusting ~	Suspicious
	Selfless ~	Selfish
	Other behaviours ~	Other behaviours
Holons & Holarchies (Represent ecologically governed organisations or structures)	De-centralised ~	Centralised
	Autonomous ~	Integrated
	Bottom-up ~	Top-down
	Ordered ~	Chaotic
	Other characteristics ~	Other characteristics ~
Light	Radiation/energy ~	Photons/matter
Electrons	Wave ~	Particle
Quarks	Up ~	Down
Gravity	Space ~	Time
Universe	Here/now ~	Where/when
Dark matter/energy	Where/then ~	Here/now
Indigenous Australians	Dreaming song-lines ~	Stories of languages
	Country ~	Totems
	Skin name ~	Moiety

governing social constructs like 'price' and 'value' that cannot be translated into Aboriginal languages as these concepts are not required to sustain their existence and wellbeing. Poelina et al.[139] identifies other concepts that are not relevant like 'markets and state', identified by Ostrom[140] and 'ownership' identified by Turnbull.[141] Aboriginals saw themselves as being created by their Country, so they became its descendants. This established a much more powerful and integrating relationship of being an 'ownee'.[142] It introduced obligations to Country. Mission social worker, Margaret Bain, cited in Turnbull,[143] noted that the Aboriginal 'approach to life is based on being rather than doing'. Also, they have no verb 'to have', they see white people as 'possessed by their property', and they have no word for 'thank you'.

139. Poelina et al., 2021
140. Ostrom, 2009
141. Turnbull, 1980, pp. 163, 164
142. Turnbull, 1986
143. Turnbull, 1980, pp. 56-58

TABLE 3: HOW MIMICKING NATURE CAN MITIGATE SYSTEMIC PROBLEMS OF HIERARCHIES

	TOXIC PROBLEMS OF HIERARCHIES	MITIGATION BY MIMICKING NATURE
1	Society assumes top-down control is natural	Nature uses bottom/up control & top/down guiding
2	So no education about ecological governance with distributed control to simplify complexity	Complexity simplified with almost self-governing sub-systems dependent upon contrary guiding
3	Unitary boards obtain absolute power to identify and manage their own conflicts of interest to allow absolute corruption of directors, auditors, the business and society. Allows toxic leaders	Shareholders appoint one board to manage the business and another board to become integrity guardians to govern the corporation and represent all stakeholders & community views for investors
4	Group think arises from directors captured by CEO to hide risks, misconduct & malfeasance	Guardians of stakeholder voices obtain contested 'requisite variety' of data for checks and balances
5	Corporations can lie and/or mislead themselves about director independence	Directors' independence becomes irrelevant except for their relationship with Guardians
6	Directors capture auditors who judge their A/c	Guardians control auditors who judge director's A/c
7	Auditors lie that they are independent	Auditors kept independent by Guardians
8	Accounting doctrines hide how investors get overpaid beyond their investment time horizons with surplus profits creating hidden sources of inequality and stakeholder exploitation	Ownership of surplus profits distributed by corporations issuing shares to citizen stakeholders that democratizes wealth and power. Reduces the need for corporate taxes and welfare programs
9	Directors control advisors to shareholders	Shareholder advisors controlled by Guardians
10	Directors nominating themselves for election	Director nomination by shareholders & Guardians
11	Directors control their own pay after setting and marking their own 'exam papers' aka KPIs	Guardians determine director pay from Stakeholder Key Performance Indicators (KPIs)
12	Directors control reports about corporate impact on the environment, stakeholders and community welfare and their own governance	Stakeholders provide guardians with reports for shareholders on Guardians pay, corporate impacts on stakeholders, the environment and society.
13	Directors control how they are held accountable to shareholders at AGMs and control the voting processes on own election and remuneration.	Stakeholder nominee controls conduct of AGMs. Guardians determine AGM agenda, location, acceptance of proxy votes, vote counting, etc.
14	Directors ignorant of shareholder identities, etc.	All ultimate owners and/or controller made public
15	Share trading relationships and price manipulation hidden from directors and public	No shares traded without prior disclosure of any related derivatives and identity of counter parties
16	Shares traded covertly by third party exchanges	Corporations directly execute all share transfers
17	Directors not held to account by various stakeholder groups who may have conflicting interest but on who directors rely upon to improve the quality, reliability and efficacy of continuous operational improvements	Each common interest stakeholder group obtains rights to form their own non-profit associations to appoint advocates/supplementary regulators/ management mentors that avoid directors and shareholders being kept in a cocoon of ignorance
18	Directors of simple command-and-control hierarchies lack systemic process to cross check management actions and misreporting	Directors obtain stakeholder communication and control channels independent of managers to cross-check the integrity of operations and outcome reports.
19	Impossibility of controlling complexity directly	Complexity controlled indirectly by stakeholders
20	Self-regulation/governance is impossible	Self-governance shrinks costs & size of government

A word like 'Dreaming' presented in Table 2 may not be alien to theoretical physicists who explain how fundamental particles can emerge and disappear in a 'quantum vacuum', a term included in Table 2. This term resonates with Aboriginal 'Dreaming' that communicates the circular 'songlines' integrating the past, present and future into the now.[144] However, each language Country in Australia possess their own 'stories' based on the differing fauna, flora and geographic features of each Country. This makes language stories different and independent, but they only make sense in the context of Dreaming. In this way, the cosmology of Aboriginal Dreaming integrates the many hundreds of language countries that make up a territory as large as Europe.

Everyone in a family, clan and tribe is allocated 'Totems' that are relevant to the Country of their language. Totems bond individuals for life with non-human kin/family, imposing guardianship duties that require other individuals to act as 'managers/mediators' of their close ~ respectful obligations to Country. Inbreeding relationships are avoided by specified differentiation in gender and ancestral relationships that are determined by 'skin group' ~ 'moiety' noted in Table 2. The term 'Tensegrity' provides a simple way to explain the outbreeding integrity of their complex network of interdependent ancestral relationships.

Ecological governance creates quite a different context to change the way modern managers behave. It allows them to display tensegrity and be appreciated for making a constructive contribution to an organisation and for the organisation itself to possess tensegrity.

Simplifying the Management of Complexity

A compelling practical advantage of polycenricity is that it introduces what Turnbull and Guthrie[145] describe as 'Simplifying the management of complexity: As achieved in nature'. Their article provides a figure[146] that illustrates a generic outline of the polycentric governance and the associated communication and control channels. Table 3 outlines how the change in power relations from introducing polycentric governance would mitigate or remove 20 toxic behavioural problems identified in hierarchies.

Besides changing the behaviour of individuals, ecological governance would also change the way business activities expand their operations. The continuous re-birthing of enterprises keeps the size of firms to a human scale with networks of many smaller firms like those found in the MCC. The MCC grew organically by this type of process. As firms grow beyond 'human scale',[147] part of the business would be spun off to become a supplier or customer organisation. Groups of firms, each an almost self-governing holon, formed organisations to manage their group to become part of a holarchy.

An analysis of the MCC corporate architecture illustrates how self-governing holonic components can grow both vertically and laterally nested in self-governing holarchies as illustrated in Table 4, adapted from Turnbull.[148] As noted by Mathews,[149] 'Once attuned to the structure of holonic architectures, we see them everywhere'.

144. Evidence of possible time reversal was reported by Boyle, L., Finn, K. & Turok N. (2022) The Bib Bang CPT, and neutrino dark matter. High Energy Physics – Phenomenology, Cornell University, revised 22 January, https://arxiv.org/abs/1803.08930
145. Turnbull and Guthrie, 2019, p. 58
146. Turnbull, 2022a, Figure 1 on p. 85
147. Dunbar, updated in this issue on, 1993
148. Turnbull, 2000b, p. 221
149. Mathews, 1996, p. 47

TABLE 4: HOLON TYPOLOGY OF MONDRAGÓN (ONLY METRICS UPDATED TO 2019)

CONCATENATED HOLONS		INTEGRITY HOLONS TO ASSURE COORDINATION AND SUPPORT ALL COMPONENT HOLONS IN THE SYSTEM (with recursive intra-support)	INTEGRITY HOLONS INTERNAL STRUCTURE (Possesses lateral recursively)
PRODUCTIVE	**INTRA-SUPPORT (Vertical recursivity)**		
25,320 Individuals (MCC 1992) **81,000 Individuals (MCC 2019)**	Biological components (Brain, nervous system and other support organs)	Cultural imprinting (Hezibide Elkartea) Schooling (EPP) Social security (Langun-Aro) Retail store (Eroski) Retail banking (CLP)	General Assembly Workgroups Social Council Supervisory Board Watchdog Council
150 Firms (MCC 1992) **200 Firms (MCC 2019)**	General Assembly Workgroups Social Council Supervisory Board Watchdog Council	Trade and professional schools (EPP) Work experience (Alecop) Wholesale banking (CLP) R&D (Ikerlan)	General Assembly Workgroups Social Council Supervisory Board Watchdog Council
12 Groups or Relationship Associations (MCC 1992)	General Assembly of groups Group Social Council Group Governing Council	Entrepreneur and imprinter of 'holonic architecture' (LKS)	General Assembly Workgroups Social Council Supervisory Board Watchdog Council
Mondragón Corporacion Cooperativa	Mondragón Congress Central Social Council of Groups	Fund for Inter-cooperative Solidarity	

How the holonic architecture of the MCC and VISA follow the holonic architecture of natural systems has been tabulated by Turnbull.[150] The devil is in the detail, which needs to be developed by trial and error. Nevertheless, there are numerous empirical case studies to provide guidance and the eight design principles suggested by Ostrom.[151] Turnbull[152] presents a literature review of Ostrom design principles and those of other authors. Table 5 identifies the authors discussed and the context of their analysis.

CONCLUDING REMARKS

Indigenous Australian practices illustrate and reinforce the point that the current dominance of centralised authority systems is counter-productive to environmental, human and planetary wellbeing. The ideas of polycentric decision making originated by Ostrom et al.[153] have allowed theorists to understand and value Indigenous practices and wisdom.

150. Turnbull, 2000b, p. 130
151. Ostrom, 2009
152. Turnbull, 2021c
153. Ostrom et al., 1961

TABLE 5: DESIGN PRINCIPLES REVIEWED TO PROVIDE BENEFITS FOR ALL CORPORATE STAKEHOLDERS

AUTHOR BY DATE ORDER	CONTEXT
Schumacher (1973, pp. 176–186)	Towards a theory of large-scale organizations
Turnbull (1975)	Ecological ownership of corporations, realty & resources
Bernstein (1980, p. 98)	A global survey of employee governed firms
Whyte and Whyte (1988, p. 259)	Mondragón Corporacion Cooperativa (MCC)
Ostrom (1990)	Governing agricultural, water and civic commons
Mathews (1996, pp. 27–54)	Governance architecture of ecological systems
Hock (1995, p. 6; 1999, p. 5)	VISA International Inc. – 'Chaordic organization'
Turnbull (2000b, pp. 177–225)	Stakeholder controlled firms in US, UK & Spain
Turnbull (2002a)	Ecological alternative to state or private ownership
Cox et al. (2010)	Reviews 91 case studies of Ostrom community common pool resources
Stern (2011, pp. 213–232)	Ostrom's eight design rules for global commons
Wilson et al. (2013)	Polycentric governance of schools & urban precincts
Holacracy (2015)	'Auxiliary' contributions as stakeholders neglected
Turnbull (2020, 2021c)	Polycentric holarchy sporting and civic organizations
Turnbull and Poelina (2022) [This article]	Transforming corporations to common pool resources with: 'A new model of (ecological polycentric) corporate governance'

However, occupiers of Indigenous Australian's Country have seriously degraded the context of their ability to self-regulate, self-manage and self-govern. Indigenous culture had checks and balances, avoidance relationships and the need for others to manage and nurture specified reciprocal relationships. These features were dependent upon their connection and relationship to Country, language, totems, skin, moiety and cultural traditions have been denied and subverted in unconscionable ways.

Turnbull recalls his public inquisition surrounded by Indigenous elders of the Gumbalanya Council, sitting on the earthen floor of their Oenpelli tin shed meeting place in Arnhem Land on 23 August 1977.

In some Aboriginal cultures, it can be disrespectful to look directly into the eyes of a person with whom you are conversing. This was not practised when the 'Chairman' of the Council asked Turnbull to explain to those present: 'What right do you have to write words for the Minister when you do not know us?'[154] Turnbull explained that the Minster had invited him because he shared Turnbull's view that the 'boss' system was not appropriate for organising modern society. Also, he wanted to learn about Indigenous ways and how they might be used to reform modern society and how the government could best distribute mining royalty money.

This article has attempted to synthesise several areas of research scholarship to lay the foundations

154. The Hon Ian Viner, MP, was the Minister for Aboriginal Affairs. On 26 August 1976 Viner attended a seminar presented by Turnbull in Perth hosted by the Extension Service of the University of Western Australia.

for a new model of corporate governance to benefit all stakeholders. We consider Indigenous practices that are radically different from those of modern society and the benefits that can gained by understanding and adopting Indigenous self-regulation, self-management and self-governance practices. We also examine the intellectual gap in applying systems science to designing self-governing organisations that can more rapidly detect and respond to internal and external strengths, weaknesses, risks and opportunities, instead of relying on command-and-control hierarchies.[155] We synthesise these ideas with Ostrom's principles of common pool resources, proposing that transforming corporations into a common pool resource is based on the idea that common pool resources are not passive entities but sentient agents to protect and promote the common good. We argue that common pool resources can acts as agents for countering existential risks to the environment and humanity. At the same time, corporate size should be limited in terms of equity investment to reduce inequality and enrich democracy. In addition, tax incentives can counter inequalities in wealth, power and individual wellbeing, while simultaneously enriching democracy and countering existential risks to creatures, including humans.

These ideas provide a rich agenda for scholars in addressing the urgent need to share existing knowledge and wisdom to counter existential risks to humanity. Much of this knowledge has now been lost, weakened or hidden from colonisation. There is no alternative but for both cultures to work together to build a new system to rescue humanity from its current toxic, dysfunctional and unsustainable practices. Hopefully, we as human beings can be encouraged to promote immediate action, to work to together to care for Country, biodiversity and the wellbeing of humanity for an eternally sustainable society.

155. Bodrova, 2021

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ARTICLE

ANOTHER WAY: THE INTERSECTION BETWEEN FIRST NATIONS PEOPLES' WAYS OF THINKING AND GOVERNANCE, ACCOUNTING AND ACCOUNTABILITY

Prof James Guthrie AM, Prof John Dumay, Dr Alessandro Pelizzon and Dr Ann Martin-Sardesai

First Nations peoples' idea of Land custodianship implies that Land cannot be offered, taken, sold, lost or abandoned. This concept does not align with the Anglo-Saxon view of land as an asset which can be owned, sold or transferred between people. A team of researchers from Macquarie University, Southern Cross University and CQ University explore the differences between Indigenous and Western thinking and reflect on future opportunities for research, reconciliation and change.

> "The conflict of cultures brings into question the impact of Western accounting and accountability systems on the First Nations peoples of Australia whose beliefs, norms and values are organised differently."[1]

INTRODUCTION

> Note: This paper has adopted 'First Nations peoples' as the preferred term for the sovereign peoples of territories colonised by foreign powers,[2] while also, at times, using the term 'Indigenous peoples' to refer to Aboriginal and Torres Strait Islander peoples. Using this terminology, we respectfully acknowledge the great diversity of First Nations peoples, their histories and cultures, within and between nations.

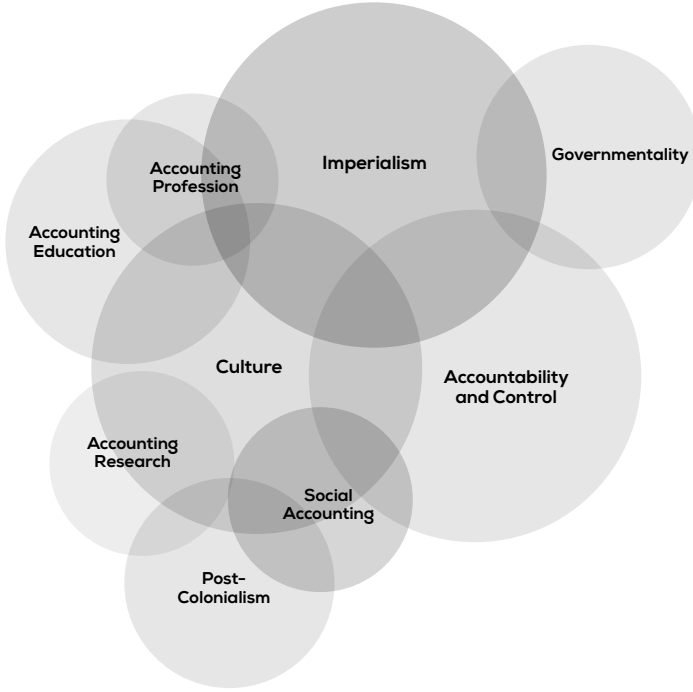
This article explores the inadequacies of contemporary Western governance, accounting and accountability practices regarding First Nations peoples' ontology, epistemology and axiology.[3] It encourages the reader to reflect on future opportunities for research and change. Therefore,

1. Greer and Patel, 2000
2. AIATSIS, 2021
3. The nature of reality and of what really exists (ontology), the relationship between the knower and what is known (epistemology), what we value (axiology), the strategy and justifications in constructing a specific type of knowledge (methodology), as linked to individual techniques (method/s); https://i2insights.org/2018/05/22/axiology-and-interdisciplinarity/

this paper is relevant to academics and practitioners seeking to support the rights of First Nations peoples to self-determination in line with the United Nations Declaration on the Rights of Indigenous Peoples.[4] We argue that further accounting research is urgently required to ensure First Nations organisations and people are adequately supported in their practices, incorporate traditional knowledge and achieve positive outcomes for their communities. This future research aligns with Alawattage et al.'s[5] calls for community accountability and the accounting discipline to serve the public interest and support the struggles for an emancipated society. Also, Bujaki et al.[6] stated that Indigenous understandings of ontology, epistemology, axiology and methodology should form the basis of more future research into accounting and Indigenous Peoples.

In support, Norris et al.[7] review 51 interdisciplinary accounting research articles over the past three decades on the intersection between First Nations peoples and the accounting discipline. They establish the need for more culturally responsive accounting and identify how accounting systems should be relevant to First Nations people and cultures. Bujaki et al.[8] also undertook a systematic literature review on accounting and Indigenous Peoples. They synthesise research in this area through a review using 72 articles from 1979–2020 for synthesising the research related to Indigenous Peoples and accounting to serve as a foundation for future research. Figure 1 below is a Venn diagram of associations among the themes of this review. Bujaki et al.[9] Figure 1 presents the most common overlaps among the themes.

FIGURE 1



4. https://antar.org.au/campaigns/un-declaration-rights-indigenous-peoples
5. Alawattage et al., 2021
6. Bujaki et al., 2022
7. Norris et al., 2022
8. Bujaki et al., 2022
9. Ibid., Appendix I provides the complete list of the 72 accounting research articles from their SLR search.

Exploring the nine themes is beyond the scope of this article; therefore, one was chosen — **accountability and control**. We use these two recent reviews as evidence to focus on the aims of our paper, which is an understanding of accounting and control within First Nations peoples' thinking and differences with Anglo-Saxon thinking. Therefore, our paper aims to explore the intersection between First Nations peoples' thinking and how governance, accounting and accountability systems must consider First Nations peoples and culture in terms of Land and Society.

Alawattage et al.[10] argue that "central to the concept of sustainable development is the theme of future generations, where resources would be used to meet eternally sustainable population needs without overly exploiting them.[11] The concept of future generations is also critical to the Indigenous teachings of the Seven Generations, where decision-makers are encouraged to think about the effect of their choices on society seven generations into the future".

However, contemporary accounting and accountability systems are not relevant to First Nations peoples. For example, Chew and Greer[12] demonstrate that a clash of cultural values in accounting and accountability contributes to the marginalisation and disempowerment of Australian Indigenous peoples. Their study highlights the conflict between First Nations values and the Western capitalist values implicit in the language of governance, accounting and accountability. Also, Chew and Greer[13] have questioned the impacts of Anglo-Saxon accounting and accountability systems on the Indigenous peoples of Australia, whose norms, beliefs and values are ontologically, epistemologically and axiologically different.

In another example, Boyce and McDonald-Kerr's[14] recent case study of Victorian public policy documents related to social, cultural and environmental considerations in PPP contracts asked how the treatment of social and environmental issues impacts Indigenous cultural heritage values. They found that non-financial issues are framed through a financial lens that distorts outcomes and marginalises specific stakeholders. Also, the analysis in this paper highlights how public policy reproduces the logic of calculation in the non-financial domain. Processes of quantification and monetisation tend to preclude public discussion of the underlying non-financial values, having the associated effect of moving social and political decisions to the technical realm. Assigning dollar values may provide a basis to include non-financial values in overarching calculations, but monetary assignment represents an incompatible basis for considering non-financial values. In practice, a fundamental problem of incommensurability is masked by quantitative techniques that start with estimates but end with simplifying inherently complex. As a result, environmental and individual wellbeing for eternity is ignored.

McDonald-Kerr and Boyce's[15] chapter provides an overview of research that considers how accounting discourses and technologies were intertwined from the onset with colonial practices and their impacts on Indigenous peoples. The chapter positioned accounting within the process of colonialism in the form of Indigenous–government relations, highlighting its historical and contemporary significance.

In line with the above-stated aims, this paper is structured as follows. Section two offers an overview of the Uluru statement to provide

10. Alawattage et al., 2021
11. Klarin, 2018
12. Chew and Greer, 1997
13. Ibid.
14. Boyce and McDonald-Kerr, 2021
15. McDonald-Kerr and Boyce, 2020

the contemporary intercultural context to our discussion. Section three gives an overview of Indigenous governance scholarship. Section four focuses on First Nations accounting practices in relation to heritage, culture and community assets and liabilities to the environment. Section five expands on the culture and accountability practices of First Nations peoples. Section six brings the paper to a close by advocating for greater inclusion of First Nations peoples' values and viewpoints when framing governance, accounting and accountability and identifying potential research projects for the future.

THE ULURU STATEMENT

The Uluru Statement (USH)[16] calls for structural reform, including changes to the Australian Constitution. Structural reform means establishing a new relationship between First Nations and the Australian nation based on justice and self-determination, where Indigenous cultures and peoples can flourish. The USH states the following:

> **"Our Aboriginal and Torres Strait Islander tribes were the first sovereign Nations of the Australian continent and its adjacent islands and possessed it under our own laws and customs. This our ancestors did, according to the reckoning of our culture, from the creation, according to the common law from 'time immemorial', and according to science more than 60,000 years ago". Furthermore, "[t]his sovereignty is a spiritual notion: the ancestral tie between the land, or 'mother nature', and the Aboriginal and Torres Strait Islander peoples who were born therefrom, remain attached thereto, and must one day return thither to be united with our ancestors. This link is the basis of the ownership of the soil, or better, of sovereignty. It has never been ceded or extinguished and co-exists with the sovereignty of the Crown."**

The statement asserts that Aboriginal and Torres Strait Islander tribes seek **"constitutional reforms to empower our people and take a rightful place in our own Country. When we have power over our destiny, our children will flourish. They will walk in two worlds and their culture will be a gift to their Country"**.

The effects of centuries of marginalisation, dispossession and oppression of First Nations peoples are also recognised in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).[17] The Declaration formally acknowledges '**that indigenous peoples have suffered from historic injustices as a result of, among other things, their colonisation and dispossession of their lands, territories and resources, thus preventing them from exercising, in particular, their right to development in accordance with their own needs and interests**'.

Worldwide, 24% of the Land is regarded as First Nations territories, whereas, in Australia, Aboriginal prescribed bodies hold 33% of the Australian landmass under the native title.[18] In Australia, an estimated 17,900 First Nations-owned and managed business entities contribute AUS$6.6 billion annually to the Australian economy.[19] The establishment of First Nations entities has accompanied a cultural renaissance, a celebration of traditional knowledge, language and customs,[20] demanding respect for the unbroken connection to Land and sea that First Nations culture maintains.

16. Uluru Statement from the Heart, 2017
17. UNDRIP, 2008
18. Altman and Biddle, 2015
19. PwC, 2018
20. Norris et al., 2022; Guevara et al., 2020

FIRST NATIONS GOVERNANCE

Turnbull and Poelina[21] argue that ancient self-governing practices of Indigenous Australians reveal how modern society can achieve sustainable wellbeing for the environment and humanity. They explore Ostrom's[22] work, which describes how pre-modern societies developed polycentric self-governance to avoid overexploitation of common life-sustaining resources. The ideas of polycentric decision making originated by Ostrom[23] has allowed social scientist theorists to understand Indigenous practices and wisdom. Ostrom identified design principles for self-governing 'Common Pool Resources' without the intervention of markets or states.

