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Mr Kevin Scarce
Commissioner
South Australian Royal Commission on Nuclear Fuel Cycle

www.nuclearrc.sa.gov.au

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Dear Commissioner Scarce

I present the submission to the SA Royal Commission on Nuclear Fuel Cycle from the Centre for Culture Land and Sea Inc.

Yours sincerely

Ruth Trigg
Director

FIRST THE **EARTH.**
ECOLOGY
FOR A HEALTHY **PLANET**
BEFORE
ECONOMY
FOR UNHEALTHY
LIFESTYLE



The Royal Commission has produced four Issues Papers that are intended to generate community and industry discussion on the associated risks and opportunities of these aspects of the nuclear fuel cycle.

This submission is focusing on the risks.

Executive Summary

The Centre for Culture Land and Sea Inc (CCLS) does not support extraction, storage and milling of nuclear material, and does not support the management, storage and disposal of nuclear waste.

The Centre for Culture Land and Sea challenges the framing of the four issues. They reflect a dominant view consistent with science discourse that humankind is in charge of all living and non-living matter and systems. This discourse is now not only redundant as a belief system, but its dominance as a belief system is in a great degree, responsible for the threats to the survival of the living systems on the earth.

The Centre for Culture Land and Sea challenges the SA Royal Commission on Nuclear to recognise the severe threats to living systems now facing the earth, and challenges the Royal Commission to acknowledge that these threats cannot be solved by nuclear science and technology.

The Centre for Culture Land and Sea reinstates the issues, offered by the public, which have been denied and removed from the proper consideration of this Royal Commission. The issues about nuclear have been separated from the other issues, such as environment, culture and community. These issues of environment, culture and community are not only connected, but have priority over the nuclear questions presented for examination in this Royal Commission.

The Centre for Culture Land and Sea presents to the Royal Commission the removed terms of reference and requires the Royal Commission to address them. These are:

the severe threats to the living systems of the earth

the ways science, technologies and industrialisation have contributed to these threats

the human demand for energy and production of goods threatens the interconnecting living systems of the earth

the significance of knowledge about culture and community having higher priority than science and technology in addressing these threats.

The Centre for Culture Land and Sea advocates that the cultural work for humankind is to remove itself from the 'god' position of engineering the world for its own unbalanced needs, so that, instead, humankind lives on the earth as within the living species and living systems, not above it.

This cultural work needs to be an essential term of reference for this Royal Commission as it considers the place of nuclear.



Submission

The reintroduction of terms of reference for this Royal Commission on nuclear issues is supported by detailed linguistic analysis of science and the dominant metaphors and tropes science has developed since the 1600s. These analyses will be presented, as follows.

First analysis: inadequacy of the terms of reference

The inadequacy of the terms of reference reveals the severe problems with the way science is currently practised and disseminated. These problems are unwittingly exemplified within the language and processes shown on the website, nuclearrc.sa.gov.au.

One problem in current science and the way it presents itself and the way it 'acts' on the earth is the constant effect of creating false hierarchies between 'science' as the dominant paradigm, and 'culture' as the soft, unscientific, weak pair of the binary opposition. Binary opposition is a linguistic analysis where the strength of one side of the binary is dependent on the weakness of the other. It can be shown as:

[Science – strong (based on facts)] *opposed to* [Culture – weak (based on story)].

To develop the analysis that the text from the website exemplifies severe problems with science, as developed further in this submission, I am quoting from the text from the website (collected 23 July 2015).

The submissions noted the need for the Nuclear Fuel Cycle Royal Commission to consider:

- *the effect on the economy;*
- *the effect on the environment;*
- *nuclear safety;*
- *renewable energy technology;*
- *the impact upon communities, including aboriginal communities;*
- *the effect on other sectors of the State's economy, in particular the tourism, wine and food sectors; and*
- *technical issues.*

This feedback was carefully considered and reflected in the prepared [draft Terms of Reference](#).

Reflecting concerns raised in the submissions, the draft Terms of Reference specifically requires the Royal Commission, when inquiring into the risks and opportunities associated with these matters, to consider, where appropriate, their impact upon the economy, the environment and the community (including regional, remote and aboriginal communities).