Moreover, Turnbull and Guthrie[24] developed a vocabulary (such as 'holon', 'holarchy', and 'tensegrity'), which, described by these systems science words, is used to identify an alternative to hierarchies for designing organisations' governance. Against Turnbull and Poelina's[25] highlight of Indigenous Australian practices, the current dominance of Anglo-centric authority systems is counter-productive to environmental or human wellbeing.

Greer and Patel[26] provide evidence of cultural differences between Indigenous Australian values and the Western capitalist values implicit in the language of governance, accounting and accountability. Utilising Hine's[27] alternative 'yin-yang framework' developed for accounting, they find that the core Indigenous yin values of sharing, relatedness and kinship obligations inherent in Indigenous conceptions of work and Land are incompatible with the yang values of quantification, objectivity, efficiency, productivity, reason and logic imposed by Anglo-Saxon thinking and accounting and accountability systems.

In this *BESS*®, Turnbull and Poelina[28] explore yin and yang via systems science thinking, summarised in Table 1 (see page 42).

Further, Turnbull and Poelina[29] explain that Aboriginal knowledge looks at sustainable self-governance for all living things. Life cannot exist without knowing how to survive, thrive and reproduce in complex and dynamic environments. These complexities involve new ways of understanding, feeling, hearing, and participating with reality for most settlers. The English language speaks about nature and environments as if these concepts are separate from people, and the dichotomy between 'nature' and 'culture' is deeply rooted within the Western ontology.[30] Conversely, Australian Indigenous languages describe complex relationships between individuals and place, resulting in the knowledge that is, at the same time, place-connected, physical, cultural and intuitive. These relationships are contained in the widespread Indigenous concept of 'Country', a concept that transcends political connotations alone and extends to incorporate metaphysical and ethical meanings at once. Deborah Bird Rose[31] describes the Country as the organising matrix of identity, knowledge and action.

Words such as "ownership", "value", "price", "cost", "markets" or "hierarchy" carry an inherent hierarchy of meanings that perpetuate a fragmented

21. Turnbull and Poelina, 2022
22. Ostrom, 1990, 2009 and 2012
23. Ostrom, 1990
24. Turnbull and Guthrie, 2019
25. Turnbull and Poelina, 2022
26. Greer and Patel, 2020
27. Hine, 1992
28. Turnbull, 2022b
29. Turnbull and Poelina, 2022
30. Descola, 2013
31. Rose, 1992

TABLE 1: DEFINING DUAL BEHAVIOUR VIA YIN AND YANG (TURNBULL AND POELINA, 2022)

DEFINING DUAL BEHAVIORS OF HUMANS/BIOTA/HOLONS (HOLARCHY) & THE UNIVERSE TENSEGRITY GOVERNS THE EXISTENCE AND BEHAVIOR OF DOMAINS		
DOMAIN	**TENSEGRITY DRIVES BEHAVIORS & EVOLUTION**	
Chinese philosophy	Yin~	Yang
Humans	Approach ~	Avoidance
	Cooperative ~	Competitive
	Trusting ~	Suspicious
	Selfless ~	Selfish
	Other behaviors	Other behaviors
Ecologically governed organisations (Holons & Holarchies)	De-centralised ~	Centralised
	Autonomous ~	Integrated
	Bottom-up ~	Top-down
	Ordered ~	Chaos
	Other characteristics	Other characteristics
Light	Radiation/energy~	Photons/matter
Electrons	Particle~	Quantum field
Quarks	Up~	Down
Gravity	Space~	Time
Qubit worm holes	Quantum vacuuum~	Anti matter/energy
Universe	Time~	Gravity
Indigenous Australians	Dreaming song lines~	Language & its stories
	Country~	Totems
	Skin name~	Moiety

and exploitative approach to the non-human world (as well as to a host of human relationships). Conversely, less vertical and more horizontal governance is essential to Indigenous Australians' governance systems.[32] The varied and place-specific practices of sustainable self-governance of First Nations peoples offer a different approach to the more narrow and universalised forms of Anglo-Saxon governance. Since polycentric governance also appears to reflect patterns of organisation generally found in the natural system, we describe it as ecological. While this suggests that it could be effectively applied to protecting the environment,[33] it also posits the idea of any governance structure as a veritable ecosystem, marked by complexity and, at times, conflicting relationships, essential for introducing tensegrity.[34]

32. Berndt and Berndt, 1952
33. Cullinan, 2002
34. Turnbull, 2021

In this sense, Country epitomises Indigenous systems-thinking, whereby cultural practices, ethical expectations and environmental concerns are inherently and inextricably intertwined. By embracing the complex systems-thinking possibilities inspired by Indigenous worldviews, Turnbull[35] argues that solutions to society's grand challenges and wicked problems should be more effectively developed. These problems include overpopulation, loss of biodiversity and the pollution of oceans, atmosphere and soils. Wicked problems are complex and ill-structured.[36] A growing literature suggests that transdisciplinary (TD) research teams best address wicked problems by adopting a joint problem framework.[37]

This section considered Indigenous practices radically different from Anglo-Saxon practices as an inspiration for a new governance model. In so doing, however, we are reminded of the fact that power relationships inform the current exchanges between Indigenous knowledge holders and the colonial settler state. As a result, the acknowledgment of the leadership provided by Indigenous voices should be tempered by the recognition of the power imbalances within settler states, whereby hegemonic and exclusionary sovereign claims are still capable of defining the parameters of interactions between First Nations peoples and the settler hegemonic state.[38]

FIRST NATIONS ACCOUNTABILITY AND ACCOUNTING PRACTICES. THE LAND.

Lim[39] argues that Indigenous knowledge, self-regulation and self-governance involve cultural landscapes, biodiversity, transdisciplinary sciences, wisdom and high culture. Therefore, no one defines value or more specified goods or services in such a milieu. On the other hand, prices represent a social construct not ultimately defined by anything in the natural world. As a result, prices and value in settler market economies are ultimately disconnected from the wellbeing of individuals, humanity and the environment.

One of the core components of Australian Indigenous peoples' worldview is the kinship system that shapes and orders behaviour. Kinship rules prescribe what must be done and what must not be done concerning (among others) marriage, food gathering, sharing food and other goods, trading among communities and educational roles.[40] This system imposes obligations on community members regarding gift-giving.[41]

The concept of Land (which is inextricably connected to the kinship system just mentioned) illustrates the conflict between accounting and accountability systems deeply removed from any kinship relation and highly relational values. This section illustrates that Indigenous *yin-like value*s related to Land are profoundly different from the Western *yang-like value*s of property that conceptualise Land as a traded commodity.

First Nations peoples' idea of custodianship of Land arises because the Land owns them as "ownees".[42] This implies that Land cannot be offered, nor can it be taken, sold, lost or abandoned. Instead, Indigenous peoples are symbolically eternally responsible for the maintenance and ongoing creation of their Country and its cycles.[43] As Poelina notes, the Ancestors walked through the Land and sang the Land into existence, and their

35. Turnbull, 2022
36. Guthrie and Dumay, 2021
37. Pearce and Ejderyan, 2020
38. O'Donnell et al., 2020
39. Lim, 2016
40. Berndt and Berndt, 1988
41. Poelina, 2021
42. Turnbull and Poelina, 2022
43. Berndt and Berndt, 1988

TABLE 2: CHARACTERISTICS OF ASSETS AND VALUE IN ANGLO-SAXON ACCOUNTING VERSUS FIRST NATIONS PEOPLE'S CULTURES

CHARACTERISTICS OF ASSET VALUE IN ACCOUNTING	CHARACTERISTICS OF ASSET AND VALUE IN FIRST NATIONS CULTURES
Exchangeable	Circulated not exchanged
Alienable	Cannot transfer responsibility to care for Land and assets
Fungible	Inseparable from spiritual significance, not substitutable
The exclusive right of use	* Owneeship accepting inclusivity

Source: Norris et al., 2022. Table 1, p.8 and *Turnbull 1986

chanted stories gave the Land its form.[44] To this day, through the process of walking and singing ancestral songs, Indigenous peoples are part of the continuing process of creating the Land. In this sense, the songs and the songlines they form represent the musical embodiment of reality.[45]

This Indigenous concept of the Land does not align with the Anglo-Saxon concept whereby the Land is an asset, something to be owned, sold and transferred between people. This misalignment in worldviews between First Nations and Anglo-Saxon peoples' cultures is a source of tension for First Nations entities to measure their financial assets. For instance, current approaches to disclosure under international accounting standards are incompatible with the relationship attributed by First Nations values and customs to certain assets under their custodianship.

Several studies contrast the characteristics of assets based on Anglo-Saxon versus First Nations perspectives.[46] The most notable differences are in the accounting treatment of heritage, cultural and community assets (HCAs).[47] The protection of cultural heritage, including sacred places, artefacts, knowledge, stories and language, is central to the identity and purpose of First Nations peoples' cultures. Table 2 summarises the contrasting concepts of of assets and value between the Anglo-Saxon principles of accounting and First Nations cultures.

Understanding and measuring HCAs relate to more profound cultural interpretations of what constitutes an asset and what gives it its value. The spiritual nature of HCAs and the characteristic of perpetual communal ownership do not translate to Anglo-Saxon economic value in accounting terms. Hence, a concern over accounting for HCAs is not limited to considering the value of assets. Rather, it is more about the fundamental differences in the concept of what these assets are, how their value is perceived and how they should be measured.[48]

44. Poelina, 2021
45. Turnbull and Poelina, 2022
46. E.g., Gallhofer et al. 2000; Gallhofer and Chew 2000; Greer and Patel 2000
47. Norris et al., 2022
48. Norris et al., 2022

First Nations cultures and accountability

Nature's value is undoubtedly multidimensional, requiring monetary and non-monetary measures.[49] Nicholson et al.[50] consider the impact of neoliberal economics on society and the environment and conclude that the Western market system has 'overwhelmed society, alienated cultural institutions, damaged environmental relationships, placed the pursuit of individual wellbeing over that of collective wellbeing and has led to spiritual and creative debasement'. Indeed, the impact of unchecked consumerism on society and the environment requires urgent attention.[51] By contrast, First Nations cultures often encompass intergenerational time horizons, perpetual communal ownership of assets where there is a sacred connection between humankind and the Earth.[52]

First Nations perspectives should be instructive for the global sustainability agenda and for re-thinking the balance between profit, people and the planet.[53] Alawattage et al.[54] stated that central to sustainable development is the theme of future generations, where resources would be used to meet eternally sustainable population needs without overly exploiting them. The concept of future generations is also critical to the Indigenous teachings of the Seven Generations,[55] where decision-makers are encouraged to think about the effect of their choices on society at least seven generations into the future.

Past studies reveal a marked difference between the needs of First Nations communities and decision-makers in terms of accountability compared to the requirements of other stakeholders (such as government funders and regulators). Externally imposed requirements have skewed accountability away from the customs of First Nations societies, creating tensions between these organisations and their stakeholders.[56] As concluded by National Audit Office inquiries in Canada and Australia, these (somewhat burdensome) Anglo-Saxon accountability requirements for First Nations entities can put program delivery at risk.[57] They have limited the ability to envision alternative modes of accountability beyond the project's logical and rational elements and include affect, experience and emotions.[58]

A recent study by Kaur and Qian[59] of annual report disclosures by Australian mining companies on their engagement with First Nations peoples indicates that such measures were not defined in appropriate cultural terms and lacked meaning for First Nations groups. Barrett et al.[60] advocate for the inclusion of First Nations values in accountability when framing corporate sustainability objectives. Engaging cross-cultural and inter-disciplinary perspectives in constructing sustainability indicators will give these global initiatives a greater chance of success. One direction that Alawattage et al.[61] recommend is to embed sustainability and the SDG agenda into national and corporate governance systems, accounting, accountability and transparency. With accounting recognised as a mechanism capable of social change, community accountability needs to grow to make the world a more equitable, safe and inclusive space.[62]

49. Turner et al., 2019
50. Nicholson et al., 2019, pp. 32–33
51. Guthrie and Dumay, 2021; Gleeson-White, 2020
52. Gallhofer et al., 2000; Barrett et al., 2020; Turnbull 1980, 163/4
53. Turnbull and Poelina, 2022; Gallhofer et al., 2000; Barrett et al., 2020
54. Alawattage et al., 2021
55. https://www.ictinc.ca/blog/seventh-generation-principle
56. Rossingh, 2012
57. ANAO, 2012
58. Alawattage et al., 2021
59. Kaur and Qian, 2021
60. Barrett et al., 2020
61. Alawattage et al., 2021
62. Alawattage et al., 2021

Conclusions

Conventional Western discourse should no longer ignore or dismiss Indigenous peoples' political, social and cultural views. Our attempt to highlight differences between cultural values in the context of governance, accounting and accountability systems may help safeguard First Nations peoples' cultural and socio-economic priorities.

Like Bujaki et al.,[63] we encourage researchers to focus on developing actionable solutions to contemporary issues in conjunction with Indigenous Peoples that beneficially impact Indigenous communities. We acknowledge that actionable solutions are challenging to develop, and they cannot be developed without Indigenous Peoples' active involvement. More importantly, we need to recognise that Indigenous accounting and accountability goes beyond double-entry accounting system outcomes as Indigenous outcomes are based on the Land, and society cannot be measured in monetary terms. Here, non-Indigenous accounting researchers need to take Bujaki et al.'s[64] advice and consider conducting research that respects the "centrality of relationship" rather than economic outcomes.

Bujaki et al.[65] state that "Rigney (1999) goes further and presents an understanding of Indigenist research as being part of a struggle for Indigenous self-determination (both individually and collectively), undertaken by Indigenous individuals (what Rigney calls "political integrity in research"), and privileging Indigenous ways of knowing and Indigenous voices as co-producers of knowledge. Wilson (2008, p. 77) offers a set of six questions to guide Indigenous research, which reflects the centrality of relationships:

1. How do my methods help to build respectful relationships between the topic I am studying and myself as a researcher (on multiple levels)?
2. How do my methods help to build respectful relationships between myself and other research participants?
3. How can I relate respectfully to the other participants involved in this research so that together we can form a stronger relationship with the idea that we will share?
4. What is my role as a researcher in this relationship, and what are my responsibilities?
5. Am I being responsible in fulfilling my role and obligations to the other participants, to the topic, and all my relations?
6. What am I contributing or giving back to the relationship? Is the sharing, growth, and learning that is taking place reciprocal?"

McDonald-Kerr and Boyce[66] conclude that there is much to learn about our Country's history. Through their further study, we are likely to find some energising and exciting ways to challenge our sedimented styles of thinking about and doing 'accounting'.

63. Bujaki et al., 2022
64. Bujaki et al., 2022, 5
65. Ibid.
66. McDonald-Kerr and Boyce, 2020

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ARTICLE

THE ANATOMY OF BAD DECISION MAKING AND THE ROLE OF NEUROSCIENCE AND THE SECOND TRACK IN IMPROVING DECISION MAKING

Peter Fritz AO and Nicholas Mallory

Any poor decision can be blamed on insufficient information, but the paralysis provoked by too much data can be as damaging as snap decisions based on too little. Human judgement must find the right balance between analysis and action, prudence and reform. Entrepreneur Peter Fritz AO and writer Nicholas Mallory discuss the individual and organisational factors behind bad decision making and how it can be improved in business and government today.

INTRODUCTION

"To err is human", wrote Alexander Pope[1] in urging people to forgive the missteps of others. We all make hundreds of decisions every day, and even the simplest and most mundane errors can have severe consequences – from crossing the street without looking to cutting up food without care. More seriously, the blunders made by senior decision-makers in politics or commerce can have calamitous effects on other people and the common good. It has never been more critical to understand the drivers behind bad decisions, investigate the brain processes that may empower them, and develop methods to improve decision making.

While blinkered personal or political motivations can trump common sense or social conscience, a lack of care or research in making decisions can backfire and changing circumstances can make fools of us all. History is littered with examples of people who made the wrong moves for the best of reasons.

1. Pope, 1711

Organisational decision-makers, for example, tend to be risk-averse, given the responsibilities of their position. The Decca record label famously plumped for the popular, London-based Tremeloes over an obscure beat combo from far-off Liverpool,[2] while Excite CEO George Bell passed on buying Google for just $750,000 in 1999,[3] Blockbuster spurned Netflix for a bargain $50 million in 2000.[4]

Other decisions appear trivial at the time but may have calamitous unforeseen consequences. Thomas Austin released thirteen rabbits on his estate in Victoria in 1859 to shoot for sport – seeding a devastating plague that topped six hundred million by 1940.[5]

Some people make a series of errors and are dogged with misfortune. American scientist Thomas Midgley Jr[6] blundered more than most, pushing the adulteration of petrol with brain-damaging lead, encouraging the use of ozone-destroying chlorofluorocarbons in fridges and industry eventually strangling himself in a pully he had devised to help him sit up in bed after contracting polio.

A willingness to forgive well-intentioned people who make mistakes should not reduce efforts to understand and improve organisational decision making. While innumerable circumstantial factors can be found in any misstep, a series of common themes also emerge,[7] while insights from the fast-developing sphere of neuroscience, and the success of the Second Track's approach,[8] offer hope that better decision-making processes can be adopted in the future.

FACTORS BEHIND BAD DECISIONS

While power-hungry tyrants,[9] profit-hungry companies[10] and narcissistic sociopaths[11] will always ignore their disastrous impact on others, even well-intentioned, well-informed people make poor decisions sometimes. Anyone can stumble when pressed for time, become overwhelmed by complexity or be wrong-footed by events. However, despite our natural inclination to find and blame others or the stars, all too often the fault is our own. This is cause for optimism, as it means we have the power to recognise, address and rectify these faults, rather than remain pawns of a capricious universe.

Decision making is always a matter of judgement, and bad decisions may result from a surfeit as well as a deficiency of any factor. Any poor decision can be blamed on insufficient information, for example, but the paralysis provoked by too much data can be as damaging as snap decisions based on too little. In all the factors sketched below, human judgement is required to find the right balance between analysis and action, or prudence and reform.

Many decision makers often **fall back on past practice** rather than assume a true leadership role and consider original approaches as circumstances change. Senior decision makers who rose to prominence through a particular method will usually repeat it, regardless of its utility in a new role or challenge,[12] while well-established companies tend assume future results will extrapolate from the past, leaving them vulnerable to rapid disruption.[13]

2. Mosley, 2019
3. Weintraub, 2010
4. Zetlin, 2019
5. Zurski, 2017
6. Larsen, 2021
7. Farnam Street, n.d.
8. Fritz, 2019, 2020, 2021a, 2021b; Fritz-Kalish, 2019; Massingham, 2020; Massingham, Fritz-Kalish and MacAuley, 2020
9. Panné, 1999
10. Atiyeh, 2019
11. Serwer, 2021
12. Scragg, 2021
13. Goh, 2021

As business professor Sydney Finkelstein, author of *Think Again: Why Good Leaders Make Bad Decisions and How to Keep it From Happening to You*, observes, "Leaders tend to rely on experience that seems useful but is actually sometimes dangerous. We always talk about how important experience is. I think we overstate experience, because it doesn't exactly fit the situation, you're in. You're liable to rely on it in a way that's just not going to be that helpful".[14]

Conversely, companies which adopt a 'not invented here' mindset – or new hires eager to make their mark – may abandon tried and trusted methods to implement disastrous new methods merely for the sake of it.[15]

The COVID-19 crisis shows the danger of **failing to prepare for future contingencies**.[16] While the likelihood of a global pandemic in any particular year is small, history shows the certainty of plagues appearing and sweeping the world with devastating effects.[17] While the creation of standard vaccine frameworks after SARS allowed the rapid deployment of effective COVID jabs, the initial lack of medical stockpiles and effective quarantine contingencies exposed governments around the world to justifiable criticism.

No administration wants to invest in capacity which may lay unused – or only benefit its successors – but a modicum of proper preparation could have saved countless lives as well as reduced the massive economic and social toll of 18 months of shutdowns and isolation. Similarly, managers rewarded for adopting just-in-time stocking and cutting staff to the bone faced sudden and devastating shortages when supply chains were affected.

Most decision makers are optimists by nature, as this energy drives their interest in public involvement and personal advance. Some executives and politicians also progress by placing the best gloss on events, rather than admitting, examining and correcting their mistakes. Unfortunately, neglecting the possibility of negative events and **rejecting worst case scenarios** leaves them unprepared for when they occur. Individuals, groups and nations fall into the trap of thinking they are somehow special or immune from the forces which affected their predecessors or peers. Each pandemic, conflict, or market crash[18] then takes the world by surprise and underlines the need for an appreciation of history as well as economics at the highest levels.

Prolonged **prevarication** can be as damaging as a swift but misguided choice,[19] but critics of inaction fail to appreciate its attractions for decision makers. While the media and political activists often paint issues as black or white, leaders are besieged by a cacophony of competing interests. Everyone tends to put off complex decisions, particularly when wicked problems offer no good answers, and a promotion away from the problem may rely on remaining a 'safe pair of hands', rather than embarking on radical reform. Governments often use public inquiries to postpone as much as to inform difficult choices, buying time in the hope the problem will fade from popular concern.

A less forgivable flaw is a **lack of strategic alignment** between tactics and strategy. Expedient steps to appease a passing public concern can undermine progress to achieve a greater goal, if tactics are not linked to an overall strategy.

14. White, 2009
15. Watts, 2020
16. Gluckman and Tyler, 2020
17. Jarus, 2021
18. Givens, 2021
19. Although "he who hesitates is lost" is the usual phrase, it was Joseph Addison, in his 1712 play Cato, who first noted "the woman that deliberates is lost".

Organisational inertia and **complex chains of command** can also impair decision making. Leaders of rigid hierarchies tend to be shielded from unpalatable information lest the messenger be blamed, while lower down the ladder, the experience and ideas of skilled frontline operators is ignored, and initiative is punished rather than encouraged. The best leaders hire people more intelligent than themselves, rather than mediocrities they can dominate, secure in the knowledge that better organisational performance will benefit rather than threaten their position.

Governments and companies tend to be run by generalists, rather than technocrats, for very sound reasons,[20] but their **lack of technical depth** can be exposed in fast-moving situations where complex technologies and concepts are involved. If decision makers are forced to rely on others' knowledge and expertise without any perspective of their own, they will struggle to judge and integrate that information to make effective choices.

This underlines the importance of leaders consulting widely, rather than relying on a handful of trusted yes-men.[21] Conversely, people may be promoted into decision-making positions because of exceptional technical skills, but lack the leadership, communication and analytical qualities required of their new position.[22] An inability to create and lead teams, inspire peers and motivate subordinates can quickly undermine trust in whatever decisions are made, even if they are the right ones.

A **failure to communicate** the rationale behind decisions, or evasiveness around their costs, uncertainties and calculations behind it, can hamper any decision maker. The best leaders not only make good decisions, but have the communication skills to rally their colleagues, companies or countries behind them.[23] Unfortunately, highly educated decision makers have a history of scorning popular communication channels, from tabloids and TV in the past to social media today, because they themselves do not use them.[24]

Many other factors could be alluded to, from a focus on corporate politics rather than commercial success to a surfeit – or deficiency – of personal self-confidence. Decision makers often pay more attention to some facts rather than others, cleaving to their personal beliefs or prejudices rather than the evidence in front of them. Similarly, humans are subject to confirmation bias – selecting evidence which supports our prior beliefs while ignoring data which undermines them.[25]

People will choose the better option out of two, for example, rather than seek alternatives to either. They will also tend to use tools or techniques in traditional ways – or believe they must invent new tools entirely – rather than employ existing resources in new ways to create value. This 'functional fixedness' is a common flaw, so much so that tests of suggesting alternative uses for common objects have been used to evaluate intelligence itself.[26]

While the ability to analyse data to find patterns is the foundation of science, it can also lead us astray. The gambler's fallacy,[27] for example, sees out brains invent links between independent variables, hindsight bias[28] makes people think malleable events were inevitable, 'the IKEA effect'[29] means we

20. Runciman, 2018
21. Allen, 2018
22. Wagner, 2018
23. Owasi, 2020
24. Fujiwara, Müller and Schwarz, 2020
25. Nickerson, 1998
26. Lambert, 2013
27. Victorian Responsible Gambling Foundation, n.d.
28. Psychology Tools, n.d.
29. The Decision Lab, n.d.

over-value things we helped create ourselves, and loss aversion[30] makes us value current possessions over greater future gains.