The four terms of reference are:

Exploration, extraction and milling

This Issues Paper looks at the feasibility of expanding the current level of exploration, extraction and milling of minerals containing radioactive materials in South Australia. It will also examine the risks and opportunities that will exist if the level of exploration, extraction and milling is expanded and how this might be regulated.

Further processing and manufacture

This Issues Paper looks at the processing and manufacturing of radioactive and nuclear substances, including conversion, enrichment, fabrication or reprocessing in South Australia and risks associated with doing this.

Electricity generation from nuclear fuels

This Issues Paper will look at the future potential of generating electricity from radioactive materials in South Australia. It also discusses the risks, opportunities and impacts compared with other methods of electricity generation – including renewable sources.

Management, storage and disposal of waste

This Issues Paper will look at the possibility of managing, storing and disposing of nuclear and radioactive waste in South Australia. It will also examine the risks and opportunities of doing this.

This text, quoted in italics above, contains three main sections.



The first section is the list of points summarised from submissions by people responding to a request to help develop the terms of reference for the Royal Commission.

- *the effect on the economy;*
- *the effect on the environment;*
- *nuclear safety;*
- *renewable energy technology;*
- *the impact upon communities, including aboriginal communities;*
- *the effect on other sectors of the State's economy, in particular the tourism, wine and food sectors; and*
- *technical issues.*

The terms within the seven dot points above can be separated into two groups. The following terms

Economy, environment, renewable energy technology, impact upon communities, including aboriginal communities, tourism, wine and food

comprise one group.

The other group is

Nuclear safety, technical issues

The first group is longer and contains descriptors that are clearly identified as connected to culture and community.

The second group is shorter, and is presented in the affirmative regarding nuclear – nuclear safety, and a non-descript term, 'technical issues'.

The second part of this text is the statement:

This feedback was carefully considered and reflected in the prepared [draft Terms of Reference](#).

The four draft terms of reference form the third section for this analysis. But nowhere in the four draft terms of reference;

Exploration, extraction and milling
Further processing and manufacture
Electricity generation from nuclear fuels
Management, storage and disposal of waste

or in the text accompanying them as further description, do any of the terms relating to culture and community appear. These considerations have completely disappeared, despite the declaration:

This feedback was carefully considered and reflected in the prepared [draft Terms of Reference](#).

This practice – for it is a continual practice, of making declarative claims which are then completely abandoned, has been described as

'Facadism.' The practice of appearing to consult with the public, but using practices which prevent or repudiate interaction—and still claiming 'consultation' has occurred. (Trigg, R 2005)

The terms of reference are inadequate for two reasons.

The managers of the Royal Commission claim to have gathered, considered and included public concerns, concerns which have a rightful connection for culture and community to the question of nuclear development. But then they immediately make these concerns invisible, despite claiming the opposite.



This behavior is justified on the basis that science has a prior and dominant position over culture and community considerations, because of the position of each in the power relationship of binary opposition – science is made present, culture is made absent. This is a process which is constantly repeated in the culture. It is a process which is constantly justified, because it is the ‘rightful’ exercise of power.

Here, in this submission, through these analyses, I challenge these beliefs, assumptions and use of power. The practice of power in affirming the priority of science over culture means this Royal Commission is not based on equivalent terms of reference incorporating both culture and science: it is already deeply complicit in a biased analysis.

A strategy is used of confining the disciplinary fields drawn on to conduct discussion and development of knowledge around complex issues. Authority is made through mono-disciplinary proclamation rather than multi- and trans-disciplinary engagement.

The remaining sections of this submission will present further evidence to support this analysis, that the terms of reference make the work of the Royal Commission deeply complicit in a biased analysis.

This work, presenting this critique of the work of the Royal Commission will be presented as a full submission, and will not be relegated to the position of appendices.

Second analysis: culture and language speak their terms of reference

The question being silently posed, but not articulated, in this Royal Commission, is:

What has to be done to maintain the economics of expansion, and maintain and further develop the sciences and technologies to support this dominant paradigm of entitled economic expansion, and the ‘lifestyles’ for some, dependent upon this expansion?