More fundamental forces are also at play. Humans evolved as members of families and tribes, for example, and we relied on those groups for our very survival. We therefore remain more afraid of being ostracised from a group more than being wrong about any decision.[31] Any number of studies point to people's predilection for following the crowd[32] in the most trivial or extreme circumstances, rather than acting rationally or in our own best interests.

As Julia Coultas of University of Essex notes, "For an individual joining a group, copying the behaviour of the majority would be a sensible, adaptive behaviour. A conformist tendency would facilitate acceptance into the group and would probably lead to survival if it involved the decision, for instance, to choose between a nutritious or poisonous food, based on copying the behaviour of the majority".[33] The bandwagon effect has a strong evolutionary rationale, but without understanding the social psychology of group dynamics, this cognitive bias can lead us astray in modern life.

An influential study by French psychologists Serge Moscovici and Marisa Zavalloni[34] showed how poorly moderated group discussions tend to harden the opinions of participants rather than challenge them, not least because people enjoy the company of others who agree with them. Just as children copy adults to learn how to behave, so adults look for behavioural cues from others. In his bestselling book *Influence: The Psychology of Persuasion*, psychologist Robert Cialdini writes: "Whether the question is what to do with an empty popcorn box in a movie theatre, how fast to drive on a certain stretch of highway, or how to eat the chicken at a dinner party, the actions of those around us will be important in defining the answer".[35]

Aping the actions of others remains an effective logical shortcut – or heuristic – for individuals in navigating the complex world around us. Crossing the road when everyone else does in Japan is quicker and safer than trying to translate a crossing sign. Collectively, such approaches are also logical – as English philosopher and mathematician Alfred North Whitehead observed over a century ago: "Civilisation advances by extending the number of operations we can perform without thinking about them".[36]

Our instinctive desire for 'social proof' can generate unexpected consequences. Signs in Arizona's Petrified Forest National Park which cautioned visitors that the park suffered 14 tons of theft a year, one small piece at a time actually increased the pilfering, as people are prone to behaving as everyone does, rather than follow an abstract rule against it.[37]

Group think[38] is also exploited by advertisers who persuade us to buy their wares merely by making them seem popular, rather than pretending they are good (books are always 'best sellers'). Falling for such ploys means our decision making is being driven by ancient evolutionary pressures, rather than any rational analysis of the merits of the item.

These phenomena are not intrinsically bad. Humans are successful because our intelligence allows us to

30. Behavioral Economics, n.d.
31. Cherry, 2020
32. Hanson, 2019
33. Croutear, 2021
34. Moscovici and Zavalloni, 1969
35. Cialdini, 1984
36. Whitehead, 1911
37. Keim, 2017
38. Groupthink occurs when a group of individuals reaches a consensus without critical reasoning or evaluation of the consequences or alternatives due to their common desire to maintain collective harmony. This process stifles creativity and individuality to avoid conflict.

be social, as much as individual intelligence itself. Human societies of tens of millions – or billions in this globalised age – can accomplish absurd feats,[39] when any single individual dropped in the wilderness would still starve or freeze within a week.[40] This evolutionary reality demands that group dynamics should be tuned to improve outcomes, rather than suppressed or ignored.

THE NEUROSCIENCE OF BAD DECISIONS

Bargain bins overflow with books dissecting the organisational and social factors behind decision making, but increasing attention is being paid to more fundamental factors such as neurological processing in the brain itself. The unconscious calculations we make when allocating value to alternatives and then deciding between them is the foundation of all decision making, good and bad.

Traditional economic theory assumes people consciously and rationally attribute a pseudo numerical value to alternatives and logically rank and act on their preferences. This presumption simplifies the drawing of graphs and diagrams but tends to break down in reality. The recent award of the Nobel Prize for Economics to researchers who analysed human behaviour in real-life situations[41] shows the importance of understanding value allocation and choice making in action.[42]

As Angela Yu,[43] a theoretical neuroscientist at the University of California, San Diego, explains, "Knowing something about how information is represented in the brain and the computational principle of the brain helps you understand why people make decisions how they do".[44]

In one recent experiment, Paul Glimcher, a neuroscientist at New York University, asked people to choose between different chocolate bars,[45] including their pre-stated favourite. When faced with a choice of three, people would always choose the one they said they preferred, as economic theory assumes they will. However, if that choice was extended to twenty different bars, then many participants picked a different candy, even though they retained their original preference in their minds. When faced with a plethora of choices, it seems people often choose options they know to be suboptimal – and decision makers face a plethora of choices all the time.

Glimcher is combining research results from both brain imaging and behavioural studies to generate a neural theory explaining why such decisions are made. These and other approaches are quickly accumulating to create a new field of "**neuroeconomics**".

A recent paper[46] by Glimcher, Kenway Louie and Ryan Webb argues their neural hypothesis works better than standard economic theory to explain the decisions people make when faced with a multiplicity of options. They argue the human brain evolved to take short cuts in decision making to reduce the amount of energy required, as the brain already uses 20% of an individual's energy despite comprising only 2–3% of body mass.

Just as our visual system tunes out expected information to concentrate on unexpected changes – allowing us to spot movement or a rogue speck with ease – Glimcher argues that brain neurons code information as efficiently as possible in a

39. Dunn and Taber, 2021
40. Discovery, n.d.
41. Jaeger, 2021
42. Singer, 2016
43. Yu, n.d.
44. Valdez, 2020
45. Neuroeconomics Lab, n.d.
46. Webb, Glimcher and Louie, 2019

similar way. Building on the concept of divisive normalisation developed in the 1960s,[47] he argues that neurons have evolved to send more efficient messages by encoding relative differences in choices, rather than absolute values.

Glimcher has since analysed the electrical activity in monkeys' brains as they decide between different food options and shown their decision-making neurons fire as his theory predicts – increasing or decreasing their rate of fire as the relative value of a particular food increases or decreases as alternatives are removed or added to the selection.

Just as our eyes are overwhelmed by a low sun, so the abundance of choice in the modern world may overwhelm a biological system which evolved to make simpler decisions – fight or flight or eat or not eat – in the natural world. Glimcher and his collaborators are therefore examining whether these basic brain algorithms can predict human error in more complex scenarios.

Such studies are at an early stage, and much remains to be discovered. Other researchers have identified spikes in neural activity during the allocation of value in areas of the brain beyond the parietal cortex examined by Glimcher, for example. Camillo Padoa-Schioppa, whose laboratory also investigates the cognitive and neuronal mechanisms underlying economic reasoning, notes that damage to the parietal cortex does not impair value-based choices, while impairments to the frontal lobe does. Angela Yu accepts that Glimcher's idea may explain simple choices but argues that innumerable other factors may affect more complex human decision making.

Despite their infancy, such theories may already offer clues for better practical decision making, such as eliminating as many bad choices as possible before choosing the best one. This reduction of options allows the brain to allocate relative value to those that remain more effectively. Glimcher says that "rather than pick what I hope is the best, instead I now always start by eliminating the worst element from a choice set… I find that this really works, and it derives from our study of the math. Sometimes you learn something simple from the most complex stuff, and it really can improve your decision making".[48]

Neuroscientists have also looked at the interaction of groups and the best ways to generate the sense of '**team flow**' of when a group gets 'in the zone' to accomplish a task together.

Psychologist Mihály Csíkszentmihályi offered the concept of 'flow' over 30 years ago and explores the idea in his book (best-selling no doubt), *Flow: The Psychology of Optimal Experience*.[49] He argues that 'flow' – creative and productive engagement in a task – tends to emerge when people are challenged by a task, rather than overwhelmed or bored by it, and can offer it their full attention instead of being distracted.

Flow – akin to the sense of a sportsman feeling 'in form' – is more likely when individuals and groups have clear goals and can track their progress towards them, receive immediate feedback about their ideas, have control over their activities and feel immersed in the process to the extent of losing self-consciousness to become self-confident. Time in such states seems to pass differently, apparently standing still in the moment but seeming fleeting when recalled.

New research[50] published in the journal *eNeuro* offers empirical confirmation that this brain state exists, with participants in 'flow' sessions exhibiting a unique brain state associated with enhanced information integration and inter-brain synchrony quite distinct from that experienced during ordinary teamwork or solo activities.

47. Heeger, 1992
48. Singer, 2016
49. Csíkszentmihályi, 2008
50. Shehata et al., 2020

A group of researchers led by Mohammed Shehata[51] used electroencephalograms to measure the brain activity of teams while they played video games, for instance. He found team-mates reporting 'flow' generated increased beta and gamma brain waves in the middle temporal cortex, a type of brain activity linked to information processing. Teammates also had more synchronised brain activity during the team flow state. Shehata's researchers are now using the neural signature of team flow to monitor team performance and build more effective team structures.

USING THE SECOND TRACK TO IMPROVE DECISION MAKING

Csíkszentmihályi's concept focused on individuals, but rather than expect every team member to achieve that state for themselves, the **Second Track** encourages 'team flow' in line with Shehata's findings. The outstanding results of this approach over the last two decades suggest that freely collaborating groups of individuals with a range of expertise can achieve more than traditional first track groups considering the same problems.[52]

The Second Track facilitates harmonious groups of diverse individuals whose close relations and frank communication generates and implements practical solutions to clearly stated problems. Second Track groups have evolved to emphasise the 'five Cs' outlined by Csíkszentmihályi – **clarity** of purpose, **concentrating** on a mutually interesting issue, **choosing** between options, **committing** to the team and **challenging** themselves to face complex situations. Analysis of the brain waves of people in such groups might offer a fertile new resource for researchers such as Shehata, Glimcher and Yu to analyse.

Other systems to improve decision making which have evolved over time may also have succeeded by tapping into the neurological and group processes sketched above, even if they were not aware of them.

Australia's Office of Best Practice Regulation,[53] an apolitical body nestled within the Department of Prime Minister and Cabinet, has outgrown its original mission of reducing red tape to scrutinise all kinds of proposals before they are put before cabinet. Its seven-stage filter, outlined in Figure 1, weeds out unnecessary, poorly thought out or self-defeating schemes before they are presented. This system reduces the alternatives considered by ministers to a manageable number, in line with Glimcher's approach of weeding out inferior alternatives to the best two or three which our brain's processing abilities have evolved to efficiently manage.

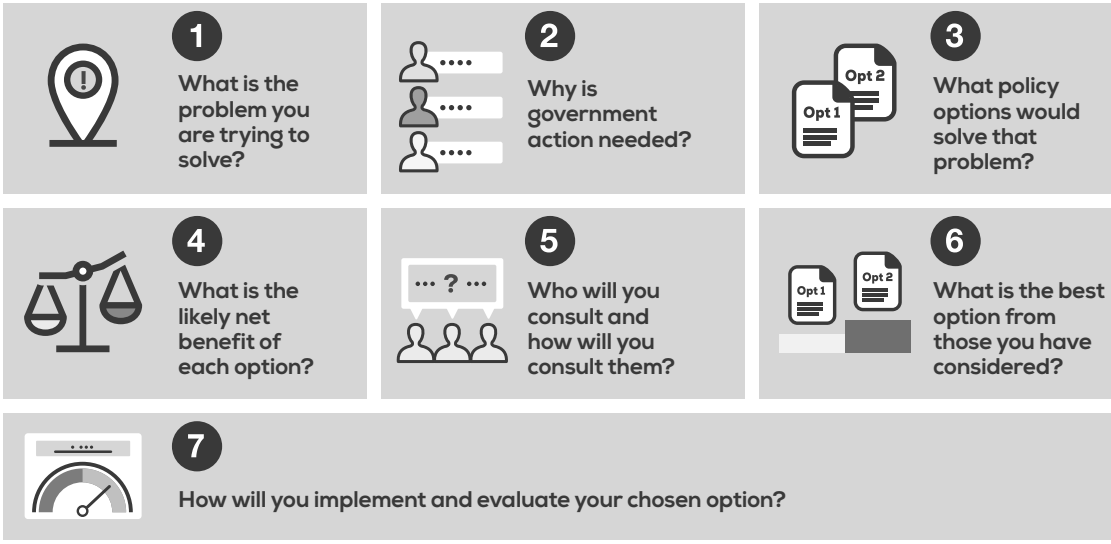
The Second Track process offers a similar approach by inviting participants to focus on a particular topic, generate a range of 'blue sky' solutions, reduce them to the best options and then work together to communicate and implement them.

This approach avoids the pitfalls outlined in the first part of this article, while tapping into the evolutionary and neurological insights outlined in the second to generate the 'team flow' required to produce creative ideas and pursue concrete applications.

The Second Track may be even more effective than more highly resourced government bodies due to its broader range of participants. Poor decisions are often made because key factors are missed from the outset – rather than an illogical choice being made between fully researched alternatives

51. Shehata et al., 2020
52. Global Access Partners, 2022
53. The Office of Best Practice Regulation, 2022

FIGURE 1: THE 7 REGULATION IMPACT STATEMENT QUESTIONS, OBPR 2022



– and the Second Track allows participants to fully understand the situation they face from a wider range of perspectives before they generate and select solutions for it. A series of related issues can be symptoms of a more fundamental but unexamined problem, for example, which only consultations with a full range of stakeholders will bring to light.

Just as importantly, the Second Track offers a safe and constructive environment in which experts can discuss issues of mutual concern free from the responsibilities and risks which their assigned roles within different organisations can create. The elusive state of 'team flow' is encouraged in groups where all members are peers, no speech will be punished, and everyone has an equal say in decision making.

The Second Track allows people to contribute to the discussion without being constrained by an immutable agenda, or the fear of others rejecting them and their ideas. The initial session of a Second Track group often resembles a 'brainstorming' session to push participants beyond everyday modes of thinking to produce more innovative ideas, while subsequent meetings prune these suggestions to a handful of choices, then select one or two to implement.

When the group has generated a broad selection of realistic alternatives, it then evaluates the feasibility, risks and implications of each one, with each member encouraged to offer input on potential pitfalls. This scrutiny echoes that of the government's office in ensuring solutions are not only practical but directly address the stated problem at hand. The production of rigorous minutes helps create a structured approach to this scrutiny, as opposed to the free-flowing initial creation of ideas, allowing members to study the discussion afterwards, and assess threats, costs and ethical implications which can be raised at the next meeting.

Rather than require formal techniques, such as Decision Matrix[54] Analysis or Paired Comparison Analysis,[55] the decisions regarding which ideas to progress emerge organically from group discussions. The personal bonds created in the group, strengthened by their equal status, help to avoid the need for approaches such as the Delphi Technique[56] to reach a fair and impartial decision. Rather than reach decisions through a cycle of anonymous, written discussion and argument in which participants may not even meet, the Second Track emphasises the value of face-to-face communication, just as our ancient ancestors did and Pacific Islanders still do.

Regular interpersonal interactions, both in and around Second Track meetings, also eases the process of evaluating plans before they are actioned. There is no loyalty to traditional approaches or rejection of outside ideas because each Second Track group is a newly created entity. Members are encouraged to offer insights from their own experience to check the proposals of others, as well as suggest their own. Members cannot cherry-pick only the data which suits them, as other participants come from different organisations and fields, and so confirmation bias is much less likely to creep in than with long-standing groups established in existing organisations.

Second Track groups also differ from other think tanks and inquiries by encouraging members to implement as well as extol their ideas – in contrast to other groups which merely generate paper proposals or a range of generic 'apple pie' platitudes to mollify all participants. This also avoids the problems of prevarication, or paralysis by analysis, outlined at the start of this article, and forces participants to choose the best solutions their discussions have produced.

Such groups tend to have around five to seven people in the final decision-making group for each project, an ideal 'family' which balances workloads while offering individuals direct influence which encourages their further involvement.

Once decisions on the best recommendations have been made, the members of Second Track groups are in an ideal position to communicate them to decision makers in government and the corporate world, as well as act themselves. Coming from an independent group, they will not be seen as representing any particular vested interest or political party, encouraging an appraisal of the ideas on their merits.

CONCLUSION

While human brain functions share the same fundamental processes, individuals themselves are incredibly diverse in their interests, expertise and views about the world. Indeed, the diversity and equality of participants in multidisciplinary Second Track groups is perhaps their greatest strength.

Politicians, public officials or interest groups inevitably have a similarity of experience and outlook which limits the breadth of their discussions and therefore constrains the decisions they make. Such monocultures cannot consider every angle or push the boundaries to find more innovative solutions and so always risk being stale.

In contrast, the Second Track embraces diversity of opinion, which in turn encourages initiative, innovation and collaboration. Each taskforce comprises experts from different walks of life, offering a wider range of inspiration and knowledge to draw from.

54. ASQ, n.d.
55. CIToolkit, n.d.
56. Twin, 2021

Far from slowing down the deliberation process, Second Track groups move more quickly than traditional groups, often holding only three to four meetings rather than dozens to achieve their goals. Indeed, independent research shows[57] that teams with diverse approaches make their decisions up to 60% faster than monocultures. Despite participants offering their services without financial remuneration, the collaborative nature of the groups increases retention, as people who feel their contributions are meaningful are far more likely to relish their work.

The Second Track's flat hierarchy and culture of acceptance and creativity minimises many of the individual and organisational factors behind poor decision making, while new insights from neuroscience will inform its evolution to optimise group interaction and improve decision making in government, business and beyond.

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ARTICLE

MACROECONOMICS – DEVELOPMENTS AND MODERN TRENDS

Prof Finn Olesen

The economic history of most countries is a story of economies out of equilibrium. Aalborg University Professor Finn Olesen suggests combining the approach of post-Keynesian economics with the core elements of behavioural economics could challenge the dominance of modern mainstream macroeconomic understanding more thoroughly than ever before.

INTRODUCTION

The birth of modern macroeconomics is normally linked to the publication of John Maynard Keynes's *The General Theory* in February 1936. In the book, Keynes criticised the mainstream understanding of his time both theoretically and methodologically.

For Keynes, the classical theory only addressed macroeconomic outcomes of perfection; given the strength of the market mechanism – operating efficiently through changes in relative price relationships – every single market would provide an optimal equilibrium solution, thus making the goal of macroeconomics to be one of full employment. As per the validity of Say's Law, a given aggregated supply would always create a matching aggregated demand. As such, unemployment could only be voluntary. However, Keynes argued that this result had been thoroughly falsified by empirical evidence – indeed, 'real life' was not characterised by harmony and prosperity for the majority of those living in the 1920s and early 1930s.

For Keynes, the classical theory only addressed a special case – full employment. As he argued in *The General Theory*:

> **I shall argue that the postulates of the classical theory are applicable to a special case only and not to the general case… there would obviously be a natural tendency towards the optimum employment of resources in a society which was functioning after the manner of the classical postulates. It may well be that the classical theory represents the way in which we should like our economy to behave. But to assume that it actually does so is to assume our difficulties away.**[1]

Keynes aimed to provide the more general theory that economics so urgently required. He claimed that he could address problems of optimality and equilibrium (the classical case) and disequilibrium outcomes, whether in recessions or booms. As has been widely established, *The General Theory* paved the way for the Keynesian Revolution in economics that dominated macroeconomics for decades.

Methodologically, Keynes argued that the classical theory accepted a type of determinism not found in real life. As later termed by Paul Davidson,[2] Keynes' view on economics was non-ergodic due to the system being open, socially determined, path-dependent and changeable. As such, Keynes opposed the ergodic methodology of the classical theory – real life is not repetitive. The economic behaviour of households and firms are not hinged only on prices (and changes to these) as the only salient variable. Indeed, when households and firms plan, decide and act, they incorporate a wealth of relevant information further to prices. However, although Keynes succeeded in laying the foundations for a new theoretical economic paradigm, his methodological messages in *The General Theory* became somehow forgotten for many years. Generally speaking, only post-Keynesian scholars have tended to acknowledge the genuine importance of Keynes's new and alternative methodology.

However dominant the Keynesian paradigm became for the decades following the Second World War, some questioned the relevance of its interpretation (known as the Neoclassical Synthesis) with which most macroeconomists agreed. In particular, post-Keynesians argued that this interpretation was too theoretically classical and lacked Keynes's methodological understanding. Others – the proponents of the Neoclassical Synthesis – argued that they had improved the messages of *The General Theory*. According to them, Keynes only concerned himself with economic recessions – i.e., special cases where aggregated demand was below the level of aggregated supply due to (wage) inflexibility – whereas the Neoclassical Synthesis provided a more general macroeconomic framework. Still others, such as adherents to the Chicago school of economics, argued that Keynesianism should be replaced by a more old-classical-like understanding. The market mechanism could be made so strong and effectively present in the economy that economic policy changes were not needed to equilibrate aggregated demand and supply.

Accordingly, while the Keynesian paradigm took centre stage for several decades, one could not argue that there was only ever one school of macroeconomics present in academia. In this respect at least, macroeconomics has historically had certain pluralist characteristics. Furthermore, the history of macroeconomic thought suggests that the content of this perceived mainstream macroeconomic theory has changed continuously ever since the initial publication of *The General Theory* to the present day.

Through this article, I seek to provide a selected presentation of macroeconomic history from 1936 and onwards, as well as to highlight why and how

1. Keynes, 1936, pp. 3 and 33–34
2. Davidson, 2016

the NNS has, in contemporary society, become the dominant method with which to analyse macroeconomic phenomena. Furthermore, the article aims to present two alternatives that may possibly challenges this dominance.

FROM KEYNES TO THE NEOCLASSICAL SYNTHESIS

In 1937, John Hicks published his interpretation of what should be seen as *The General Theory*'s core theoretical core statement. Hicks perceived this as the rejection of the classical dichotomy. Keynes argued that financial and real economic activity crucially interact with one another. Therefore, the demand for money had to be explained by liquidity preference rather than the (for Keynes) outdated classical quantity theory. That is, the demand for money changed from MD(Y) to MD(Y,r). Keynes proposed that this demand was determined by three motives: for transaction, for precaution, and for speculation. In contrast, the original quantity theory of money included only the transaction motive. If needed, monetary policy could increase the level of aggregate demand through lower interest rates stimulating investments decisions, thereby leading the macroeconomic output closer to one of full employment. As such, Hicks[3] fundamentally changed macroeconomics with his IS/LM model which still today is a core model in basic macroeconomic teaching.

Almost a decade later – see, especially, Modigliani[4] – building on the IS/LM model, combined with a labour market with sticky wages, a consensus among macroeconomists changed the interpretation of Keynes. His 1936 theory should not be regarded as general, but rather as one fixated upon a specific economic situation. It portrayed economies hit hard by a recession. However, a prolonged economic recession that lasted for years should not be explained by a lack of effective demand, but instead by wage inflexibility:

> **It is usually considered as one of the most important achievements of the Keynesian theory that it explains the consistency of economic equilibrium with the presence of involuntary unemployment… this result is due entirely to the assumption of 'rigid wages'.**[5]

This interpretation was termed the Neoclassical Synthesis, which came to be the dominant representation of Keynesian theory for decades.[6]

MILTON FRIEDMAN: FREE THE MARKET MECHANISM

Generally speaking, while Keynesianism dominated both the development of macroeconomic theory and the perception of how to conduct economic policy for decades after the Second World War, not all economists adhered to this school of thought. In particular, those part of the Chicago school of economics advocated an alternative. With their classical view on economics, they proposed a more market-based approach. Fundamentally, they argued that the market mechanism is both strong and highly effective if allowed to function freely, thus not requiring the 'stop and go' policies of the Keynesians. The battles between supply and demand are sufficient in themselves; together they can deliver both efficiency and optimality in every market. Such a battle would consequently lead to the macroeconomic outcome of full employment.

For many years, Milton Friedman was one of the most famous Chicago economists. He essentially paved the way for not only a period of Monetarism but, more importantly, also the later emergence of the New Classical theory of macroeconomics.

3. Hicks, 1937
4. Modigliani, 1944
5. Modigliani, 1944, p. 65
6. However dominant the Neoclassical Synthesis may have been, it was not the only interpretation of Keynes. Indeed, suffice it to mention the post-Keynesians (who saw themselves as his only true successors) and the school of disequilibrium economics; see Clower (1965), Barro and Grossmann (1971), Malinvaud (1977, 1980), and Muelbauer and Portes (1978). The post-Keynesian understanding will be presented later in the article.

As such, Friedman should be seen as a forerunner to Robert E. Lucas, and one of the most influential economists of his generation. Indeed, Palley[7] recognised that Friedman:

> **… influenced both the economics profession and the general public, pushing all to adopt more pro-market, pro-business, anti-government view of the world … [as such, he] … in part reflects the political and social forces that made neoliberalism the dominant global doctrine after 1980. It is also testament to Friedman's rhetorical powers. Powerful political forces created the neoliberal wave, but Friedman both rode that wave and contributed to it … [thereby having the effect that] … his triumph has taken economic understanding back in a pre-Keynesian direction.**[8]

For Friedman, monetary policy had one, and only one, task to perform: achieving a low and stable inflation rate. If successful, such an outcome would minimise the sum of economic failures made by firms and household, thereby optimising the economy and ensuring the macroeconomic output to be as close as possible to full employment. One had to allow the allocative strength of the market mechanism to work as freely as possible. He thus proposed that economic policy intervention would generally do more harm than good.[9]

In December 1967, Friedman presented his Presidential Address to the American Economic Association (AEA),[10] which may well be one of the most widely read speeches in AEA history.[11] In his address, Friedman highlighted what he saw as the fundamental tasks of monetary policy. It can give stability to the economy by focusing on achieving low inflation. To achieve this goal, monetary policy should be based on rules rather than, as the Keynesians argued, continuous changes – i.e., the 'stop and go' policy strategy arising from cyclical GDP fluctuations. For Friedman, the Keynesian task was futile as monetary policy 'cannot use its control over nominal quantities to peg a real quantity – the real rate of interest, the rate of unemployment, the level of real national income'.[12]

Conversely, Friedman regarded rightly conducted monetary policy as rather effective, as 'it is a matter of record that periods of relative stability in the rate of monetary growth have also been periods of relative stability in economic activity'.[13]

Focusing on inflation, Friedman (1968) famously established the framework of the expectations augmented Phillips curve.[14] One must remember that firms and households act economically on price expectations, which may change over time. Therefore, households are concerned about the level of their real wage as they do understand the difference between nominal and real variables. If they expect the price level to rise in the future, they will demand a higher nominal wage. Moreover, the wage-setting process on the labour market is determined by the demand and supply of labour, and the level of unemployment:

> **At any moment of time, there is some level of unemployment which has the property that it is consistent with equilibrium in the structure of real wages rates. At that level of unemployment, real wage rates are**

7. Palley, 2014, pp. 28 and 35
8. Ibid.
9. Laidler (2005, p. 16) characterised the essence of Friedman's economic understanding: 'markets were stable and capable of dealing efficiently with allocative challenges. If they failed to meet them, this was not because they were inherently flawed, but because misconceived monetary policies had been visited upon them'.
10. Published as Friedman, 1968
11. Laidler stated that 'Friedman's address turned out to convey not just a message for its own time, but also one that would evolve and reverberate for long enough to make it instructive reading even today' (2018, p. 444).
12. Friedman, 1968, p. 11
13. Ibid., p. 15
14. This framework was first presented by Samuelson and Solow (1960). See also the seminal contributions by Phelps (1967, 1968)

> tending on the average to rise at a 'normal' secular rate… A lower level of unemployment is an indication that there is an excess demand for labor that will produce upward pressure on real wage rates. A higher level of unemployment is an indication that there is an excess supply of labor that will produce downward pressure on real wage rates.[15]

Friedman termed the level of unemployment consistent with labour market equilibrium as the natural level of unemployment.[16] The closer the labour operates around this level of unemployment, the greater the economy's stability. Relatively small changes in nominal wages ensure minimal adjustment in firms' labour costs, thus giving them little incentive to change their price setting procedures. In such a state, the economy tends to operate close to the level of full employment. Accordingly, it is crucial to stabilise how people perceive future price changes. Moreover, stability in price expectations can be ensured by the correct conduct of monetary policy. Therefore, monetary policy must be rule based, and not subject to short-sighted strategies (with long-term focuses preferred). This is the essence of Friedman's view on monetary policy.

As such, Friedman's Presidential Address heralded an upcoming economic revolution. Indeed, his 1967 speech to the AEA was possibly more impactful than he himself realised at the time. As Storm[17] wrote:

> Friedman's address holds an almost mythical status as the harbinger of a building revolution in macroeconomic thinking: the supply-side revolution centred on the rejection of a Phillips-curve inflation-unemployment trade-off in the long run that swept the profession at the end of the 1970s.[18]

ROBERT E. LUCAS: THE FOUNDING FATHER OF THE RBC

In 1976, Robert E. Lucas presented his famous 'Lucas critique', which seriously questioned the status of much contemporary macroeconomic thought. He criticised how Keynesians built macroeconometric models and that their policy analyses tended to conflict with general equilibrium theory. He argued that future questions concerning economic policy ought to focus on alternative policy rules 'which allowed individual agents to formulate forward-looking dynamic optimization problems'[19] within a general equilibrium framework.

As such, Lucas[20] became tremendously influential in terms of how to build macroeconometric models and evaluate economic policies. To many, this seminal paper was the first of several contributions which finally led to the real business-cycle (RBC) theory in modern macroeconomics. RBCs became synonymous with New Classical thinking, and remain a core element of modern mainstream macroeconomics to this day – commonly referred to as NNS.[21]

Furthermore, with his rational expectations revolution, Lucas laid the foundation for mainstream macroeconomic methodology. Most economists argue that, after Lucas, macroeconomics can only be conducted within an equilibrium framework with intertemporal optimising households and

15. Friedman, 1968, p. 8
16. Contrary to many interpretations of Friedman (1968), this level of unemployment is not uniquely given, as he himself indicated. Rather, it is determined by many factors: 'the actual structural characteristics of the labor and commodity markets, including market imperfection, stochastic variability in demands and suppliers, the cost of gathering information about job vacancies and labor availabilities, the costs of mobility, and so on' (Friedman, 1968).
17. Storm, 2018
18. Ibid., p. 517
19. Rudebusch, 2005, p. 246
20. Lucas, 1976
21. An importance that Lucas himself seems to acknowledge: 'This "Lucas critique" … is probably the most influential paper I have written' (2001, p. 291).

firms using rational expectations. As such, not only should macroeconomics rest upon explicit microeconomic axioms; macroeconomic theory must also be formulated exclusively through mathematical modelling. Indeed, as Lucas himself stated:

> **I came to the position that mathematical analysis is not one of many ways of doing economic theory: It is the only way. Economic theory is mathematical analysis. Everything else is just pictures and talk… It is a method to help us get to new levels of understanding of the ways things work.**[22]

Moreover, Lucas narrowed the focus of macroeconomic analysis to supple side effects only. He considered demand side effects – i.e., shocks of an exogenous nature – to be generally unable to affect the macroeconomic outcome.

Stated differently, macroeconomics must be applied based on an intertemporal general equilibrium understanding with optimising agents using rational expectations. Households and firms therefore use their intellectual capacity to understand how the economy works in order to most efficiently exploit all of the relevant information available. That is, they act with the same knowledge about the economy as that of the modelmaker, leading their expectations to be model-consistent. With this kind of behaviour, macroeconomics is essentially transformed into microeconomics as both types of behaviour become highly similar – the representative agent pursuing optimality and the policymaker seeking to minimise a social-loss function.

Lucas argued that one must have 'a disciplined way of establishing the connection between particular policy actions and their consequences for resource allocation and individual welfare'.[23] That is, one must use a welfare criterion when having to decide between different policy proposals. In principle, '… an efficient monetary/fiscal authority will choose a history-contingent sequence of income tax rates and money growth rates (inflation tax rates) so as to maximize the expected discounted utility of the typical consumer'.[24]

Following such a policy strategy, 'we obtain a method for evaluating policies that has comprehensible units and is built up from individual preferences'.[25] With this kind of strategy, together with the acceptance of the representative agent, the macroeconomic analysis transforms into a microeconomic analysis.

Furthermore, if economic fluctuations – the business cycles – are to be explained by the equilibrium-like reactions of agents to unanticipated changes in relevant variables, that must, in general, 'imply severe limitations on the ability of government policy to offset these initiating changes'.[26] This is to say that the need to formulate economic policy for stabilising the macroeconomic outcome over time is hardly ever present from a Lucasian perspective. The economic fluctuations we see over time should be considered as endogenous equilibrium-like adjustments made by the representative agent. As such, to achieve optimal outcomes, the task of fiscal policy is restricted to minimising intertemporal distortions. Likewise, as with monetary policy, it should be based on credible and transparent rules focusing on achieving a low and stable rate of inflation.

22. Lucas (2001, pp. 279 and 294). Therefore, to Lucas, technical matters are the only one way to gain scientific progress in economics: 'better mathematics, better mathematical formulations, better data, better data-processing methods, better statistical methods, better computational methods' (2004, p. 22).
23. Lucas, 1986, p. 122
24. Ibid.
25. Lucas, 2003, p. 2
26. Lucas and Sargent, 1979, p. 10

THE NEW KEYNESIANS: GET REAL!

However consistent and theoretically elegant the RBC school of thought may have appeared for young economists in the late 1970s and early 1980s, some – possibly infected with a Keynesian virus – found the New Classical theory too out of sync with real life. Come on – get real! Indeed, in real life, people experience not harmonious outcomes of optimality, but rather the very opposite or, for many, drastically troublesome economic conditions. It may be that, in the long run, the strength of the market mechanism is pushing the economy towards the unique intertemporal path of macroeconomic optimality and full employment, but, in the short term, we often experience less-than-perfect macroeconomic outcomes. This is evidenced by history. Indeed, the general economic story of the late 1970s and much of the '80s is one of economic recession.

Accordingly, an alternative to the story perpetuated by RBC economists became increasingly required. This alternative became known as the New Keynesianism.[27] Although in full methodological agreement with RBC,[28] they differed theoretically. Modern economies do not operate with perfection in the short run due to various imperfections and inflexibilities. The New Keynesians argue that, in the short-term, one must accept that aggregate demand has an important role to play. Indeed, Romer argued that 'only new Keynesian models provide an explanation of the importance of nominal disturbances to the real economy; and... they also provide the most plausible explanation of why other aggregate demand shocks matter'.[29]

As such, there may be a serious mismatch between aggregated demand and aggregated supply. That is, as the economy could be occasionally hit hard by economic downturns, involuntary unemployment is thus a real phenomenon for both individuals and society at large.

Furthermore, the New Keynesians argued that these disequilibrium situations of macroeconomic outputs of second best in the short run could be explained by various kinds of imperfections and inflexibilities in the goods and labour markets. The market situation might not always be one of perfect competition. Rather, some tendencies of monopolism are often experienced in most markets. Likewise, the price mechanism does not operate consistently perfectly in the short run. Indeed, it is costly to change prices continuously and, contractually, prices and wages may remain fixed for specific time periods (e.g., by collected labour market agreements). As such, the New Keynesians argue 'that nominal price rigidities are the essential way in which market economies differ from the Walrasian Arrow-Debreu model'.[30] Furthermore, they focus on incomplete contracts as central market failures, and thus try 'to explain the causes and consequences of these market failures'[31] as key macroeconomic issues.

That said, however difficult or troublesome the short-term macroeconomic situation may be, market-based adjustment processes are set in motion so as to cope with short-run disequilibrium phenomena. However, it is worth noting that such adjustment take time.[32]

27. For a wide reading of New Keynesianism, see Mankiw and Romer (1991), Greenwald and Stiglitz (1993), and Romer (1993).
28. That is, a methodological coherent understanding of arguing that firms and household are optimising economic units using rational expectations in their quest for an optimal intertemporal planning which must be analysed within a general equilibrium setting.
29. Romer, 1993, p. 21
30. Greenwald and Stiglitz, 1993, p. 25
31. Ibid.
32. Through Greenwald and Stiglitz (1993), the New Keynesians acknowledged the existence of rigidities in modern economies. Indeed, New Keynesians would generally argue that 'firms set prices and wages in an uncoordinated fashion, facing considerable uncertainties about the consequences of their actions. As a result, it will often be true that wages, prices, and interest rates are not at market clearing levels (and will not adjust rapidly to those levels), so that large parts of the economy will not be in equilibrium' (p. 42).

Therefore, given these imperfections and inflexibilities, economic policy changes might make a short-term difference by actively addressing the present economic problems. As such, there may be room for adjusting both fiscal and monetary policy. However, the policy strategy of the New Keynesians is much more refined than that of their older counterparts. The changes in economic policy should be specific rather than general. Policy should be targeted according to the nature of the present economic disequilibrium. A policy strategy of continuous 'stop and go' managing of the level of aggregate demand may thus not be the optimal approach to pursue. Furthermore, economic policy should not only focus on aggregate demand – despite this possibly working in the very short run – but also fixate on important supply-side matters, especially regarding longer-run considerations focusing on structurally mismatched problems in the economy. As such, the short-term tactics of economic policy must effectively accord with the overall given long-term economic strategy, thus ensuring that the economy finally achieves a macroeconomic outcome of optimality on the unique intertemporal equilibrium path of full employment.

MODERN TIMES – TIME TO MERGE: THE NNS

As discussed in the previous section, despite the RBC and New Keynesian's theoretical differences – the former advocating a more classical market fundamentalism – both agree on methodological matters. They both argue that there is only one acceptable way to conduct economics. Macroeconomics must have an explicit microeconomic foundation: firms and households pursue the principle of optimisation and use rational expectations when planning for intertemporal optimality. Moreover, both proposed general equilibrium models as the only relevant setting for studying such behaviour.

Based on this agreement, a new synthesis gradually arose. Why not combine the core elements of the RBC programme and the New Keynesian understanding? Could one not succeed by accepting a skeleton of RBC arguments fleshed out by New Keynesian arguments on imperfection and inflexibilities?

This was exactly what happened when the NNS (New Neoclassical Synthesis) gained paradigmatic status and dominance in modern macroeconomics.[33] Empirically, the NNS understanding should be modelled within a dynamic stochastic general equilibrium (DSGE) framework.

The NNS benchmark model can be essentially characterised as a monopolistically competitive RBC model. As such, gaining macroeconomic optimality is a four-step process.[34] First, the representative household must plan its optimal intertemporal consumption pattern. Second, it must decide on how much to work. Three, given the optimal consumption pattern and the household's optimal supply of labour, combined with the process of profit maximation of firms and the level of technology, the level of output and employment in the economy can be determined. Fourth, the Central Bank – through changes in the nominal interest rate – ensures that the real interest rate is set so as to be able to equilibrate the level of aggregate demand with the level of aggregate supply. In so doing, the economy can reach an optimal macroeconomic outcome.

33. An early contribution to the NNS understanding is given by Woodford, 2003
34. Goodfriend and King, 1997

The NNS understanding is thus a mixture of New Classical and New Keynesian features, as 'even though output may be demand-determined on a period-by-period basis... output must be supply-determined on average.[35] Therefore:

> In the NNS model, fluctuations in aggregate demand can ***induce*** fluctuations in employment and output. In that sense the NNS model is Keynesian... Since firms maintain the profit maximizing markup on average over time in the NNS model, the NNS model behaves like the flexible price RBS model on average but with leeway for monetary policy to influence aggregate demand and stabilize employment and inflation.[36]

Accordingly, the role of the Central Bank is crucial for gaining macroeconomic optimality, and a low and stable level of inflation (which both Friedman and Lucas had earlier argued was essential if economic prosperity would prevail to benefit both individuals and society):

> ... targeting inflation thus makes actual output conform to potential output, where potential output is defined as the fluctuating level of aggregate output that would be determined by supply factors in the flexible-price, imperfectly competitive real business cycle core of the economy. This line of argument implies that inflation targeting yields the best cyclical behavior of employment and output that monetary policy alone can deliver.[37]

Based on the NNS, empirically, a DSGE model aims to introduce rigidities – the New Keynesian imperfections and inflexibilities – into a dynamic framework where the economy can suffer from both short-term supply and demand shocks. As such, DSGE models consist of three parts.

The first is an aggregate demand block – a New Keynesian dynamic investment-savings (IS) curve – stating that the output gap in the short term is typically different from zero, meaning that the economy could be below or above the level of full employment. The IS curve relates the output gap to the real interest rate trough consumption.[38]

The second part is an aggregate supply block – a New Keynesian Philips Curve[39] – which relates the rate of inflation to the output gap.[40] If an economy experiences a boom, the output gap closes and the rate of inflation increases. Conversely, if it experiences a recession, the output gap widens and the rate of inflation drops.

The last part consists of a monetary policy block typically modelled on a Taylor-rule-like design for optimal monetary policy. This block describes how the Central Bank, through changes in short-term nominal interest rates, reacts to fluctuations in both the output and inflation gaps. That is, the Central Bank tries to equalise the level of aggregate demand to the level of aggregate supply, thus gaining a macroeconomic output of optimality (in terms of output and inflation).

The triumph of the NNS led one of its founding fathers to state in 2009:

> While the problems of the field have not all been resolved, there are no longer such fundamental disagreements among leading macroeconomists about what kind of questions one might reasonably seek to

35. Ibid., p. 256
36. According to Goodfriend (2004, p. 31), 'NNS locates the transmission of monetary policy to real activity in its influence on ... the average markup. A monetary policy action which raises aggregate demand raises marginal cost and lowers average markup'.
37. Goodfriend, 2007, p. 61
38. Whereas an 'old' IS curve typically relates the output to the interest rate through investment.
39. Firms maximise profit in markets characterised by monopolistic competition. They typically act with some form of price inflexibility, modelled as a Calvo pricing rule.
40. Whereas an 'old' Philips Curve relates the unemployment rate to the rate of inflation.

> **answer or what kinds theoretical analyses or empirical studies should be admitted as contributions to knowledge … there are not really alternative approaches to the resolution of macroeconomic issues.**[41]

A CRITIQUE OF THE NNS

To many economists, the global economic crisis from 2008 and onwards – often termed the 'Great Recession' – was somewhat of an eye-opener concerning the theoretical content and validity of the macroeconomic mainstream. As such, the NNS was subject to a storm of criticism from most heterodox macroeconomists – yet due to their many years of criticising the mainstream, this was hardly surprising. However, their denunciations were this time joined by some former mainstream macroeconomists, such as Romer[42] and Stiglitz,[43] who raised critical voices against the dominant view of macroeconomics and called for changes.

For these critics, the NNS essentially told a story about harmonious macroeconomic outcomes of optimality that was too far removed from reality. There is a broad consensus that modern macroeconomies – being heavily dependent on globalised finance – is not so highly functioning as to always achieve a near-perfect performance. Indeed, the reverse seems true in that, most often, modern economies do not operate around an intertemporal equilibrium path of harmony. To claim that the quest for perfect intertemporal utility and profit maximisation automatically leads to macroeconomic outcomes of optimality may look nice in modern mainstream macroeconomic textbooks, but it certainly does not reflect the hard facts of reality. Firms and households do not act in this way. Therefore, in general, the macroeconomic situation is not one of full employment. While economies experience booms, they also face years of recession wherein involuntary unemployment is seriously present.

That is, to many, the NNS, and its DSGE models, is highly out of sync with empirical evidence:

> **… it may not be surprising that these models often have a hard time describing macroeconomic data. The strong prevalence of non-stationarity in economic time series is, in itself, evidence of the fact that we do not know in which direction the future is moving … we have to rely on such unrealistic assumptions that most results can be deemed empirically irrelevant from the outset.**[44]

However, it must be noted that many mainstreamers are not so foolish as to have been unaffected by the years of the Great Recession. Indeed, they have set changes in motion.

As such, the view on economic policy has changed. Conventional monetary policy cannot ensure equivalence between aggregate demand and aggregate supply alone. It must occasionally be helped by unconventional policy actions (quantitative easing).[45] Likewise, there may be more room for fiscal policy. It seems as if the multipliers are greater than expected, thereby making fiscal policy more effective in 'zero-bound' scenarios.[46] Moreover, we have learnt the hard way that financial aspects matter in macroeconomics. Therefore, DSGE models must account for this fact.[47] Furthermore, one could argue that now is the time to discard the representative agent and focus more on agent heterogeneity,[48] as perhaps the

41. Woodford, 2009, pp. 268 and 274
42. Romer, 2016
43. Stiglitz, 2018
44. Juselius, 2011, pp. 429 and 431
45. De Grauwe, 2020, chapters 8–10
46. Blanchard and Leigh, 2013
47. As indicated by Vines and Wills (2018, p. 2), 'Many of us – although not all – were proud of what had been achieved. But the benchmark model has let us down: it explained neither why the GFC … [the global financial crisis] … happened, nor what to do about it'.
48. Galí, 2018

assumption of perfect rational expectations is too extreme.[49] Finally, there might be room for more models in macroeconomics than just those of the DSGE,[50] which themselves must be adjusted and improved in various ways.[51]

The mainstream has thus seemed to accept certain changes. However, seen from the perspective of its critics, these changes may be insufficient.

THE POST-KEYNESIANS

In their own perception, many post-Keynesians (especially those adhering to Davidson's definition[52]) see themselves as the only true followers of Keynes. Although post-Keynesians are no more homogeneous than other groups of economists, their unique characteristic is that they place an enormous emphasis on three key concepts: time, uncertainty, and money.

In contrast to the mainstreamers, post-Keynesians view the economic system as one that is open, social, changeable, and path-dependent.[53] Simply put, they consider the economy to be evolutionary. Therefore, one must take the concept of time seriously. Economic behaviour unfolds in historical calendar time, not in model-made consistent time (meta time), as typically proposed by the mainstreamers. The correct ordering of past, present, and future is thus important. What happens today is partly determined by what happened yesterday, and tomorrow – the future – results from our actions today. Moreover, when we deal with the future, we act in an environment tormented by uncertainty (both epistemologically and ontologically), thereby making it impossible to truly know the future – at least in some aspects. Therefore, firms and households urgently need to hedge their economics decisions, which they do by establishing contractual arrangements. As these contracts are set up in monetary terms, money thus truly matters.

Sheila Dow explained Keynes's understanding of uncertainty thusly:

> **For Keynes, the significance of uncertainty for economics follows from the nature of the economic system, which does not satisfy the conditions for certain knowledge. He saw social systems as being organic, involving complex interrelationships within an evolving structure of institutions and with individual behaviour being both social and in general non-deterministic. This was his 'vision' of economic reality, that is, his ontology.**[54]

Seen from a post-Keynesian perspective, while the NNS understanding tells a (seemingly coherent and logical) story of macroeconomics, it is still one out of sync with real-life phenomena. Economic evidence does not depict a world of harmony and optimality. Quite the contrary. The economic history of most countries is a story of economies out of equilibrium. It could be argued that the mainstreamers do not particularly address these problems when describing an economy placed

49. As Woodford (2013, p. 1) explained, '... [this assumption] ... is a strong one, and one may wonder if it should be relaxed ... the assumption that an economy's dynamics must necessarily correspond to an RE equilibrium may seem unjustifiably strong ... We should like, therefore, to replace the RE hypothesis by some weaker restriction, that nonetheless implies a substantial degree of conformity between people's beliefs and reality – that implies, at the least, that people do not make *obvious* mistakes'.
50. As such, Blanchard (2018, pp. 52–53) mentioned five types of useful macroeconomic models: 'i) "Foundational models" that deal with important theoretical aspects, ii) "DSGE models", iii) "Policy models" aiming to help the correct design of economic policy, iv) "Toy models", a rudimentary model that only addresses a few core issues and, v) "Forecasting models" focusing on giving the best forecasts possible'.
51. Christiano et al., 2018
52. Davidson is one of the most famous post-Keynesians still living. Throughout his life, he has advocated that one can learn tremendously from the writings of Keynes when analysing the many problems of modern financially globalised economies. On Davidson, see Olesen (2013). To Davidson, a true post-Keynesian builds their economic understanding on Keynes's *A Treatise on Probability* and *The General Theory of Employment, Interest and Money*, published in 1921 and 1936, respectively.
53. Chick and Dow, 2005
54. Dow, 2004, pp. 551–52

on the unique intertemporal path of sustained equilibrium. Instead, they overfocus on dealing with equilibrium rather than its opposite.[55] Furthermore, the modern macroeconomic mainstream pays scant regard to methodological aspects. To a post-Keynesian, methodological matters are crucial for correctly understanding economics. As such, there are many differences between the two schools of macroeconomics.[56]

BEHAVIOURAL ECONOMICS

Similar to the post-Keynesians, behavioural economists seek to align economic theory with the facts of real life. Thaler[57] argued that neoclassical economics might be useful as benchmark models on optimalisation but, when trying to build models 'to understand how people actually behave, we needed a new breed of descriptive theories designed specifically for that task'.[58]

However, the modern generation of behavioural economists were not the first to state this obvious point. Indeed, such a view has been around for many years.[59] Suffice it to mention the pioneering work of Herbert Simon, who in the 1940s found that, generally speaking, firms do not run for first best solutions, but rather typically accept second best solutions. They neither have the necessary cognitive abilities nor time to act optimally. As such, they are characterised by bounded rationality:

> Two concepts are central to the characterization: *search* and *satisficing*. If the alternatives for choice are not given initially to the decision maker, then he must search for them. Hence, a theory of bounded rationality must incorporate a theory of search ... But utility maximization ... was not essential to the search scheme ... As an alternative, one could postulate that the decision maker had formed some *aspiration* as to how good an alternative he should find. As soon as he discovered an alternative for choice meeting his level of aspiration, he would terminate the search and choose that alternative. I have called this mode of selection *satisficing*.[60]

Kahneman,[61] Tversky, and McFadden[62] showed that households, like firms, use 'rules-of-thumb' in their economic decision making. As McFadden concluded:

> ... what stands out is that humans fail to retrieve and process information consistently, and this generates a variety of cognitive anomalies ... I conclude that perception-rationality fails, and that the failures are systematic, persistent, pervasive, and large in magnitude.[63]

55. As Kirman (2011, p. 62) argued, 'we should be more interested not in the periods where the economy is running along relatively smoothly, but in the periods where it changes ... we should be studying non-normal periods, instead of normal ones, because that is what causes real problems. And we do not do that ... That is the major failure in macroeconomics. It does not address the serious problems that we face when we get out of equilibrium. And we are out of equilibrium most of the time'.
56. Olesen (2010, Table 1, p. 121) highlighted some of the most important differences between these two macroeconomic world views.
57. Thaler, 2017
58. Ibid., p. 491
59. As such, Keynes stated in 1938 that economics is 'a science of thinking in terms of models joined to the art of choosing models which are relevant to the contemporary world. It is compelled to be this, because, unlike the typical natural science, the material to which it is applied is, in too many respects, not homogeneous through time ... Progress in economics consists almost entirely in a progressive improvement in the choice of models' (Moggridge, 1973, p. 296). Accordingly, Pecha and Milan (2009) have argued that Keynes could be seen as an early behavioural economist. That Keynes took psychological aspects, such as uncertainty, seriously in his economic thinking is beyond doubt (Koutsobinas, 2014). de Grauwe (2010) also tried to incorporate animal spirits as an important behavioural economic aspect in a new kind of DSGE model-setting which aligned more fully with empirical evidence than that of a traditional DSGE benchmark model.
60. Simon, 1979, pp. 502–503
61. Kahneman, 2003
62. McFadden, 1999
63. Ibid., p. 96

To state rational choice as a behaviour has its limitations, as indicated by Nelson.[64] Humans do not act as robots, but (arguably) have free will and are motivated by more than only economic aspects regarding their economic behaviour. Indeed, humans' decision-making processes are also impacted by phycological, ethical and moral factors.[65] Therefore, economic theory must also focus on these aspects when seeking to explain goal-based economic behaviour.