I submit that this is the wrong question.

The earth is at a state where the interconnecting living ecosystems of the whole earth are at tipping point. Tipping point means that once exceeded, former states of diversity and interconnectivity to maintain the living ecosystems of the earth cannot be regained.

I submit that in the known, but ignored, state of knowledge where the interconnecting living ecosystems are at tipping point, the question most ethically demanded is:

What are the cultural changes that are needed to live within the current means, to reduce the threats to the interconnecting living ecosystems of the whole earth?

This question reframes the work away from a focus on the dominance of science as the epitome of knowledge, to a focus where the values and beliefs of cultural and community systems need to be brought to the fore, so that the proper work to restore the earth can be carried out. Then people can live well on and with the living earth.

This prioritising of one question over the other is exemplified in the very presentation of material on the nuclearrc.sa.gov.au website, as analysed in the previous section.

The commission requires responses in the four areas of Exploration, extraction and milling; Further processing and manufacture; Electricity generation from nuclear fuels; and Management, storage and disposal of waste.

All of these areas are the scientific and technical areas of nuclear materials and energy. These topics have not included, in the list of significance and equivalence to the science and technology, culture and the living ecosystems of the earth, as legitimate fields to locate and present analysis of risk.



The absence of these fields is not unexpected in a dominant discourse of science and technology. Discourse is a technical term within the field of sociolinguistics. This field of knowledge and analysis has followed a parallel path to the development of physics since the 1600s. The field also refers back to knowledge about language and power developed by the ancient Greeks, particularly through Socrates, Plato and Aristotle. Science also refers back to this era, to those who asked questions of the universe and developed models and metaphors to attempt to answer their questions. Language such as 'atom' and 'rhetoric' has an important history in both the study of science and culture and language.

Discourse - through critical discourse analysis - offers ways of discerning power and language, and the ways these apparently separate phenomena are intertwined within each other. Intertwined In a similar way to matter and energy. A contemporary analysis of the discourse of science is that it presents itself as based on independent method (the scientific method) and is thus value-free. This can be shown to be a powerful, but erroneous, belief. Science, because it has been formed within cultures using the practices of cultures, such as symbolic forms within mathematics, graphs, models, reports, journals, seminars and conferences, is made within symbolic forms created within culture, and science carries those forms within it, even though the processes of creating the forms may appear silent and unseen.

The belief that the work of science - as a value free enterprise - is more significant than the history of science, the sociology of science, the philosophy of science, the critical analysis of science, is a false belief. The absence of these knowledge disciplines to make a submission to the SA Royal Commission on Nuclear is evidence of this dominant belief.

To make the case that the analysis which will be offered, is as significant and equivalent as the four issues listed for response in submissions, this submission, in the fields of history of science, sociology of science, philosophy of science, and critical analysis of science, will be presented as a full submission, not relegated to the back irrelevance of an appendix.

I am bringing the analytical tools for this submission to the surface.

The first is the rhetorical analysis developed by Aristotle, following Plato, to analyse the effectiveness of the senators presenting their case to the public from the steps of the senate.

This tool is the interconnecting rhetorical effects, both in presenting and receiving communication: ethos, pathos and logos.

The second field of analytical tools emerges from the advances of sociolinguistics and critical discourse analysis (Aronowitz 1998, Halliday 1985, Halliday and Martin 1993, Harding 1991) since WW2. A parallel image is that of the advance from straight line Newtonian physics ($F = ma$) to exponential physics of Einstein ($E = mc^2$). Language has shifted from Latin grammar of external description of parts, to Hallidayian grammar - the meaning is within the grammar - the relationships of subject, verb and object - who is doing what to whom. These internal relationships rather than the 'meaning' of the words on the surface reveal the deeper cultural constructions of power and meaning within the culture. Science is within this cultural complexity, not discrete and separate from it.

This is the critical linguistic outline of the field I am working in. The other fields, as important, are from the disciplines of the history of science, the sociology of science, the philosophy of science, and the critical analysis of science, using critical discourse analysis.