Economic behaviour is undoubtedly neither perfect nor optimal. Both firms and households are bound to make mistakes in a complex and uncertain world:

> **... that people make *predictable* errors was profoundly important to the development of behavioral economics ... This was a crucial insight. It implies that, at least in principle, it would be possible to improve the explanatory power of economics by adding psychological realism.**[66]

In essence, the strategy of behavioural economics is useful for both micro- and macroeconomics, particularly when ensuring that economic theories are not so out of sync with real-life phenomena. Unsurprisingly, modern behavioural economics is successfully advancing through attracting an increasing number of proponents.[67] Thaler[68] thus seems apt in conclusion that:

> **Although not every application of behavioral economics will make the world a better place, I believe that giving economics a more human dimension and creating theories that apply to Humans, not just Econs, will make our discipline stronger, more useful, and undoubtedly more accurate.**[69]

Finally, for Thaler, the success of behavioural economics' methodology should be seen as a return to the older economic thinking of Adam Smith, Irving Fisher and John Maynard Keynes (among others), rather than as a new revolutionary paradigm in economics.[70]

CONCLUDING REMARKS

In light of the above, and from my own perspective, the journey towards the modern macroeconomic mainstream of NNS began with the writings of Friedman – especially his 1967 Presidential Address. It was based on this theoretical world view that Lucas refined Friedman's arguments and presented what became the New Classical theory, best known as the RBC. As such, Lucas initiated a both a theoretical and methodological revolution in macroeconomics.

However innovative and attractive RBC thinking may have appeared, some questioned its validity. New Keynesians argued that, in the short run, modern economies are generally not characterised by optimality and harmonious macroeconomic outcomes. They explained that this was due to various kinds of imperfection and inflexibility. As such, contrary to the RBC understanding, economic policy might have an important role in minimising economic fluctuations in the short term, as well

64. Nelson, 2004
65. 'If the world is mechanical, how can it also be moral and valuable? … The notion that humans are created as rational decision-makers is, from a physical anthropology point of view, just as ludicrous as the notion that humans were created on the sixth day' (Nelson, 2004, pp. 213 and 215). On the need of incorporating ethical aspects in macroeconomics, see Olesen (2021).
66. Thaler (2017, p. 490). Furthermore, 'psychological theories of intuitive thinking cannot match the elegance and precision of formal normative models of belief and choice, but this is just another way of saying that rational models are psychologically unrealistic' (Kahneman, 2003, p. 1449).
67. 'The rise of behavioral economics is one of the most prominent conceptual developments in the social sciences in the past 40 years. Several factors have contributed to the growth of the field: the discovery of anomalies which challenge the traditional paradigm; the development of new, psychology-based models of economic behavior; advances in helping people to make better decisions; and an influx of talented researchers into the field' (Barberis, 2018, pp. 680–681).
68. Thaler, 2017
69. Ibid., pp. 512–13
70. Thaler, 2016, p. 1577

as focusing on how structural problems in the economy can be remedied in the long run.

As both the RBC proponents and the New Keynesians advocated the same kind of methodology, a ground-breaking revolution later took place. The NNS emerged to subsume the macroeconomic arena in a paradigmatic way. Dealing predominantly with short-term matters, the NNS, with its DSGE models, was New Keynesian-like whereas longer-term economies were expected to be more similar to the RBC. As such, there was room for certain policy actions, which was then filled by monetary policy. An optimal monetary policy was designed to follow Taylor-rule behaviour.

Unsurprisingly, however, the Great Recession served as an eye-opener for economists and laypeople alike. The choir of critics that hitherto had consisted primarily of non-mainstreamers began to grow. Now even some former mainstreamers have cried out for changes. Macroeconomics had to become less 'post-real' (to paraphrase Paul Romer). While the NNS has tried to incorporate important new aspects – e.g., financial matters and agent heterogeneity – it is still built on the previously existing theoretical core with the same DSGE-style modelling. Consequently, some still question the relevance of the NNS and argue that macroeconomic alternatives are required.

However, it should be noted that alternatives already exist. Here, I have emphasised the post-Keynesians and behavioural economists due to their sharing many common features – despite the fact that they themselves may not be fully aware of this. In essence, both schools of thought seek to achieve a better accordance with real life than the proponents of NNS. The empirical evidence is unambiguously clear. In the real world, neither firms nor households behave as rational economic men. They do not run for optimality. In an economic environment characterised by uncertainty, they are satisfied with realising the best of the second-best possibly solutions (a fact widely established for many years). Perfect intertemporal planning leading to macroeconomic outcomes of optimality on the unique equilibrium path is a textbook story, not one that accurately reflects real-life economic activity.

Allow me to end this article with a bold suggestion. There may well be new important theoretical and empirical knowledge to be gained by more actively combining the approach of the post-Keynesians with the core elements of behavioural economics. Indeed, in so doing, one might be able to challenge the dominance of modern mainstream macroeconomic understanding more thoroughly than ever before. As such, this suggested new approach may prove with time to become a genuinely progressive Lakatosian research programme capable of delivering what Lakatos himself termed 'novel facts'.[71] That is, a new research programme that is capable of producing new theoretical as well as recent empirical facts hitherto unknown – e.g., giving a better understanding of how economic behaviour in an economic environment of fundamental uncertainty is not perfect, e.g., Olesen (2019 and 2010), thereby incorporating various kinds of behavioural bias into macroeconomic theory (bounded rationality, herd behaviour, loss aversion, animal spirits etc.). If successful, macroeconomics would gain a higher level of scientific status and become better aligned with facts of real life.

71. Lakatos, 1978. On applying a Lakatosian methodology on the history of economics, see e.g., Blaug, 1997

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ARTICLE

A NEW WAY TO GOVERN FOR ETERNITY BASED ON SYSTEMS SCIENCE

Dr Shann Turnbull

The pioneering work of the 2009 Nobel Prize Winner Elinor Ostrom on the governance of commonly owned resources continues to inspire researchers across many fields. In his third article for *BESS*®, Dr Shann Turnbull investigates how systems science can build on Ostrom's ideas of *polycentric governance* to transform corporations into ecologically governed common pool resources (CPRs) to help counter environmental degradation and reduce economic inequality.

INTRODUCTION

This paper is motivated by the CEO of the largest asset manager in the world[1] writing to the CEOs of all his investee companies in 2018 raising the need for: "A new model for corporate governance" and that "companies must benefit all their stakeholders".[2] A year later, 180 other CEO members of the US Business Round Table (BRT), who had received the 2018 letter from Fink, committed to "lead their companies for the benefit of all stakeholders – customers, employees, suppliers, communities and shareholders".[3]

However, unlike Fink,[4] the BRT did not suggest any "new model for corporate governance". As pointed out by Bebchuk and Tallarita,[5] Pistor[6] and others, CEOs accountable to a variety of stakeholders can allow CEOs to become accountable to no one.

1. Fink became the founding chair and CEO of NYSE publicly traded company BlackRock that in 2021 had funds under management of $US9.5 trillion dollars. This represents around ten percent of all globally traded 2020 equities of $US94 trillion reported at https://en.wikipedia.org/wiki/Stock_market#Size_of_the_markets.
2. Fink, 2018
3. BRT, 2019
4. Fink, 2018
5. Bebchuk and Tallarita, 2020
6. Pistor, 2019

This suggests that the BRT CEOs do not possess a creditable process to achieve their purpose. A contribution of this article is to present a way to provide such a process, not just for CEOs but also for stakeholders, political leaders and the wellbeing of humanity and the planet.

Neither shareholders nor other stakeholders can exist alone. They are locked into a "Yin ~ Yang" existential independency in extracting benefits from corporations. However, the "asymmetry of power and information"[7] between shareholders and other stakeholders introduces systemic problems and conflicts of interests. Evidence that these conflicts represent a systemic problem is provided by the substantial and frequently re-occurring fines reported by "Violation Tracker".[8]

Economists had long assumed that competition for accessing life-sustaining common pool resources (CPRs) led to "the tragedy of the commons" denying benefits for everyone.[9] In her Nobel Prize acceptance speech, Elinor Ostrom[10] presented design principles for avoiding such tragedies. Ostrom identified how systemic conflicts of interest could be resolved by a polycentric system of self-governance without "markets and states" as occurred in premodern times.[11]

A key contribution of this paper is to use the insights of Ostrom and systems science to design corporate constitutions and bylaws to allow corporations to creditably provide benefits for all their stakeholders. This would convert corporations into a CPR.

A second key contribution is to describe how polycentric governance can release and exploit the DNA hard-wired ability of living creatures to possess dual paradoxical contrary ~ complementary behaviour described by system scientists as "tensegrity".[12] Tensegrity is described by Ingber[13] as the "architecture of life" and was identified by Turnbull and Guthrie[14] as the most efficient way for individuals and organisations create or manage complexity.

A third key contribution of this article is to identify a self-funding tax incentive for shareholders to change their corporate constitutions to convert companies into self-governing self-reproducing CPR corporations to counter degradation of the environment locally and globally for eternity.

How these proposals might be introduced, and their broader impacts are considered in the concluding section.

Literature review

A review of literature reveals how this article makes contributions included in a list of 24 described in Turnbull.[15] The Social Science Research Network (SSRN) archives in December 2021 contained over a million abstracts from more than 700,00 authors. They included 19,168 papers that possessed in their title, abstract or keywords, the phrase "corporate governance". The only authors who had contributed *any* paper that associated corporate governance to the systems science concepts of "holons", holarchy" and "tensegrity" were Turnbull and Guthrie.[16] Only four other authors had associated the concept of a "common pool resource" to "corporate governance". None of these papers had been written before Ostrom's research gained recognition through her Nobel Prize award in 2009.

7. Hayne, 2018, p. 269
8. Violation Tracker, https://violationtracker.goodjobsfirst.org/parent/jpmorgan-chase
9. Hardin, 1968
10. Ostrom, 2009b, p. 422
11. Angus 2017, Ostrom 1990, Thurston and Fernández-Götze 2021
12. Turnbull and Guthrie 2019, p. 54
13. Ingber, 1998
14. Turnbull and Guthrie, 2019, p. 55
15. Turnbull, 2021b
16. Turnbull and Guthrie, 2019

Vincent Ostrom, a political scientist and husband of Elinor, another political scientist, first used the term "polycentric governance" in Ostrom et al.[17] The term was then used extensively in their many articles archived in Indiana University's "Digital Library of the Commons".[18] There are only 38 articles in the SSRN archives that involve polycentric governance, with less than two dozen in relation to corporate governance. However, the term polycentric governance may be described with other words such as "network governance"[19] or "bi-cameralism", or the phenomenon is ignored.

Such ignorance was explained by Kuhn[20] with the following words: "No part of the aim of normal science is to call forth new sorts of phenomena; indeed, those that will not fit the box are often not seen at all. Nor do scientists normally aim to invent new theories, and they are often intolerant of those invented by others".

An example of using different words for describing polycentric governance is provided by the author's PhD research[21],[22] based on his experience and research into firms controlled by more than one board. The term "compound board" was used to "describe the existence of two or more control centres whether or not they were required by law, the constitution of the firm or created by relationships external to the firm".

The corporate governance literature review in the author's PhD dissertation was republished as Turnbull,[23] and continues to be constantly cited. A second literature review, focused on the literature relevant to polycentric governance, is presented in the Appendix of Turnbull's 2021 working paper *Do we need a new model of corporate governance?*[24] The scope of this second review is set out in Table 5 of Turnbull and Poelina[25] in this issue of *BESS*®.

All the articles in the SSRN involving polycentricity and corporate governance are dated after Ostrom[26] authored a paper for the World Bank on "A polycentric approach for coping with Climate Change". In her paper, Ostrom advised against top-down solutions by multinational institutions like the World Bank and United Nations. Ostrom specified the need to involve "small-scale to medium governance units".

This bottom-up approach is confirmed by the laws of systems science that "absolutely prohibits any direct and simple magnification [of regulation] but it does not prohibit supplementation".[27] Regulation of large systems, such as the global environment, can only be achieved by indirect means provided by a requisite variety of complementary co-regulators. This explains why Turnbull and Myers[28] supported the Ostrom bottom-up approach before becoming aware of her work. The bottom-up approach can be introduced by the self-funding tax incentive described in Turnbull[29] and Turnbull and Poelina.[30] There are significant wider benefits detailed below.

17. Ostrom et al., 1961
18. http://dlc.dlib.indiana.edu/dlc/search
19. Craven et al., 1996; Nohira and Eccles, 1992; Pirson and Turnbull, 2011b, 2015; Podolny, and Page, 1997; Turnbull 2014c; Van Alstyne, 1997
20. Kuhn, 1970, p. 24
21. PhD dissertation republished as a book (Turnbull 2014b) with three appendices: I Key words and concepts; II Examiners report; and III Citation of resulting literature, https://www.morebooks.de/store/gb/book/designing-resilient-organisations/isbn/978-3-659-34586-9
22. Turnbull, 2000d, p. 27
23. Turnbull, 2000a
24. Turnbull, 2021b
25. Turnbull and Poelina, 2022
26. Ostrom, 2009a
27. Ashby 1956, p. 268
28. Turnbull and Myers, 2017
29. Turnbull, 1975, Appendix; 2000c; 2020b; 2021e
30. Turnbull and Poelina, 2022

Also considered are neglected areas of research into bottom-up regulation,[31] management[32] and governance.[33] A point confirmed by the preeminent Academy of Management (AOM) which in 2021 held a Caucus to discuss "Education for Managing Existential Risks of Humanity" at its Annual Meeting.[34]

The pitch document to the AOM contained an ecological form of polycentric architecture illustrated in Figure 1 of Turnbull and Guthrie[35] that is reproduced below in an upgraded version. Ecological governance arises when firms with polycentric governance replace static, exclusive and perpetual property rights with those that are dynamic, inclusive and time limited. How this form of governance could reduce or mitigate 20 systemic problems of hierarches is set out in "Table 3. How mimicking nature can mitigate systemic problems of hierarchies" of Turnbull and Poelina.[36] The outcomes provide persuasive reasons for adopting "a new model of corporate governance" based on ecological governance.

Structure of this article

The next Section introduces case studies of polycentric governance created or identified by the author. The following third Section introduces conceptual tools for identifying, understanding, evaluating and designing polycentric self-governance systems. A fourth Section expands the reasons for adopting a new model. A concluding section consider the implications of adopting ecological governed CPRs to facilitate eternal governance for humanity.[37]

CASE STUDIES OF POLYCENTRIC GOVERNANCE

Case studies of polycentric governance are identified in this section. They provide a basis for understanding the opportunities for organisations involved in sport, civil society and business to become CPRs subject to democratic self-governance without markets or state.[38]

Polycentric governance in sport

In 1950, the author became one of two delegates to represent the State of Tasmania as a member of the unincorporated Australian National Ski Federation (ANSF). The ANSF made the rules for competitions between the states and represented Australia at international competitions.

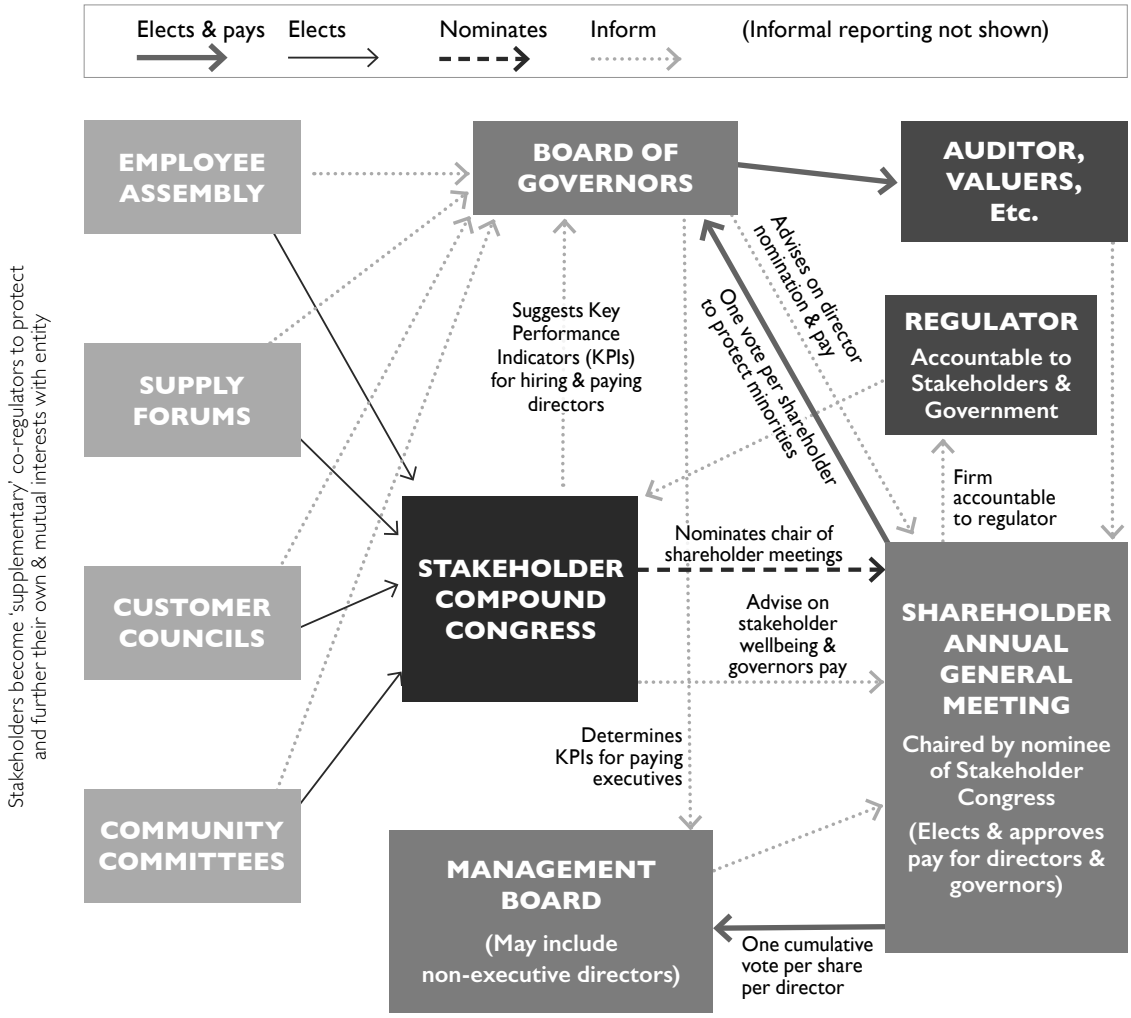
In 1974, as the unpaid Chief Executive Officer of the ANSF, the author incorporated the organisation. This had the effect of federating the polycentric self-governing State Ski Councils that, in turn, had been formed by federating their self-governing ski clubs. In turn, the incorporated Australian Ski Federation became a polycentric self-governing member of the international body for skiing that was a polycentric self-governing unit of the self-governing Olympic Committee. No economic markets were involved, and hierarchies were minimal.

The above relationships created a five-level vertical chain of nested polycentric self-regulating and self-governing units. As political scientists, the Ostroms would describe each self-governing unit at each level as a "republic". Systems scientists[39] describe self-governing units that possess paradoxical features

31. Turnbull, 2019a, 2021d
32. Turnbull and Pirson, 2019
33. Poelina et al., 2021
34. Alijani and Turnbull, 2021
35. Turnbull and Guthrie, 2019, p. 58
36. Turnbull and Poelina, 2022
37. Turnbull, 2018a
38. Turnbull, 1994, 2014a, 2022
39. Turnbull and Guthrie, 2019, p. 55

FIGURE 1:[40] Ecological governance described by Ostrom can make corporations a 'common good' benefiting all stakeholders as sought by worlds' biggest investor (Fink 2018)

Separation of governance powers from management allows independent bottom-up and outside-in stakeholder intelligence to integrate governance into Corporate Social Responsibilities to monitor and control misconduct. Systemic contestability of decisions protects and nurtures with less costs the interests of stakeholders, the firm, and society. Shareholder primacy is maintained for stakeholders who become shareholders.



For publicly traded, large private firms, non profits and government corporations to make shareholders and regulators responsible for the wellbeing of stakeholders

40. Developed by the author in various forms from 'Figure 5, Stakeholder council', in: S. Turnbull, 'Best practise in the Governance of GBEs', in J. Guthrie (ed.), *Making the Australian Public Sector Count in the 1990's*, Sydney, IIR Conferences, 1995, p. 105

as a "holon" and the nested vertical hierarchy of holons as a "holarchy".[41]

Before the work of Koestler, Simon[42] referred to this organisational architecture as "sub-components". The founding CEO of VISA Inc, who designed its bottom-up stakeholder-governed organisation invented his own word. This was "chaordic" created from combing the words "chaos" and "order".[43] Schumacher[44] noted that "all real human problems arise from the antinomy of order and freedom. Antimony means a contradiction between two laws: a conflict of authority; opposition between laws or principles that appear to be founded equally in reason". This describes the "Yin ~ Yang" relationship noted above between shareholders and stakeholders.

The dual paradoxical interdependent complementary ~ contrary relationship has become described in a growing literature as "tensegrity".[45] The tilde sign "~" was introduced by Kelso and Engstrøm[46] to indicate complementary ~ contrary relationships. They reported "experiments that show that the human brain is capable of displaying two apparently contradictory, mutually exclusive behaviors at the same time". This phenomenon is also observed with sub-atomic particles where it is described as "superposition". A hypothesis of Turnbull[47] is that tensegrity is a fundamental characteristic of the universe as suggested in "Table 2. Identifying dual behaviour of Humans/Biota/Holons/Holarchy and the universe" in Turnbull and Poelina.[48]

The organisational architecture of skiing explicitly illustrates how competition ~ cooperation can constructively exist in each self-governing unit that systems science describes as a holon. A defining feature of holons is that they allow their constituent parts at each level to both compete and cooperate with each other as occurs in the human brain.[49]

The skiing example of nested networks of self-governing independent components is commonly used by other sports and civic organisations that may not meet the test of possessing tensegrity, like the Red Cross and Rotary International. A civic example that had tensegrity built into its internal power structure was created by the author as is next considered.