Third analysis: science and the rhetoric of 'panic', 'salvation', and 'inevitability'

There is a dominant belief that humankind is the dominant species on earth, and that the needs of humankind are the prior needs over everything else. The needs of humankind are now described almost entirely by discourses of economics, and by one dominant economic discourse which only considering expansion of production and consumption. There are other economic discourses such as 'steady state economics' which present a model for new relationships with the earth, with cultures, and with energy needs and production of goods. (Lawn 2014)

There is a rhetoric of 'panic' about threats to the earth, but the threats to the 'economy' shout out loudest and override the threats to the earth. The panic about the economy creates the loudest discourse, its sole purpose to keep the current economic systems 'afloat' (for some).



There is a dominant belief that science can 'save' humankind, and the challenged planet, from the threats which are now known. There is a dominant belief that it is 'inevitable' that science will develop new technologies to 'save' the needs of some of the economies and some of the peoples of the planet, by supporting the expansionary economic model, in the belief there are no other possibilities.

I submit, that while these beliefs about science and its project in the world are dominant, and in fact, underpin the focus of this Royal Commission, they are false and redundant beliefs. I submit the following layers of analysis to support this statement.

Science derives its prestige from beliefs that it is based on 'facts' and is therefore 'value-free'. Established work in language use [Latour and Woolgar 1979, Halliday and Martin, 1993 Harding, 1991] has shown that 'facts' are not value-free, and a report generally has a deep stream of argument (position, point of view, line of best fit, persuasive strategy) even when it purports to be 'value-free'.

Fourth analysis: the multidisciplinary fields that interconnect to support this submission

There is a deep grammatical metaphor operating with the whole project of the Royal Commission that asserts (silently, because it is embedded as a cultural given) that the knowledge developed within physics, mathematics and the allied science are pre-eminent above all other knowledge forms.

The linguistic analytical strategy of looking at the deep structures of grammatical metaphor and their illumination of significant, but unstated power structures within the culture, reveals how the facadism of asking the public for terms of reference, and then completely ignoring them, can occur without challenge. The silent support for a false hierarchy of knowledge and power determines that this is as it is.

The multi-disciplinary fields that interconnect to support this submission mirror the complexity and diversity of the sciences involved in nuclear physics and technologies. This submission does not allow this relegation of these significant and equivalent cultural and linguistic analyses to the appendices.

The following sections are connected. The threads of analysis and meaning that emerge from the parts connect to make a stronger whole. These connected analyses challenge the dominant assumption that science is a salvation project for the planet and its peoples.

Science is not a salvation project for the planet and its peoples. It is one form of knowledge amongst others. These parts present the case to support that analysis, which is the basis for this submission.

Ethics

What does it mean to bring the forces of linguistic analysis into the forces of the science project operating through the culture and on the planet?

It brings a shift from spectator to participant; in ethical issues and directions for citizens interested in the culture.

It enables a shared literacy, or shared literacies, as the work of science and language communication and culture intersect. This will reveal positions and actions for agency and accountability.

It will make a shift from the individual to the cultural, and from the cultural to positions of 'mindedness'.

It will enable literacies to deal with the important new work of bringing 'limitations' into a culture where a false mode of 'progress' dominates all thought and action.

It will enable literacies to perform reflexivity – to stand outside one's familiar discourse community and ask 'What is going on here?'

It will enable literacies to develop considered, mindful vision about what else is possible.

It will enable public sharing and action around the ethical imperatives of 'We can, but should we?'

It will enable new models and practices for science, to move beyond 'control' metaphors of panic, salvation and inevitability, to knowledge metaphors which acknowledge complexity.