Polycentric civic governance

In 1976, the author accepted an invitation to join three others on the Board of The Company Directors Association of Australia (CDA). The CDA was a not-for-profit organisation that both paid director's fees and fees for any additional services such as writing modules for the first educational qualification in the world for company directors.[50]

The CDA was formed in 1967 to compete for members with the autonomous branches formed in Australia by the London-based Institute of Directors (IOD). In response, the IOD branches were merged into an autonomous Australian entity in 1971. Its CEO was a sales representative of a London-based life insurance company. The founding Chair/CEO of the CDA was likewise a commission agent for an insurance company. The CDA founder

41. Koestler, 1967
42. Simon, 1962
43. Hock, 1999
44. Schumacher, 1973, p. 209
45. Fuller, 1961
46. Kelso and Engstrøm, 2006
47. Turnbull, 2021c
48. Turnbull and Poelina, 2022
49. Kelso et al., 2013
50. 1975 Chartered Directors Course brochure and other related materials: https://drive.google.com/drive/u/0/folders/0B13bh2n3zrFAQnRZOWJZdWN4dDQ?resourcekey=0-H01HjOhuSHfN3Cy29eHKjw

had incorporated a private for-profit company named CDA Services P/L to provide insurance and secretarial procurement services to members of the CDA and for anyone else.

The discovery of this otherwise undisclosed conflict between private and public interests resulted in the founding Chair/CEO of the public CDA resigning in 1976. To reduce the opportunity for such conflicts arising and remaining undetected in the future, the author rewrote the CDA constitution that was adopted by a vote of members in 1978.

The amended constitution introduced a division of powers with each State Chapter becoming self-governing. Tensegrity in the form of competition ~ cooperation for individual members' power, status and influence (PSI) was introduced by State Chapters not being able to appoint their own President unless a contested election was held to elect the State Committee. There were also limited terms of appointment for office bearers that required a larger majority of votes to extend office holders appointment.

In 1990, the CDA merged with the IOD affiliate in Australia to create the Australian Institute of Company Directors (AICD). The merger arose because of the rapid growth in membership generated by local State Chapters promoting the Company Directors Course.[51] The merger retained the State Chapters, and the AICD now has over twice the number of members than similar organisations in the UK or the US whose total populations were respectively over two and half times and 13 times larger.[52]

Polycentric corporate governance in three different jurisdictions

Substantial firms that illustrate a polycentric governance architecture can be found in major jurisdictions like the US, UK and Europe.[53] They demonstrate that: (a) no changes are required in public law to introduce polycentric governance, only a change in corporate constitutions that only involves private law; (b) the ability of polycentric governance to be competitive with mainstream forms of governance, and (c) the ability of polycentric governance to be resilient, survive and prosper over business cycles during the last half-century.

One US example is the credit card company VISA International Inc created in 1970 by banks that had been competing in issuing their own credit cards. Its polycentric governance allowed each stakeholder bank to obtain exclusive control for issuing cards in their territory but cooperate with other banks in promoting and managing their mutually owned and controlled business.

Hock[54] explained that the organisation possessed "multiple boards of directors within a single entity, none of which can be considered superior or inferior as each has irrevocable authority and autonomy over a geographical or functional area". "No part knew the whole and the whole does not know all the parts, and none had any need to" because they were self-regulating. This illustrates Mathews'[55] statement regarding holonic systems that "no part of the system will possess complete information about any other part". This partly

51. The rapid growth in CDA membership arose from small traders incorporating to obtain limited liability who knew they had an educational deficit in corporate matters. Members of the IOD in Australia were mainly qualified accountants and lawyers acting as non-executive directors for local and foreign firms. This explains why the CEO of the IOD in Australia declined the author's invitation arising from Turnbull (1971) to host the first educational qualification course in the world for directors as it would been seen to be demeaning of its members.
52. The 2021 membership reported on the webpages of the AICD, US-based National Association of Corporate Directors, and IOD are 46,000, 22,000 and 20,851 respectively.
53. Turnbull, 2000d, pp. 179, 186, 200; Turnbull and Guthrie, 2019, pp. 56, 57
54. Hock, 1999, p. 191
55. Mathews, 1996, p. 40

explains how "the reduction in data transmission, and in data complexity, achieved by the holonic architecture, is prodigious".[56]

Hock[57] described VISA as an inside out holding company in that it does not hold but is owned by its functioning parts. The 23,000 financial institutions which create its products are, at the same time, its owners, its members, its customers, its subjects and its superiors." In 2008, VISA made the then biggest IPO in history[58] to prove investor confidence in what represented "a new model of corporate governance".[59]

The John Lewis Partnership (JLP) provides a UK example of a business with a polycentric self-governing architecture. It is one of the largest retail businesses in the country, operating chains of supermarkets and department stores. In 1929, the son of the founder entered into a 21-year agreement with the employees for them to acquire all his shares in the business he had inherited. Since 1950, JLP has been employee-controlled with carefully crafted polycentric distributed decision-making centres. This introduces the checks and balances required for stakeholder self-governance and also minimises information overload.

The architecture of JLP is described in Turnbull's doctoral dissertation "The governance of firms controlled by more than one board: Theory development and examples".[60] Like VISA, the polycentric decision-making centres are distributed geographically as well as functionally. As with VISA, this also creates bottom-up governance to challenge top-down control. In this way, tensegrity is systematically embedded vertical with horizontal tensegrity arising from cooperating units competing for superior operating performance. The benefit of such internal competition is noted by Smith and Lewis[61] who describe how "paradoxical tensions enable sustainability – peak performance in the present that enables success in the future".

The Mondragón Corporacion Cooperativa (MCC) is a European example of polycentric bottom-up governance guided by top-down control. Located in the Basque region of Spain, its first worker cooperative was established in 1957. The MCC now contains almost 200 self-governing multi-stakeholder primary cooperatives. These become federated in a second level coordinating cooperatives that, in turn, are coordinated at a third level of the holarchy.[62] However, like the communication and control architecture of human bodies, the MCC contains lateral "service" holarchies like a bank, research and development cooperative, a social security business, and an entrepreneurial business creating new cooperatives described by Ellerman[63] as a "factory factory".

Details and MCC analysis are presented in Turnbull (2000d).[64] Notable elements are described in: "Figure 6.1. Mondragón Cooperative System: With dates of establishment". Like other Figures detailing the governance architecture of the other case studies of stakeholder-controlled organisations, these do not explicitly reveal their polycentric governance architecture. The polycentric governance architecture is vividly revealed in Figure 6.3 of Turnbull.[65] Table 6.1 of Turnbull[66]

56. Mathews, 1996, p. 30
57. Hock, 1995, p. 7
58. Reuters, 2008
59. Fink, 2018; Turnbull, 2002
60. Turnbull, 2000d, pp. 190–194
61. Smith and Lewis, 2011, p. 381
62. Turnbull, 2000d, p. 218
63. Ellerman, 1982
64. Turnbull, 2000d, pp. 200–225
65. Turnbull, 2000d, p. 218
66. Turnbull, 2000d, p. 221

provides a holon typology of the MCC (reproduced in Turnbull and Poelina[67]). How the MCC component holons integrate into the architecture of the universe is presented in its "Table 3.8, Holarchy: Hierarchy of Holons".[68] How the MCC decomposes the decision-making labour of a single board into five different decision-making centres is shown in Figures 7.1, 7.2 and 7.3[69] reproduced in Turnbull and Guthrie.[70] The decomposing and distributing of decision making in this way is another process for minimising information overload.

A methodology for evaluating and explaining polycentric governance in nature or society was developed in Turnbull[71] described as "Transaction Byte Analysis" (TBA). A table showing how TBA subsumes and extends Transaction Cost Economics (TCE), developed by Williamson,[72] to any social system in any forms of life is reproduced in Turnbull and Poelina.[73] TBA grounds the analysis of complex organisations in the natural sciences. The following Section introduces related concepts from systems science to provide a basis for further research, design, experimentation and evaluation based on systems science and so the laws of nature. This illustrates the value of "biomimicry".

NEW CONCEPTS REQUIRE NEW WORDS

As reported in the literature review above, it seems that social scientists have not concerned themselves with the words, concepts and phenomena described by holons, holarchy and tensegrity. These words and concepts have been introduced by *BESS*® in the contributions by Turnbull and Guthrie[74] and Turnbull and Poelina.[75]

Mathews[76] describes the existence of intellectual bubbles arising within groups of scholars using different words to describe similar concepts, so their research becomes disconnected and neglected. In other words, different authors may be researching the same phenomenon but use different terms. As noted above there was no need for new words to be created like "tensegrity" and "chaordic" when the word "antinomy" already existed.

Tensegrity

Mathews[77] stated: "It is striking how organisational science has tried to discuss this most fundamental and basic of problems without adequate terminology". A point he was unwittingly illustrating by omitting the word "tensegrity" in his article when it so fully described its features that led to his cited statement. Mathews shared the speculation of Ingber,[78] Hock[79] and Wilson et al.[80] that tensegrity could explain "the origin of life itself". Support for this speculation is also presented in Turnbull.[81]

Innovations of evolution seem to arise from the variety introduced by tensegrity being challenged in various contexts to allow novel changes to emerge to form new entities by mutation or symbiosis that is better suited while also reproducing

67. Turnbull and Poelina, 2022
68. Turnbull, 2000d, p. 130
69. Turnbull, 2000d, pp. 244–245
70. Turnbull and Guthrie, 2019, pp. 65, 66, 67
71. Turnbull, 2000d, pp. 83-140
72. Williamson, 1975
73. Turnbull and Poelina, 2022, Table 1
74. Turnbull and Guthrie, 2019, pp. 54-59
75. Turnbull and Poelina, 2022
76. Mathews, 1996, pp. 36–38
77. Mathews, 1996, p. 31
78. Ingber, 1998
79. Hock, 1999
80. Wilson et al., 2013, S24
81. Turnbull, 2021c

tensegrity to maintain the evolutionary processes. Tensegrity is a process inhibited, denied or punished in hierarchies of "authority" on which the theory of firms was developed by Coase.[82]

Buckminster Fuller[83] coined the word "tensegrity" by combing the words "tension" and "integrity" for describing physical structures, not social ones. This concept has since been recognised by natural scientists but neglected by social scientists. One exception is Pound,[84] who recognised its need, but not its name, when stating: "always have an opposition viewpoint" and "There must always be an opposition party and the prospect of insurgency".[85] In other words, unlike hierarchies, checks and balances need to be embedded in survivable social systems. The relevance of tensegrity to social organisations was identified in Turnbull[86] and confirmed by Kelso and Engstøm[87] with support from Judge,[88] Hock[89] and Muresan.[90]

"The science of governance"[91] explains why the laws of nature found in the physical world also apply to individuals, society and institutions. They explain the similarities noted between biology and economics tabulated in Turnbull.[92] Ashby[93] explains why identical phenomena arise in both social and natural science by observing that "The truths of cybernetics are not conditional upon them being derived from another branch of science. Cybernetics has its own foundations."

Extending the remit of cybernetics to governance

The initial remit of cybernetics was "The science of communication and control in the animal and the machine".[94] "The science of governance" has subsumed the science of cybernetics by being the science of communication and control in the animal, machine and social organisations of any species. The science of governance was established by using "bits"[95] or bytes as a physical unit of analysis. Today, this unit is ubiquitously revealed in countless devices and by Internet service providers.

Bits are perturbations in energy or matter that make a difference. This makes governance a natural science, not social science, and so independent of social constructs like "information" or "costs" used by Williamson[96] and others. It would have been more appropriate for the word "disadvantage" to be used to replace the word "cost" in the literature developed from the work of Ostrom. This is because economic value and so costs cannot be defined by any one or more specified real things.[97]

To minimise the materials and energy for DNA to communicate how living things are created, survive birth and reproduce in unknowable dynamic complex environments, evolution has developed processes for minimising the material and energy required. The importance of this statement is because "The brain makes up only 2 percent of

82. Coase, 1937
83. Fuller, 1961
84. Pound, 1992, 1993, p. 11
85. Pound, 1993, p.18
86. Turnbull, 2000d, pp. 8, 69, 134
87. Kelso and Engstøm, 2006
88. Judge, 2021
89. Hock, 1999
90. Muresan, 2014
91. Turnbull, 2008
92. Turnbull, 2000d, p. 68
93. Ashby 1956, p. 1
94. Wiener, 1948
95. Shannon, 1948, p. 1, Ashby 1956, p. 126
96. Williamson, 1975, p. 1
97. Turnbull, 2019b

our body weight, but it consumes 20 percent of the oxygen we breathe and 20 percent of the energy we consume".[98] The human brain is thousands of times more efficient than the most advanced computer chips that cannot match its performance, even if their dependence on external power sources is ignored.[99]

Unlike the social science of economics that seeks to minimise the undefinable social construct of cost, the science of governance is based on minimising materials or energy.[100] In this way, Transaction Byte Analysis (TBA) subsumes and extends the Transaction Cost Economics (TCE) developed by Coase[101] and Williamson[102] for analysing only hierarchical organisations. TBA provides a method for analysing any type of organisation and any type of collective activity by humans or any other species. No collective action can occur in society or any form of life without data processing within and between coordinating entities. This statement includes plants. For example, Wohlleben[103] describes the communication and control processes in trees.

While tensegrity is inhibited or denied in hierarchies, it is a defining feature of holons that are next considered.

Holons

Holons and their holarchies possess radically different properties from social hierarchies of authority. This is revealed by Hock's[104] description of chaord/holon that he described in two different ways: 1) Any self-organising, self-governing, adaptive, nonlinear, complex organism, organisation, community or system, whether physical, biological, or social, the behavior of which harmoniously combines characteristics of both chaos and order; 2) An entity whose behavior exhibits observable patterns and probabilities not governed by the rules that govern or explain its constituent parts.

In the inside cover of his book[105] describes "chaordic" in three ways: 1) The behaviour of any self-governing organism, organisation, or system, which harmoniously blends characteristics of order and chaos; 2) Patterned in a way dominated by neither chaos nor order; 3) Characteristic of the fundamental organising principles of evolution and nature.

There are many ways distributed decision making can be introduced that do not meet the tests of Hock or Mathews of creating holonic behaviour that as are considered next.

Other alternatives to hierarchies

Beer[106] pioneered the application of cybernetics analysis to management. He developed the Viable Systems Model (VSM) to describe any organisational structure that can produce itself and survive in a changing environment.[107] However, as VSM described by Beer are created in hierarchies at the discretion of management they cannot systemically reproduce themselves as described below with an ecological form of polycentric governance. Because of their cybernetic heritage, several VSM features are found in holons, but the reverse does not apply. VSM lacks tensegrity that is a defining feature of holons. Likewise, holacracy[108] does not offer an adequate basis for a new model of corporate governance as it neglects stakeholders and so the possibility of being a CPR.

98. NCBI, 2021
99. The Economist, 2020, p. 9
100. Muresan, 2014
101. Coase, 1937
102. Williamson, 1975
103. Wohlleben, 2017
104. Hock, 1999, p. 30
105. Hock, 1999
106. Beer, 1959
107. Beer, 1995
108. Holacracy, 2020

However, Bernstein et al.[109] and Velinov and Denisov[110] describe how holacracy could provide helpful "auxiliary" guidelines. Bodie[111] reports that Delaware Law would allow elements of holacracy and sociocracy[112] to be recognised in corporate constitutions.

Beer developed VSM before the concept of corporate governance became a discipline recognised by social scientists.[113] Beer did not envisage VSM being embedded into the constitutions of organisations as in VISA, JLP or the MCC.

Beer[114] was aware of the concept of tensegrity that inspired him to develop "team syntegrity"[115] as process of small group decision making. However, like VSM, its introduction was at the discretion of management and to small scale of around 30 individuals.

Kelso et al.[116] identified how the human brain possesses different decision-making areas like a computer that possesses parallel data-processing capability. Tensegrity is created by different brain areas, competing ~ cooperating with each other to take control according to internal or external needs, risks and opportunities. The brain has no "Chief Executive Officer neuron".[117] Different decision-making centres compete ~ cooperate to take control according to the context.

Indigenous Australians likewise practice fluid relationships as indicated in Table 2 of Turnbull and Poelina[118] and "Aboriginal attitude" described by Turnbull.[119]

Tensegrity naturally arises in mutual organisations from conflicts arising within and between stakeholders. Tensions can arise between similar stakeholders, like the member banks of Visa, or between different stakeholder classes. Examples of the latter are customers, distributers, suppliers, contractors, employees, executives, shareholders and host communities. Tensegrity is mostly extinguished in centralised command and control hierarchies. This could explain why management scholars and practitioners promote collegiate and cooperative relationships that obscure even further how DNA embeds tensegrity into human behaviour.[120]

Polycentric governance provides a way to separate various conflicts and constructively focus on providing checks, balances and adaptive outcomes that may not otherwise become available in simple hierarchies. Tensegrity forces a cultural change that also exploits rather than inhibits the various types of human contrary ~ complementary behavior shown in Table 2 of Turnbull and Poelina.[121] The following Section expands on the reasons adopting a new model for corporations.

109. Bernstein et al., 2016
110. Velinov and Denisov, 2017
111. Bodie, 2018
112. https://en.wikipedia.org/wiki/Sociocracy
113. Beer met the author in Toronto on August 3, 1996. After reading a version of Turnbull (1997) he advised that he had not extended his cybernetic insights to the governance of firms. Beer had been President of the World Organization of Systems and Cybernetic (WOSC) since 1987. He encouraged the author to publish in the Systems Science literature as undertaken in Turnbull (2005, 2007, 2013), Turnbull and Guthrie (2019).
114. Beer, 1994
115. Espinosa and Hardin, 2007
116. Kelso et al., 2013
117. Kurzweil, 1999, p. 84
118. Turnbull and Poelina, 2022
119. Turnbull, 1980, pp. 56–58
120. Kelso and Engstrøm, 2006
121. Turnbull and Poelina, 2022

ADDITIONAL BENEFITS FROM A NEW MODEL

While polycentric governance provides a way to constructively manage the systemic conflict that exists between shareholders and stakeholders to allow corporations to become a CPR benefiting all stakeholders, many other powerful additional benefits emerge.

The most important is the prospect of creating a requisite variety and number of self-governing CPR agents acting locally to counter degradation of the global atmosphere, oceans, soils and biodiversity that through climate change that are introducing existential risks to humanity.

The more immediate but hidden benefit is providing a systemic way of reducing inequality. This arises from corporate investors being overpaid in a way accountants cannot report and so are not known to economists nor taxed by governments as discussed below.

Another crucial benefit of polycentric distributed power is that it releases and constructively exploits the DNA hard-wired paradoxical dual contrary ~ complementary behaviour of individuals. This empowers, motivates and reward individuals to change their corporate culture required to survive in centralised command and control pyramids of power favoured by dictatorships. Details on how changing the power structure changes culture is presented below.

The operational benefits from changing both the architecture of corporate power, and so also corporate culture, offers superior operating performance, especially in identifying and managing risks, opportunities, threats and harms. These concerns become crucial when corporations obtain local and global responsibilities in managing existential risks to the environment and biodiversity. Risks that need to be shared as equally as possible as next considered.

Funding universal wellbeing from overpayments to investors

The unreported overpayment of investors is described as "surplus profits"[122] because they are not required to attract investment. As there may be no limit to human greed, economists have apparently not yet accepted that such surpluses can exist.[123] But in practice, investors cannot foretell the future, so they will not rely on obtaining any cash back after their foreseeable future, described a time horizon, to obtain a competitive return.

All intellectual property is time limited. This can be twenty years for patents, even if the knowledge is useable for a much longer time. International investors exposed to indeterminate political, social and foreign exchange volatility typically limit their time horizons to ten years or less.[124] The author has been able to raise millions of dollars of high-risk funds for new ventures with property rights limited to 15 years or less.[125]

Surplus profits are not trivial. They can be many times greater than the initial investment cost.[126] The unlimited extent of surplus profits was implicitly recognised by Penrose.[127] She stated that foreign investment introduces to its host country "the acceptance of an unlimited, unknown and uncontrollable liability". As accounting doctrines do not report investment time horizons, surplus profits cannot be reported or taxed. It also means governments who accepted foreign investment

122. Turnbull, 2000c, p. 403
123. The concept of Surplus Profits was first presented to economists in Turnbull (1975a, b, p.21)
124. This was the limit used in a much less volatile world of 1964 with fixed exchanges rates when the author worked as a financial investment analyst in the New York office of Esso Standard Eastern.
125. The start-up ventures were Saxonvale Vineyards Limited founded 1969, publicly traded 1975; Barwon Cotton Limited, founded 1979, publicly traded 1984. Australian Film Underwriters Pty. Limited, operated from 1980 to 1983. Both public companies were funded with 15-year leases. Film copyright was transferred from investors to the producer after seven years to avoid administrative costs after investor time horizons.
126. Turnbull, 1973, 2017
127. Penrose, 1956, p. 235

without requiring ownership to "boomerang"[128] back to capture surplus profits are undermining domestic prosperity in a way unknown to economists.

Surplus profits could explain why Picketty[129] raised a question without a convincing answer as to "Why is the return on capital greater than the growth rate?" The difference is consequential. Picketty reports that "through most of human history, the inescapable fact is that the rate of return on capital was always at least 10 to 20 times greater the rate of growth output (and income)."

Piketty only considered the use of taxes to reduce inequality. Ecological corporations provide a more efficient and politically attractive option by *reducing* taxes. At the same time, a process is established to deliver a universal wellbeing dividend to all voters as has been achieved in Alaska[130] since 1982. Another benefit is to enrich democracy as is next considered.

The nature of human behaviour

Despite established empirical evidence by professional psychologists like Wearing,[131] economists have developed multiple models of human behavior. Influential examples are the five discussed by Jensen and Meckling.[132]

However, none of their five models can be relevant all the time, or for every individual. This is because Wearing[133] identified that "differences between individuals are significant and important", rather than there being "no significant differences between individuals" as assumed by economists. Wearing states that human "needs are simple and many", rather than "simple and few", and that humans are also "sometimes competitive, sometimes collaborative, usually both", rather than just being competitive. Importantly, Wearing pointed out that humans "stand in an interactive cybernetic relationship to his/her environment and is changed as a result of any interaction", rather than "not explicitly related to the world as an element in interactive system and remains unchanged as a result of any interaction".

The experiments by neuroscientists Kelso and Engstrom,[134] cited above, has proved the views of Wearing. To illustrate the defining dual paradoxical nature of holons in nature, it is relevant to note that Kelso et al.[135] reported: "Our approach is both top-down and bottom-up and aims at ending up in the same place: top-down to derive behavioural patterns from neural fields, and bottom-up to generate neural field patterns from bidirectional coupling between astrocytes and neurons." In a similar manner, Mathews[136] reported that Czech engineer Jozsef Hatvany had created a design methodology relevant for creating a new model of governance. It "combined a thorough top-down functional analysis with an ordered bottom-up stream of implementational decisions".

A fundamental reason for humans to possess a variety of behaviour is to provide them with a requisite variety of responses to survive birth, mature and reproduce in unknowable dynamic complex environments. Likewise, organisations also need to obtain these characteristics to survive and thrive.

DNA needs to create instincts for creatures to survive their birth and processes for learning how to survive and mature. To reduce the size and

128. Turnbull, 2011
129. Picketty, 2017, p. 353
130. https://knowledge.wharton.upenn.edu/article/alaskas-experience-shows-promise-universal-basic-income/
131. Wearing, 1973
132. Jensen and Meckling, 1994
133. Citations are from a Table presented by Wearing (1973) reproduced as "Table 3.4, Differences between 'economic' and 'real' people" on page 103 of Turnbull (2000d).
134. Kelso and Engstrom, 2006
135. Kelso et al., 2013, Abstract
136. Mathews, 1996, p. 38

complexity of DNA, it needs to hardwire processes for creatures to "amplify" their survival behavioural repertoire. In explaining "Amplification of regulation in the brain", neurologist Ashby states:[137]

> **The indirect use occurs when the gene pattern builds a regulator (R1) whose action is to build the primary regulator (R2), primarily if this process is raised through server orders or levels. By achieving this ultimate regulation through stages, the possibility of large-scale supplementation occurs, and thus the possibility of an ultimate regulation, far more significant than could be achieved by the gene pattern directly.**

Amplification allows the volume of data/bytes coded in DNA to be reduced to minimise the matter or energy required to reproduce self-regulating self-governing entities.

However, the ability of humans to seed their organisations with tensegrity depends on organisations being designed so that the variety of human behavior patterns may co-exist to systemically maintain tensegrity. This also requires embedding a division of powers within organisations to legitimate, facilitate and empower different stakeholders expressing a requisite variety of contrary ~ complementary behaviours. In this way, symbiotic virtuous feedback processes are established to provide requisite variety in data communications, controls and decision making to assure sufficient accuracy for survival.

Just as in nature there can be countless designs for living things, so it would be with polycentric organisations. This means that organisational architects are needed to be custom design firms to become best fit for its purpose. No one size may fit every context. This explains the importance of filling the educational gap for "governance architects".[138]

Figure 1[139] only indicates generically how a division of corporate powers could be introduced. Some of the operating advantages are explained in Turnbull[140] for "Non-Executive (Independent) Directors", "Auditors", "Management", Stakeholders" and "Regulators". How the different power relationships are expected to change the behavior of individuals and the corporations is presented in Turnbull and Poelina.[141]

The stakeholder boards identified in Figure 1 with bold titles create the symbiotic polycentric republics. They introduce systemically bottom-up and outside-in challenges to top-down shareholder interests with a requisite variety of communication or control channels to reliably and comprehensively regulate and govern complexity. In practice, there would be a need for each stakeholder constituency to possess different geographic and functional sub-comments.

Systemic governance failures

Nearly all publicly traded companies undermine democracy. This arises from plutocratic voting with one vote per share electing a single board controlling a command and control hierarchy. These arrangements create 27 ways, as detailed in Turnbull[142] for introducing corruption.

Turnbull and Guthrie[143] identified why the systems science Law of Requisite Variety (LRV) makes it impossible for hierarchies to reliable simplify complexity and so incapable of reliably managing

137. Ashby, 1956, p. 270
138. Turnbull, 2010
139. Turnbull and Guthrie, 2019, p. 58
140. Turnbull, 2012, p.4
141. Turnbull and Poelina, 2022
142. Turnbull, 2000d, p. 115
143. Turnbull and Guthrie, 2019

risks. Turnbull and Poelina[144] identified nine "systemic problems of hierarchies", and in their Table 3 identified 20 "toxic problems of hierarchies" and how each could be either avoided or mitigated by adopting polycentric self-governance.

The failure of the existing system of so called "good governance" in the 2008 US financial crisis was documented in the "Conclusions"[145] of the 2011 Financial Crisis Inquiry Commission Report. The cause of the financial crisis was typically attributed to excessive risks in sub-prime mortgages. However, while such risks existed, it was an aspect of the problem and not the "key cause of the crisis". Instead, the inquiry reported that the "key cause" was the "dramatic failures of corporate governance and risk management". Another conclusion was "widespread failures in regulation and supervision". Both these conclusions reinforce the point of the impossibility of reliable regulation being achieved by centralised command and control hierarchies be they be in the private or public sectors.

The spread of monotheism in advanced societies may have encouraged the mindset that top-down management is the natural order of things. A compelling reason why bottom-up management, as found in stakeholder-owned or controlled enterprises, is not taught by leading education institutions was provided by the Dean of Harvard Business School in 1988. He insightfully and correctly advised the author that a market did not exist for this type of education, but this situation has now changed.

Thirty years later, a market has now been created by influential practitioners like Fink[146] and the BTR.[147] This should provide the incentive for scholars to initiate research and teaching to educate "governance architects" capable of introducing polycentric governance. However, the author is not aware of any graduate school of business, management or government that is yet planning to fill this gap of educating "governance architects" as pioneered by Guthrie and Turnbull.[148] Because of this gap, our most gifted future leaders are being educated on how to perpetuate and spread toxic hierarchies.[149] These undermine democracies and inhibit variety in individual and organisational behaviour, innovation and adaptation required for survival.

The systemic introduction, testing, evaluating, revising and testing design principles are raised in the following section.

INTRODUCING ECOLOGICAL GOVERNANCE

Applying Ostrom design principles to corporations

A review of the literature relevant to the design principles of Ostrom[150] with suggested modifications and applications of them are presented in Turnbull.[151] However, the option of involving corporations as a CPR was not considered by other authors.

The use of incorporated bodies as CPRs requires the insights of Ostrom[152] also to become embedded in the constitutions and bylaws of corporations. While Ostrom[153] discussed property rights they were not recognised in her design principles, as the context for her analysis was mainly for unincorporated CPRs like rights to water, fishing,

144. Turnbull and Poelina, 2022
145. CFCI, 2011, p. xviii
146. Fink, 2018
147. BTR, 2019
148. Presented as an elective MBA unit at the Macquarie Graduate School of Management during 2003 and 2004. Refer to "Educating Governance Architects" at https://docs.google.com/document/d/1c9gt9jsSL7i-JovneNfFiGjvxcj2V8Jz98Ku461aHmk/edit?usp=sharing and Turnbull (2014d).
149. Carucci, 2018; Turnbull, 2014b
150. Ostrom, 2009b
151. Turnbull, 2021b
152. Ostrom, 2010a, b
153. Ostrom, 2009b

grazing, or hunting and gathering, or use of modern urban infrastructure and services.

Figure 1 provides a generic outline of how to include Ostrom's insights into corporations. The added features are:

(a) Embedding polycentric governance into corporate constitutions and bylaws,

(b) Embedding other insights of Ostrom into corporate constitutions and bylaws,

(c) Introducing property rights not included in the Ostrom design principles,

(d) Introducing ecological form of polycentric governance,

(e) Formally integrating stakeholder interests into corporate constitutions/bylaws to become supplementary co-regulators in promoting self-regulation, self-management and self-governance to reduce reliance on markets and state,

(f) Introducing the rights of stakeholder to share corporate ownership and control while maintaining shareholder primacy for all stakeholders,

(g) Explicitly recognising the laws of systems science in managing complexity,

(h) Introducing and embedding the concept of tensegrity into corporate constitutions,

(i) Introducing a size limitation to organisational entities neglected by Ostrom and associated literature except by Dunbar[154], Turnbull [155] and Whyte and Whyte.[156]

The various ways and stages for introducing the proposals in Figure 1 are discussed in Pirson and Turnbull,[157] Turnbull [158] and Turnbull and Guthrie.[159] The political, social and operational considerations for their introduction is next considered.

Implications arising from introducing a new way to govern

By offering a tax incentive for shareholders to introduce ecological corporations creates a process for shareholders to learn by doing how to become governance architects. Whether an incentive is introduced or not, one way to initiate the process would be to create a competition among corporations for adopting the most promising processes for introducing elements of ecological governance.

There are many initiatives that management could introduce without changing corporate constitutions and bylaws. These involve formal engagement with stakeholders as proposed by Fink noted above to reduce "groupthink", improve innovations and risk management as outlined by Turnbull.[160] Annual awards could be made that introduced the most promising ways of introducing self-regulation, self-management and self-governance to companies that were private, publicly traded, non-profit or government-owned entities.

An example of this approach is the Annual Company Reporting awards that began in Australia in 1950.[161] Another example were annual Reputation awards of the largest business organisations of any type initiated in Australia in 1999 by a commercial consulting business. As a member of one of their judging panels involving governance, the author developed a methodology for evaluating the integrity of corporate processes that could lead to self-governance.[162]

154. Dunbar, 1993
155. Turnbull, 1973, 1975b, 1997, 2002, 2014a
156. Whyte and Whyte, 1988, p. 259
157. Pirson and Turnbull, 2011a, b; 2012, 2015, 2016
158. Turnbull 2017a, Turnbull 2020a, b
159. Turnbull and Guthrie, 2019
160. Turnbull, 2008, 2018b, 2019a
161. https://www.arawards.com.au/
162. Turnbull, 2000b

An academic competitive role model has been provided by Oxford Said Business School. For the last 25 years, it has been issuing awards for "significant scholarly contributions to the literature on corporate reputation.[163] The pioneering course to educate governance architects was established as an elective MBA unit at Macquarie University Sydney which introduced competition between students to both design and evaluate self-governance innovations.[164] Students were required to redesign the constitutions of corporations in the private, publicly traded and non-profit/government sectors of their choosing to improve their case study abilities to become self-governing to reduce the role of markets and state. Student syndicates were also required to apply systems science to develop methodologies to rate the design proposals of their peers with their methodologies also being critiqued by their peers.

The above practices and education are required globally to meet the requirements of the BRT. It is now becoming even more importantly required to custom design corporate constitutions to convert them to CPRs for countering the degradation of the atmosphere, oceans, soils and biodiversity. These introduce self-reinforcing processes to initiate change as next considered.

Policy implications

A critical condition for obtaining support is acceptance and widespread adoption from the voting public and their academic and policy thought leaders. It is for this audience that the following points are raised.

Leading jurisdictions have already introduced tax incentives for employees to obtain shares in their employer corporation. In the US, around 10% or private sector employees own employer shares valued at $1.4 trillion.[165] Extending share-owning benefits to all citizens, with the support of shareholders, should provide irresistible appeal for aspiring political leaders.

Universal share ownership would democratise capitalism to include all voting citizens. It provides a way to build a universal dividend income for all citizens as presently enjoyed by citizens of Alaska.[166] Instead of increasing taxes to provide universal welfare, ecological corporations distribute surplus profits directly to all citizens to reduce the need for welfare and government. The size and intrusiveness of government is also reduced, with stakeholders becoming co-regulators of corporations to protect and nurture the wellbeing of both citizens and their local environment.

The power and motivation to protect local environments arises from the ability of ecological endowment corporations to replace alien shareholders for locally resident citizen stakeholders. This enriches both the pollical and economic interests of corporate host bioregions providing the power, incentive and means to enrich local political self-determination to build more independent, resilient, sustainable circular economies locally and globally for eternity.

The idea of limited life business ownership may be confronting for analysts who are not aware that all intangible property rights have limited life. Except for land, all business assets wear and/or become obsolete. The knee jerk objection to time limited

163. https://www.sbs.ox.ac.uk/research/centres-and-initiatives/oxford-university-centre-corporate-reputation/annual-awards
164. Refer to footnote 147
165. https://www.nceo.org/articles/employee-ownership-by-the-numbers#6
166. https://knowledge.wharton.upenn.edu/article/alaskas-experience-shows-promise-universal-basic-income/

investments is how would new enterprises become funded? The answer is in the normal way. The author has funded two high-risk start-up ventures and films with property rights of 15 years or less.[167]

The limited property rights of ecological corporations acting as CPRs would create a compelling incentive to fully pay out all their profits like cooperatives, partnerships and many trusts. But to provide succession planning for investors, management and growth opportunities for all, dividend re-investment plans would be introduced to fund "offspring" enterprises. This would also keep CPRs to human scale.[168] It would also create sibling businesses promoting competition and local control. In this way, local diversity and resilience could be built up to cope with what scientists are describing the "ghastly future of mass extinctions".[169]

Surviving the people plague

Other scientists believe that the perpetual carrying capacity of our planet is 1.9 billion[170] individuals with existing resources. Planned population downsizing to this level could take three or four centuries, during which time the carrying capacity of the planet could be further reduced. With "overshoot"[171] of sustainability increasing the need for an eternal system of governance may become problematical unless humanity can survive during centuries of de-growth. Eternal systems of governance are required today to give hope for survivors of our "ghastly future".

Ecological corporate CPRs can make important contributions today in reducing the planetary populations in three ways:

1. Providing universal wellbeing incomes to avoid the need for have children in their old age,
2. Provisioning of birth control education and methods,
3. Providing a locus of community solidarity to protect both their home bioregions and their progeny beyond the seventh generation as practiced in many pre-modern societies.

This article has identified self-funding tax incentives for transforming corporations into ecologically governed CPRs providing benefits for all stakeholders as desired by the BRT. It has identified compelling political, economic, social, environmental and existential reasons to act. While this provided the motive for this article, many of other attractive benefits have been identified.

Of widespread immediate interest is how to democratise the wealth and wellbeing of individuals with less taxes and less government in a manner not known by influential economists and most other policy advisors.

A socially important contribution is identifying how polycentric governance provides a way to change business culture by introducing a division of powers with checks and balances. It also provides systemic ways to identify and correct harms, mistakes, miss-management and malfeasance to enhance individual wellbeing, operating performance, risk management, adaption, innovation and resilience.

Another contribution is to identify for business leaders, political leaders, political constituencies concerned with either business or citizen wellbeing a self-reinforcing congruence of interest to take action to make the world a better place today and for eternity.

167. The start-up ventures were Saxonvale Vineyards Limited founded 1969, publicly traded 1975; Barwon Cotton Limited, founded 1979, publicly traded 1984. Australian Film Underwriters Pty. Limited, operated from 1980 to 1983. Both public companies were funded with 15-year leases. Film copyright was transferred from investors to the producer after seven years to avoid administrative costs after investor investment time horizons.
168. Dunbar, 1993; Schumacher, 1973
169. Bradshaw et al., 2021
170. "How many humans can Earth sustain? And what does it mean if we've already passed it?", https://www.abc.net.au/news/science/2019-07-25/population-growth-world-overshoot-day/11320990
171. Collapse in a Nutshell, https://www.youtube.com/watch?v=e6FcNgOHYoo and, Overshoot in a Nutshell, https://www.youtube.com/watch?v=IPMPINPcrdk&t=0s

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ESSAY

THE NEUROECONOMICS OF THE SECOND TRACK: PROCESSES, OUTCOMES AND IMPACT

Peter Fritz AO

Recent research in the fields of neuroscience and behavioural economics offer clues to the success of GAP's Second Track process of productive group collaboration. Entrepreneur and philanthropist Peter Fritz AO explores the ways in which individual and group decision making can be optimised through this approach.

INTRODUCTION

The decision-making bodies that control commercial and public policymaking worldwide tend to be traditional 'first track' groups, with homogeneous participants differentiated by strict hierarchies. Unfortunately, these stereotypical structures tend to enforce an artificial and constricting pattern of human engagement on their participants that does not align with the internal brain processes[1] and group dynamics[2] that evolved in humans and their ancestors over millions of years to promote their survival in a state of nature.

The conflict between contemporary organisational models and the ancient modes of thinking and behaviour tends to suppress the variety and spontaneity of the ideas they generate in favour of safe and acceptable options agreed by rote rather than rational deliberation. Therefore, these bodies churn out yesterday's solutions to contemporary problems without consideration of tomorrow, and these suboptimal decisions can have disastrous consequences for the much greater number of people unknowingly affected by them.

1. Beaty, 2020
2. Bénabou, 2007

The problems – rather than solutions – generated by traditional 'first track' approaches remain unresolved because, until recently, they were unexamined. Fortunately, **neuroeconomic research**, combined with insights from neuroscience, evolutionary biology and psychology, not only aids the understanding of supposedly irrational economic choice-making in society but offers clues to better decision-making frameworks in the future.

Alternative modes of group interaction, including Global Access Partners' Second Track process,[3] can work with the grain of brain chemistry and group dynamics, rather than against them, to produce better results. Notably, the Second Track has a strong record in helping expert individuals from various related sectors escape from the negative 'groupthink'[4] of their respective organisations when they interact as individuals to form a common goal.

Daniel Kahneman's work in behavioural economics[5] explains why individuals in real life make irrational decisions, much to the frustration of classical economists. This helps frame 'nudges' to improve them, so a better understanding of decision-making, reward-seeking and social drives within the brain opens the way for fresh alternatives more in tune with our underlying modes of thinking.

NEUROECONOMICS

Traditional economics is the study of decision making in the production, consumption and transfer of wealth in a world of infinite wants but limited resources. These decisions are assumed to be rational calculations to maximise the value – utility – of transactions for the individuals involved, which, when aggregated, constitute local, national and global economies.

However, the underlying thought processes that drive these decisions have not been analysed until recently[6], in part because the technology required to undertake such investigations did not exist. Neuroscience – the study of the brain and nervous system – is now helping to inform our understanding of human decision making at the most fundamental level, and as human decisions involve the allocation of relative value to alternatives and choosing between them, neuroscience has such direct relevance to economics that both have delivered a new offspring – neuroeconomics.

Researchers in this emerging field use brain imaging technology to record neurological activity generated when people and animals assess options and make decisions (the essence of economics) in controlled conditions. These results are analysed to inform theories regarding the parts of the brain involved in such tasks, and their interactions. Both economists and neuro-economists are interested in variations from the state of equilibrium, be it in a market or a brain, and how individuals and groups perceive, process and act on information.

The complex data generated by neuroeconomic observation, and the neurological hypothesis these inform, offer plausible mechanisms to produce the psychological, cognitive and emotional factors that distort 'rational' economic calculations in behavioural economics. Similarly, DNA – initially discovered by Johann Friedrich Miescher in the 1860s, rather than James Watson and Francis Crick in the 1950s – explains the mechanism driving Darwin and Wallace's theories of evolution by natural selection.

3. Fritz, 2019
4. Fisher, 2021
5. Kahneman, 2011
6. Morse, 2006

Aligning the patterns found in economic decision making with the brain scans produced when such decisions are made helps understand both individual and group decision making, as brains individually and collectively try to maximise their intrinsic reward mechanisms, which may sometimes be at odds with extrinsic calculations of value.

The study of human decision making has been influenced by **game theory** since the Second World War. However, **normative decision theory**, which analyses the outcomes of decisions or determines the best decision to be made in the light of given constraints and assumptions, is increasingly influenced by neurological insights into **descriptive decision theory** – the analysis of how people and groups make the decisions they do. Digging beneath the apparent factors of circumstances, interests and power at play into the more fundamental biological foundations of individual and group decision making should improve the quality of decision making within such groups and the economic outcomes they generate in the world outside.

The human brain remains the most complex and mysterious structure[7] in the known universe, and studying its operation by way of other human brains brings its own set of complications. Until recently, it was impossible to record or analyse the chemical and electrical impulses which code memory or empower thought, and humanity was content to ascribe its workings to supernatural origins or model them through metaphor.

Such metaphors tend to reflect their time. Brains are commonly thought of as computers today, however imperfect, but accepting that homo sapiens is a product of biology and evolution, and that the use of technology does not make us machines widens our scope of understanding to embrace our animal reality.

The invention of highly sophisticated medical imaging technology such as functional magnetic resonance imaging (fMRI) allowed us to investigate the operations of our brains, all of which far pre-date technology. Similarly, accepting the imperfect evolution of humanity from ape-like ancestors eight million years ago helps us understand why human cognition and decision making which evolved to build tribes, hunt animals and evade predators, is ill-served by hidebound committees.

Just as economic orthodoxy embraced behavioural economics[8] after some initial scepticism, it is beginning to accept the validity of input from the new field of neuroeconomics. Similarly, organisational theorists and communication specialists are beginning to integrate the importance of cognitive processes into their advice on decision making and group dynamics.

THE POWER OF THE SECOND TRACK

The Second Track developed from its origins in international diplomacy[9] through more than two decades of practice and experience rather than implementing a prior theory of human communication. Theory of the Second Track is now developing from research into the successes and processes of Second Track engagements. This research is also being informed by the findings of scholars in the fields of neuroscience and neuroeconomics, whose insights will doubtless further hone its approach.[10]

Just as peeling back the surface layers of personal gain and psychological behaviour to investigate the neurological processes which drive them will help economists develop more sophisticated algorithms to predict the real-world consequences of policy decisions, so lessons from the Second Track and neuroscience will help groups arrive at better decision making in the future.

7. Mayfield Brain & Spine, 2021
8. Smets, 2017
9. Diamond and McDonald, 1991
10. Fritz, 2021b

The more we know about life, the more we realise there is more to discover. Just as neuroscience and psychology are uncovering the host of non-economic factors shaping our rational economic decisions, so research into the brain itself reveals that its decisions are produced by a complex interplay of regions and activity, rather than any single, simple driver.

While our actions are driven by fundamental forces and processes, our self-consciousness and intelligence allow us to not only understand them – however imperfectly – but to mould them to better ends more suited to current conditions. Knowledge gives us the power to change if we have the will to do so. 'First track' systems may be traditional, but they are not inevitable. Group dynamics are malleable, just as our brains remain plastic, although the ability of both to change declines with age.

Newly formed groups are more likely to accept novel approaches, just as children are more adept at learning a new language. People in Second Track groups created to investigate a problem are more likely to generate a new solution[11] because they can more easily adopt new ways of thinking, rather than being hidebound by long-standing institutions, even if drawn from established groups[12].

The explicit diversity of Second Track groups – in terms of sectors represented rather than individual experience, expertise or ethnicity – generates a broader range of input for members to consider, for example. Neuroscience suggests that our brains[13] – like our vision – evolved to tune out expected data streams to concentrate on surprises (a rustle in a bush rather than the bushes themselves). Therefore, this more significant variety of unexpected input impels all participants to stop at a visceral level and consider information they would hitherto not have known or view it from a new perspective.

Engagement in 'first track' groups tend to be motivated by economic factors – participants are paid to attend, or attend as part of their jobs, or seek economic advantage for the vested interests they represent. Second Track groups tap into a second, deeper, and a more powerful motivation: the emotional gratification generated in participants' brains when they form new group bonds and pursue a common cause close to their heart.

They may have joined because they felt stifled in their day jobs or seen proposals for change founder in entrenched bureaucracy but will be motivated to new heights of endeavour by the prospect of not only suggesting ideas which would have been impossible in their everyday interactions but driving their implementation themselves.

The importance of social interaction to humans cannot be overemphasised. Solitary confinement is an extreme punishment because our membership of tribes was once vital to our survival in the wilderness[14]. The Second Track has widely substantiated and explicitly leveraged the intensity and breadth of brain activity involved in social interactions. Participants attend voluntarily rather than being assigned or obligated, and the trust and common purpose found in voluntary groups united by a common cause tend to generate a higher level of effort and commitment. Neuroscience can track how the brain rewards itself for positive social interactions and seeks more in the future as a survival mechanism, just as it can chart the ways regions of the brain assign value to alternatives and undertake decision making.

The heightened level of creativity[15] expected from Second Track group functioning and focus on implementing effective outcomes also tend to force higher performance from their participants eager to align with the norms of the new 'tribe.'

11. Kaufman, 2019
12. Investopedia, 2021
13. National Institute of Neurological Disorders and Stroke, 2021
14. Koen, 2016
15. Fritz, 2021a

Similarly, the fluid agenda, positive ethos and open platform offered by Second Track groups echoes the 'yes and ...' formula. This is used by theatrical and comic improvisation groups to spin spontaneous stories and characters out of fresh air in ways individuals or formal groups could never have created. Mutual respect and trust in such troupes are fundamental to their success, and the common purpose, shared expert standing and impartial supervision of Second Track groups tend to build similar bonds which extend beyond the confines of the meeting to offline activities and additional endeavours.

Neuroeconomic research[16] has shown how the efficient allocation of value to alternatives becomes blurred when too many options are considered, and the brain works best when such choices are winnowed down to a manageable core. Second Track groups similarly sift the plethora of ideas and proposals they generate in the first 'brainstorming' meeting to select a more manageable list of practical projects in the second and plan implementation in the third.

The unique combination of personal motivation and positive group reinforcement in the Second Track encourages participants to act 'prosocially' and accept the need to revise their original views, rather than selfishly or defensively protect them, as they might in 'first track' meetings. As members have no official position to defend, and there are no penalties for 'blue sky' suggestions, they are more likely to suggest new solutions and approve or improve those of others rather than reflexively look to defeat them.

The Second Track offers a trusted and safe mechanism for disparate self-interest to coalesce into common goals and shared actions by working with people's deep-seated desire for social coherence and group inclusion[17]. While the First Track sees teamwork as merely a means to a pre-proscribed end, the Second Track encourages teamwork as its initial step, confident that it will produce ends and means as a consequence.[18]

The heterogeneous nature of Second Track groups means that members exposed to alternative views and experiences as a matter of course, rather than an occasional intrusion into a homogeneous group whose loyalty lies in preserving, rather than challenging, the status quo.[19] The Second Track can cross the barriers between different – and often rival – departments, companies and organisations because its participants leave those labels at the door while retaining all their expertise and experience. Just as evolution can occur through 'genetic drift' and natural selection, Second Track groups gain fresh vitality from the constant cross-pollination of ideas.

CONCLUSION

The Second Track was not created to put neuroeconomic theory into practice – the field did not exist at the time – but insights from neuroeconomics, as well as brain chemistry, evolutionary theory and human psychology, are helping to explain why the Second Track has proved successful across a wide range of sectors and circumstances. The development of artificial intelligence, machine learning and speech recognition technology allows additional insights to emerge through techniques such as sentiment analysis.

16. Nelson-Wolter, 2019
17. Kinch-Thomas, 2020
18. An example of the speed of Second Track processes can be seen, for example, in the rapid establishment of an OECD working party on small and medium-sized enterprises and entrepreneurship following a meeting of willing national representatives at the Australian embassy in Paris in 1992. This was an area which until that time was outside of the OECD's policy focus.
19. The Second Track is particularly useful in complex projects because it allows people from different groups, jurisdictions and seniority to reveal problems and discuss solutions without bureaucratic hurdles and delay of 'first track' hierarchies.