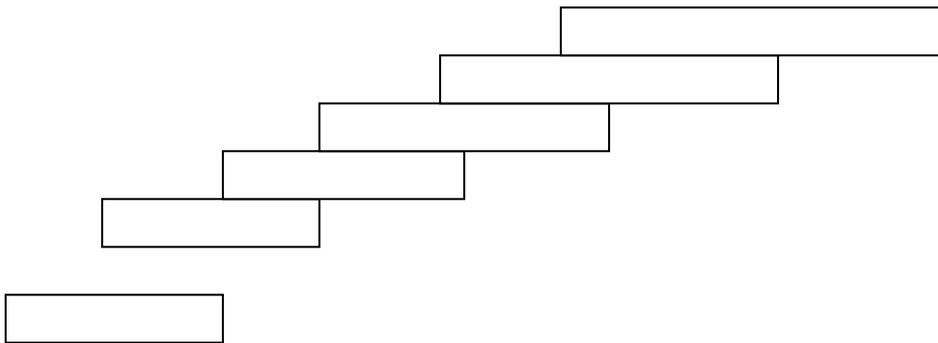
It will enable art knowledge, the pulsing rhythm between part whole part whole, to be enacted within science.



The cantilever model

The imminence of collapse has to be met with the resurgence of balance. The choice is not whether, but how, and how quickly. To step out of old learning and old knowledges. To ask, what needs reclaiming, what needs dumping? We still have the living memories of our recent ancestors and their living in modest connection with the earth. The earth remembers them. Slowly, calmly quietly, we can too.

There have been various 'revolutions' in knowledge and cultural practice over the past five hundred years.



On the bottom left, the agricultural revolution. Next, above, disconnected, the scientific, then the industrial. Then the technological. Reaching to the furthest, to the outer solar system and within to the smallest, nano particles. Cultural, social, and economic layers and constructions. None of these are discrete, all are infused with some of the previous developments.

The point is that the systems are at tipping point. And the knowledge closest to the earth, in the agricultural era, has been lost to many living in highly industrialised cultures. The technological has infused the social, so that social relationships are mediated, not face-to-face as in the village, but disconnected/connected within and through technology. The village is the world, instantly/deferred, the communication both connected/disconnected through instantaneous time and delayed time, email, texting, facebook, blogs. The social cultural consciousness of interconnection within, through and across cultures, a shared world mind dynamic of social connections (for those with the technology) but disconnected from the flowing rivers and growing earth. A mind consciousness of economies, of moving capital, which like science, has segmented the connectedness of the living world into units of exchange, to trade for units of profit (and loss). Water is not a primal, integrated fluid in the dance of life and regeneration of the earth, it is a commodity that can be traded as if it was coal, or gold, or labour. In this universal shared consciousness, primal knowledge has shifted. What was understood as necessary for life (integrated ecology) has now become necessary for life (integrated economy). In this frame of meaning, the living systems can be exploited to the state of catastrophic collapse.

This new cultural work is to unlearn some knowledges and relearn others. Unlearn war. Unlearn exploitative economies. Relearn the most basic systems of a living earth.

Photosynthesis. Where are the operas written for the grandeur of photosynthesis and its core place in life? Light energy from the sun, converted by green plants to food for every living thing.

Climate and perspective. The climate of the earth happens in a distance less than 80 kilometres above the earth. If that distance from where a person stands is stood vertically, in comparison with the size of the earth this is a strand of hair circling a soccer ball. What mess do we throw up into this atmosphere as if it doesn't matter?

Fractals . The beautiful dance of life, everywhere around us, in the shape of a tree, the uncurling frond of the fern, the pattern of the olive oil in the pan after cooking. Before we depart this life, let us find the meaning, the living dance, of fractals.



The scientific method and its limits

Scientific method refers to a body of [techniques](#) for investigating [phenomena](#), acquiring new [knowledge](#), or correcting and integrating previous knowledge. To be termed scientific, a method of [inquiry](#) must be based on gathering [observable](#), [empirical](#) and [measurable evidence](#) subject to specific principles of [reasoning](#).^[1] A scientific method consists of the collection of [data](#) through [observation](#) and [experimentation](#), and the formulation and testing of [hypotheses](#).^[2]

Although procedures vary from one [field of inquiry](#) to another, identifiable features distinguish scientific inquiry from other methodologies of knowledge. Scientific researchers propose [hypotheses](#) as explanations of phenomena, and design [experimental studies](#) to test these hypotheses. These steps must be repeatable in order to dependably predict any future results. [Theories](#) that encompass wider domains of inquiry may bind many hypotheses together in a coherent structure. This in turn may help form new hypotheses or place groups of hypotheses into context.