The Second Track offers an organisational model novel ideas are allowed to blossom on fresh ground, rather than being weeded out or buried as they can be in first track situations. This improves the quality of group interactions, the ideas they generate, and the commitment of members to implement them.

The Second Track allows disparate individuals to find a common purpose, exposes them to a novel, thought-provoking ideas and information, and leverages fundamental brain functions and group imperatives towards positive ends.

The acceptance that 'wicked' problems have a range of complex but explicable drivers is fundamental to understanding and the success of the Second Track. Rather than look for a single cure-all solution derived from past practice, or a single authoritative source, Second Track groups use their collective brainpower to synthesise a practical solution to particular problems. Second Track decisions result from the interplay of diverse participants, rather than any single contribution, just as economies are the product of myriad decisions and brain functions are a complex mix of areas and activities.

The human brain, and any group of human brains, are a mechanism for converting raw inputs into value-added outputs, just like a company or economy. Different members, and brain areas, will have their specialities, but all must be firing and interacting without barriers for the optimum result.

Further enhanced by ongoing research into neuroscience, the Second Track offers an ideal mechanism for reshaping the ossified organisational structures of the past to meet future challenges.

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ESSAY

MULTI-LEVEL ABSTRACT GAMES FOR POLICY, STRATEGY AND TECHNOLOGY DEVELOPMENT

Dr Darryn Reid

The scope of military simulations expands well beyond the traditional type of war games that focus on organised violent conflict. Defence scientist Dr Darryn Reid argues that the approaches and models used in modern 'wargaming' can inform better decision making in uncertain and fast-moving environments, such as economic planning.

When John Maynard Keynes outlined a notion of inherent uncertainty arising through the complex interdependent interactions between agents in a competitive investment environment,[1] he might just as well have been analysing the core observation of Carl von Clausewitz, one of the main founders of military theory as the field of philosophy examining the nature of war and battle.[2,3] Both effectively described precursors to discoveries of extreme impact in pure mathematics and right at the foundation of computer science, which would be developed starting about a decade later by Kurt Gödel, Alan Turing and others.[4] The implications are still being unravelled to this day.

It is common for modern defence organisations to develop and play various kinds of games, but what might be less widely recognised is that the scope of such activities expands well beyond just the war games that are directly focused on organised violent conflict. Their focus may sometimes not include any

1. Keynes, 2017
2. Von Clausewitz et al., 2001
3. Beyerchen, 1992
4. Copeland et al., 2015

direct warfare at all. Through its Modelling Complex Warfighting (MCW) initiative, the Defence Science and Technology Group is engaging with multiple research partners to build national capability in artificial intelligence for defence and national security, where, perhaps surprisingly, game models and analysis are also crucially important. Indeed, games are, somewhat counter-intuitively, the central focus in these efforts; this is because the focus is not directly on algorithm development as such, but on systematic problem-solving in problem domains that have tended to defy adequate resolution by current methods because of their intrinsic difficulty. Specifically, these problems are deeply 'wicked' – to use traditional Operations Analysis terminology – because they are high in inherent uncertainty, ambiguity, complexity and asymmetry. Games have central importance because they provide concise representations of wicked problems that capture core structural properties while washing out the mess of unnecessary and often seductively misleading details.

Games thus amount to empirically testable scientific decision-making theories in target wicked problem environments. Note that they are defined by decision-making purpose as by the problem environment itself, so there may be many distinct yet equally valid game representations possible for any given problem environment. This perspective on decision making motivates using game representations in the first place and defines the various actors in a game. Sides in a conflict are generally not monolithic. Instead of comprising multiple interacting actors, the list of actors may also include changing environmental features. Actors in games can even themselves be subordinate games.

The critical insight is that analysis has typically relied on, and hence been limited by, narrow and rigidly prescriptive models that do not fully represent decision making in realistic target problem domains.[5] Worse, a great deal of the time, models have been largely or entirely implicit, which means they naturally embody what often turn out to be overly strong assumptions that may reflect various biases, especially in obtaining ready pathways for developing solutions. Consequently, we seek to utilise explicit, immersive and well-situated models through analysis to establish them as reliable decision-making theories in a target problem environment to provide realistic yet abstract living embodiments of pivotal features. These features comprise the various modes of uncertainty, ambiguity and various kinds of asymmetries, particularly those set up by the potential for terminal failure.

Games, in this context, constitute decision-making theories in target problem environments designed to capture modes of self-reference in their logical structures. Any game model boils down to a system of invariant conditions that describe underlying symmetry properties in the problem domain, under which agents interact via a conflict, competition, cooperation, or all three. Unlike many narrowly prescriptive models oriented around a high degree of predictability in the target environment, these game models are about defining wide spans of possible evolution paths that may develop through the complex interactions between actors under the game's rules.[6] Because of this possibility of self-reference in the game structure, which leads to the presence of logical paradoxes, game models can generate environments manifesting fundamental uncertainty.

5. Reid, 2018
6. Samarasinghe et al., 2021

A prominent example of paradoxical self-reference can be seen at the heart of the military theory, which explains the nature of war and battle and applies to adversarial or competitive environments more broadly. What constitutes a good choice of action for a player is often heavily dependent on opponent action choices, so each player must develop expectations about each other players' future actions to make a good choice of action. What constitutes a good action to choose is thus dependent on what actions everyone is choosing, which means the quality of action choices is not a fixed function. This is also why deception takes such a central position: successfully distorting an adversary's theory about future actions by appropriate action choices changes – often radically – the goodness of future action choices to favourable effect.

Estimating opponents' capabilities within context is a crucial part of forming beliefs about their future actions. This is how uncertainty and ambiguity – both natural and deliberately created by disguising capability and its present arrangement – blend in formulating effective game strategy dynamically. Uncertainty occurs even in the presence of complete information, but realistic adversarial problems also involve creating ambiguity to disguise intent actively.

We can contrast paradoxical self-reference in game models with more familiar kinds of self-reference in which there is a stepwise reduction towards a base case (inductive) or generalisation away from a base case (co-inductive). In either of these situations, the self-referential structure ultimately reduces to an answer; the self-reference is just a way of compactly specifying a computation consisting of repeated steps. Most extant models, in contrast, have acyclic causal structures, or the cycles they do reduce away in this manner to a logically acyclic equivalent. Any time we have paradoxical self-reference, however, we will have a system that manifests inherent uncertainty because paradoxes in the formal logical sense do not reduce to simple answers, but to some properties of the system being unknowable within the context of the system.

There is a powerful emphasis on the systematic composition of game models in which actions can change the game itself. Such games are non-ergodic self-evolving systems, and this course of game evolution is generally unpredictable in detail – the game model's overall invariant conditions are outer bounds on what this evolution in terms of changing rules can produce. These bounds are typically at different levels of abstraction: they may be concrete for properties that are conveniently statistically predictable and successively more abstract for describing properties around which there is inherent uncertainty. Strategy, in military theory, is not about solving a given problem as such, but rather about shaping it over time towards eventually realising the kind of problem one is better to set up to solve.

A particular area of the current focus is simultaneously representing event sequences at different temporal granularities in game models;[7] many of the crucial properties in conflict involve self-reinforcing or self-denying feedback loops yielding paradoxical effects that play out across vastly different time scales. For instance, tactical events amount to relatively fine temporal granules but can generate solid strategic consequences at much coarser temporal scales, much as microeconomic activity might relate to macroeconomic policy formulation. It generally is not feasible to play a game entirely representing every time step at the finest temporal granularity

7. Cohen-Solal et al., 2015

– mainly when humans play as actors within the game – so the ability to represent only relevant events smoothly across dynamically changeable temporal scales is crucially important.

Usable invariant conditions – properties that remain constant – need be global. Systems subject to fundamental uncertainty typically undergo periods of relative stability concerning their various properties of interest in between rapid phase shifts, and these patterns can be different relative to different properties. There is often a fractal nature whereby equilibria and mode changes occur frequently but at different levels of abstraction. Temporal granules at different scales form a sliding kind of hierarchy against which more localised invariant conditions might be detected and exploited – in the case of artificial intelligence, the emphasis is on doing this dynamically, either with machine assistance or entirely within the machine – for the duration for which they hold before they dissolve when the problem environment undergoes mode shift. Invariant properties that last for only short periods are generally much harder to exploit; decision making is only reliable if it is possible to detect and respond to the potential collapse of temporary properties, and the detection and response often must occur at a finer temporal granularity than that at which the invariant property holds.

Given a game model, obtaining reliable decision making then boils down to finding invariant properties that are maximally concrete operating at the lowest practical time scales yet that are nonetheless still supported by the environment for the duration of their utilisation – as concrete as possible but no more – because using weaker invariant properties at higher abstraction yield unwarranted robustness at potentially unnecessary efficiency costs and loss of opportunity. Obtaining relative advantage over an opponent who also understands how to ground decision making in this way amounts to walking closer to the line than they can without crossing it, forming a theoretically endless competition.

The overriding observation here is that we have uncertainty everywhere, but that uncertainty is always bounded, never absolute: paradoxical effects are unknowability, within the context, of specific properties generated by an underlying paradoxical structure; that is, questions that just cannot be reliably answered within the game even with complete information. Understanding what can and cannot be answered within the decision-making context means obtaining reliable decision making within known limits. This recognition that wherever there is an unpredictable property, there is also a weaker and more abstract predictable one to utilise in its place was what was missing when Robert Lucas[8] described the axioms of economics as patently unreal yet also defended them as the only way to do economics scientifically.

Joseph Stiglitz has also reflected the sentiment in maintaining that although economic phenomena are manifestly not ergodic, using ergodic assumptions in economic analysis is necessary for us to have ourselves an economic science at all.[9] That economic phenomenon, like adversarial systems in war and battle, is generally not ergodic should be obvious and universally endorsed; yet it does not follow that analytical necessity of ergodicity means we cannot have science. It means instead that concrete predictability conditions may often need to be supplanted in analysis and technology development with abstract properties that describe weaker invariant conditions. This amounts to mapping non-stationary systems into stationary systems to which conventional methods can then be applied reliably, through abstraction.

8. Lucas et al., 1981
9. Davidson, 2003

In conclusion, theorists of war and battle emphasise this as a dynamic process because of the unpredictability of these inherently non-stationary problems. Planning in problem environments featuring uncertainty is not so much about producing plans as it is about detecting and responding – with an acute emphasis on doing so proactively – to their impending failure. Utilising invariant properties that hold for some limited time means that failure to produce credible plans requires folding back to higher levels of abstraction, typically operating at longer time scales.

Utilising game models to penetrate wicked adversarial problem domains involves two processes of abstraction. First, the game model is composed of game mechanisms to give testable decision-making theories in the target problem environment. Second, exploitable invariant conditions are extracted to base policy determination, strategy formulation, or technology development at potentially different temporal granularities. These exploitable invariant conditions may be enduring or temporary; in the latter case, solutions must handle mode switching dynamically. I warrant that economics might significantly advance in its ability to deal with wicked policy problems by adopting the same approach. Indeed, it seems doing so would be the realisation of science addressing the core problem of economics as set out by Keynes when he described his notion of fundamental uncertainty, distinct from stochastic chance, and the belief formation of economic investors.

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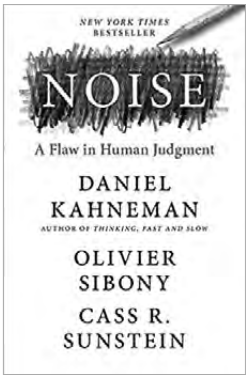
ESSAY

TOWARDS MORE CONSISTENT DECISION-MAKING (REVIEW OF DANIEL KAHNEMAN'S NEW BOOK *NOISE: A FLAW IN HUMAN JUDGEMENT*)

Ian McAuley

Kahneman's latest work takes us one step closer to understanding flaws in human decision-making. Policy commentator Ian McAuley reflects on the applicability of Kahneman's concept of decision hygiene to dealing with complex challenges – such as a global pandemic.



Daniel Kahneman and his colleague Amos Tversky introduced the world to behavioural economics, for which Kahneman received the Nobel Prize in Economics in 2002, Tversky having died in 1996. That prize was explicitly awarded for their work in *prospect theory* – an empirically based theory about how people depart from the "rational" economic model of decision-making in situations involving risk and uncertainty.

Their work was much broader than prospect theory, however, for they were concerned with the whole set of behavioural traits, some of them well-established, that influence our decision-making in economics and finance. Terms and concepts such as *overconfidence, loss aversion*, and *anchoring* are now well-established in the discipline of economics, thanks to Kahneman and Tversky.

Behavioural economists' analysis of the ways we make decisions is, in itself, a significant contribution, but they are also concerned with ways we can improve decision-making. Kahneman's 2011 work *Thinking, Fast and Slow*[1] explains how our quick paths to decision-making, which have served us

1. Kahneman, 2011

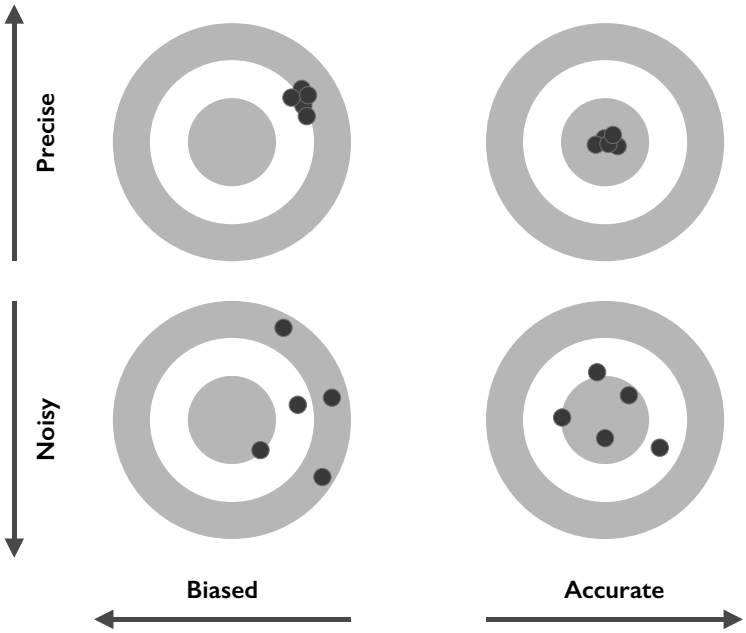
well in an evolutionary sense, can lead us to make sub-optimal decisions in many situations. Slow thinking, in which we engage our capacities to draw on experience, analyse and reflect, can often lead to better decision-making. Fast thinking, where we rely on gut feeling or simple heuristics (e.g., choosing only from the most apparent options), often leads to systematic biases in our decision-making. We are well aware of biases that lead us to save too little for retirement, underestimate the time we will take to complete a task, or overestimate our risk of dying from a circulating virus.

Kahneman's latest work *Noise: A Flaw in Human Judgment*,[2] written in collaboration with Olivier Sibony of École des hautes études commerciales de Paris, and Cass Sunstein, co-author of *Nudge: The Final Edition*,[3] takes us another step towards understanding flaws in decision-making, and importantly, to demonstrating ways to improve decision-making.

This work relies on a distinction between *bias* and *noise* in decision-making, best illustrated by the more commonly used distinction between *accuracy* (the opposite of bias) and *precision* (the opposite of noise).

For a visual illustration of the distinction, consider the four group shots on target patterns, shown in Figure 1. The two patterns on the left-hand side could come from shooters who have not compensated for the bias of a strong crosswind or whose rifles have the bias of poorly calibrated sights. The two patterns along the bottom – the "noisy" ones that seem to be all over the place – could come from inexperienced shooters or rifles with overheated barrels.

FIGURE 1



2. Kahneman, Sibony and Sunstein, 2021
3. Thaler and Sunstein, 2021

In this work, Kahneman and his colleagues are not mainly concerned with bias (although bias does come into one of their later chapters), but rather with noise. How can people make judgements subject to less noise?

This is not because they are unconcerned with bias – much of Kahneman's work has been on bias. In this work, however, they are concerned that there is often too much emphasis on bias while there is too little attention to noise. For example, if senior managers know that project teams almost always underestimate completion times, they can consider that bias. If we know that a polling company tends to overstate the vote for a particular political party, we can make a compensating adjustment.

Noise is much harder to deal with, however. They are writing not about the well-known and easily understood Gaussian distribution around survey data, but about the noise that arises from human behaviour in making judgements, not only in business and public policy but in everyday life. Nor do they go along with the idea that when noise is distributed around the correct point, we need not worry because the errors will even out. If a doctor diagnosing melanomas has as many false positives as false negatives, the consequences are severe: some will die of undiagnosed cancer while others will undergo the iatrogenic risk and cost of unnecessary surgery. If a company has recruitment practices that get it right on average but result in many poor choices, it will not find that the positives and negatives average out. The company will suffer the opportunity cost of not hiring good candidates and the realised costs of carrying poor performers.

Kahneman and his colleagues break noise into two main classifications – *level noise* and *pattern noise*, using the sentencing patterns of judges in criminal trials to illustrate these sub-classifications. Some judges are lenient, while others are tough. The sentencing inconsistencies result from the defendants' luck in getting an easy or tough judge to constitute *level noise*. The other inconsistency that influences judges is that some may be more focused on specific aspects of crime than others: they may be particularly tough on crimes against certain minorities. That is pattern noise.

There will be easy markers and harsh markers in school and university examinations of subjects without clear right-wrong answers (*level noise*). There will also be markers who will apply more weight to certain aspects of papers than others in the absence of clear guidelines or standards: some may be most concerned with factual accuracy, some with an understanding of concepts, some with logical structure (*pattern noise*).

They also mention *occasion noise*, referring to the way people's judgements may be affected by their mood or general disposition, such as the much-circulated finding that judges in criminal trials are harsher when hungry. Perhaps we can compensate for such tendencies in our behaviour with a bit of self-awareness, but it is not always clear-cut. For example, an examiner marking 100 essays may subconsciously anchor her marking criteria on the first two or three ones she examines.

Most of the authors' work is devoted to reducing noise in decision-making under the general heading of improved *decision hygiene*. Most of their suggestions, such as obtaining independent judgements from multiple judges and bringing the results together, are not new. The International English Language Testing System (IELTS), which is used to screen people seeking to work, study or live in English-speaking countries, employs an extensive suite of noise-reduction techniques described by Kahneman and his colleagues. Examiners must use detailed marking criteria, retrain and recalibrate at regular intervals, be subject to the periodic random second marking of writing and listening, and the candidate can request a second marker.

Rather than advocating new techniques, the authors emphasise extending established low-noise decision-making techniques to more areas of human activity. They acknowledge that in areas such as medical diagnosis or forensic science, there are already high and improving standards, but they note that even fingerprinting has its limits in a short whodunnit story.

They are particularly concerned with recruitment methods and related issues in performance assessments. To an extent, that may reflect Kahneman's own experience in the Israeli military, where he had been a psychology officer upending established ideas and practices about recruitment and induction.

Even though firms and government agencies use established procedures for recruitment and dedicate much effort to the task, these procedures generally allow for a great deal of noise to distort the process. As most people know, signals that have little do with a position's duty statement – such as a candidate's clever responses to "warm-up questions", carefully selected clothing, and gait on entering an interview room – can have a significant effect on even the most disciplined selection panel.

While the authors are zealous about getting rid of noise, they are aware that some noise-reduction techniques can have costly consequences. Because they remove human judgement from decision-making, rigid algorithms can be noiseless, but that does not mean they lead to sound decision-making. Australians who have observed the costly failure of the so-called "Robodebt" scheme for assessing compliance with social security schemes would have no difficulty understanding this point.[4]

Between automation and unfettered human discretion, there are many options for noise reduction, however. They advocate rules that remove as much ambiguity as possible from decision-making: for example, where possible, more reliance on specified standards rather than on general guidelines.

To deal with the problems of examination papers mentioned above, universities and marking authorities may have standards specifying only X per cent to be classed as high distinction, and so on, but even the best ranking systems become subject to upward classification creep. Furthermore, some standards are just dysfunctional, such as Jack Welch's demand that the bottom ten per cent of performers be fired each year: if General Electric was giving jobs to so many poor performers, indeed this was a case for improving their recruitment system. If whatever system the organisation has used to cut out noise does not work, do not abandon the effort: find better methods.

They acknowledge that an emphasis on noise reduction can be subject to the law of unforeseen consequences. The world is not as neatly ordered as designers of decision-support systems would like it to be. There are reasons for human discretion in decision-making – reasons to do with procedural justice, the difficulties of specifying decision criteria, and changing standards.

The authors' advice for improving decision hygiene seems most appropriate for routine, ongoing business decisions, such as recruiting new employees. To illustrate the applicability of their advice to a unique decision, they take the reader through the way a company may decide whether to bid to acquire another business – a process that involves carefully defining different criteria, bringing many people into the assessment, keeping those people from influencing one another's tentative judgements, and avoiding the risk of an early preference.

Is it all too neat, however? Is their advice designed only for a world where the consequences of decisions are incremental, such as hiring a

4. Parliament of Australia, 2020

new employee or making a better melanoma diagnosis? Does it hold for decisions about a company completely changing corporate strategy, a government deciding to change its whole approach to climate change, or public health authorities dealing with a pandemic?

Although the book was written before the results of various governments' approaches to the pandemic could be analysed, we can observe that those governments that have made their decisions on advice from experts in public health and economics have generally made better decisions than those that allowed gut feelings to dictate their moves.

Nevertheless, we might also ask if following the authors' advice on good decision hygiene would have saved governments from the error of assuming that the pandemic-induced recession was going to play out in the same way as other recessions. This assumption led to an extraordinary bout of housing price inflation, increased capital market values, and expensive misdirected compensation payments.

Governments and businesses are dealing with the pandemic, where there is some history, and there are well-established sciences of virology, epidemiology and public health. They are now in the much more complex territory of climate change. There will be better and worse ways to make decisions to deal with the challenge of keeping warming under two degrees by 2050. Is it possible, however, that some of the solutions come from unexpected directions, from gambles that defy some decision-making rules?

Maybe the world is less deterministic than we would like it to be.

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4. Usefulness
5. Persuasiveness

BACK PAGES

Group any references and appendixes, tables, and figures at the end of your manuscript. Continue your page numbering

HEADINGS AND SECTIONS

BESS® uses only three levels of headings. Use Word-heading 1, 2 & 3 function.

Don't skip steps: no second-level headings before you use a first-level heading, for instance.

Examples:

Methods [1st level]

Data and Sample [2nd level]

Measures [2nd level]

Independent variable [3rd level]

Dependent variables [3rd level]

LENGTH

Articles should be a maximum of 9,000 words.

Research notes should be a maximum of 4,000 words

Essays should be a maximum of 2,000 words.

STRUCTURE

Articles should follow this paper structure (1st level headings only listed here):

1. Introduction
2. Literature review
3. Methodology
4. Findings
5. Discussion
6. Conclusion
7. References

Research notes should follow this paper structure (1st level headings only listed here):

1. Topic: what is the idea?
2. Significance: why is this important?
3. Innovation: what is new?
4. Relevance: why do managers need to know about it?
5. Application: how can this idea be applied?
6. Credibility: what should we trust this idea? (build on previous knowledge or experience)
7. Track record: where is the evidence? (case study or other)

While this structure is recommended, it is not essential. Authors may still submit papers if they do not wish to follow this structure.

Essays do not have to follow any particular structure. If in doubt, follow the structure of the research notes.

REFERENCING

BESS® adheres to the Harvard Referencing Style Guide.

FOOTNOTES

Use footnotes placed on their respective pages (not endnotes).

TABLES AND FIGURES

The preferred format for regular tables is Microsoft Word; however, Acrobat PDF is also acceptable. Note that a straight Excel file is not currently an acceptable format. Excel files should be converted to a Word or PDF document before being uploaded.

Tables should be formatted as follows. Arrange the data so that columns of like material read down, not across. The headings should be sufficiently clear so that the meaning of the data is understandable without reference to the text. Tables should have titles and sufficient experimental detail in a legend immediately following the title to be understandable without reference to the text. Each column in a table must have a heading, and abbreviations, when necessary, should be defined in the legend or footnote.

Number tables and figures consecutively (one series for tables, one for figures). Place them at the end of your manuscript, but indicate the position of each in the text as follows:

Insert Table 2 about here

Each table or figure needs an introductory sentence in your text.

BIOGRAPHICAL SKETCHES

Each author of an accepted article is asked to submit a biographical sketch of about 70–150 words.

Your sketch should identify where you earned your highest degree, your present affiliation and position, and your current research or business interests. Authors should include an e-mail address.

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