Among other facets shared by the various fields of inquiry is the conviction that the process be [objective](#) to reduce [biased](#) interpretations of the results. Another basic expectation is to document, [archive](#) and [share](#) all data and [methodology](#) so they are available for careful scrutiny by other scientists, thereby allowing other researchers the opportunity to verify results by attempting to [reproduce](#) them. This practice, called full disclosure, also allows statistical measures of the [reliability](#) of these data to be established. Wikipedia 14 August 2009

The scientific experiment is one of the most significant developments in the history of knowledge. It is a process or method where the complexity of things and relationships are made manageable for examination by reducing as many of the 'fuzzy' characteristics as possible, controlling the others, and then comparing one aspect through repetitive experiments. This gradually brought about a shared process and with it an understanding that things could be understood in terms of their constituent parts. The parts could then be analysed using the same process for finer and finer degrees of understanding about what the living and non-living world is composed of.

All of the parts of this method required language, communication, writing and code-making, from a drawing to design new equipment, to jottings in notebooks to record data from results, from the graphs and charts to gather and interpret the data, from the methodologies of 'best fit', to the formulation of patterns (laws), to the writing of articles, to the formation of scientific journals, to the formation of scientific communities.

Once the initial work of thinking, hypothesising, designing experiments and carrying them out, and interpreting the results had been completed, most of this early work 'disappears from view'. A new law or idea takes on a status of its own as if it had not been through this process of human work and gains credibility as if it had emerged, complete and fine, from the annals of the universe, independent of human interaction.

Because all the work of science is human work and is developed through human practices of thinking and making knowledge through language, then it also completely and irrevocably, carries the deep grammar and code-making features of this human work. When the scaffolding of its making has fallen away, it is still an artefact of human work. It may be an excellent approximation of the workings of this wondrous universe, and be an excellent working stage for new understandings to be developed, but it always needs to be referenced back to its beginnings in the human arena, and not toward some separated text where the deep design of the universe is 'recorded'.

An important part of the scientific method is its openness to the scientific community so that experiments can be repeated and checked. A report format was developed to show what the hypothesis was, what processes of analysis were used, what the data and results were and what conclusions were formed.

An unknown thing was gradually identified through its parts. The amount of knowledge that has been delivered to the world through this method now carried out all over the planet, for the past four hundred or so years, is astounding. And every year the quantity of knowledge increases exponentially.

The deep metaphor inherent in this process, and in the language and communication practices surrounding it, is profound. It is the metaphor of whole entities being distributed into their parts.



This method and metaphor has served the world well, to a point. This point in history, is now. It is now out of date. Its constant application in the laboratory, in the world, in the minds of bureaucrats entrusted with protecting the world from environmental damage, much of which is a 'result' of scientific knowledge, is in itself, a threat to the future of the world.

The metaphor of control over, within and through the whole universe, is fully infused into systems of thinking and cultural ways of acting so that they are now 'normal'. We can send machines into deep space, We can send nano particles into the body as machines to 'do work' at the molecular level. We have devised technology that can link us to others on the planet immediately.

The 'control and split' action, universally, is now the action that threatens the planet.

The other half of 'reducing an entity to its parts' is to recreate the whole again. This means doing a new kind of science. It also means understanding how the first method, the scientific method, has now, reached its limit. That does not mean that it should stop immediately. But new methods, new understandings should be brought alongside it to correct its limitations, and to do the new work of devising new kinds of science.

An analogy is to consider the knowledge and methodology of a 'Newtonian' world, the straight line world of $F=ma$, to the Einsteinian world of $E=mc^2$ and its fantastic refusal to be pinned down to certainty, to its dance in curves and spaces and evolving delight in both the huge and the small.

There are deeper historical knowledges to be brought into this discussion. The women living close to the earth, collecting herbs and plants and developing knowledge of their healing properties, were denied access to the laboratories in the 17th century when science became organised as a social project. The knowledge of the women connecting people with the earth, with its seasonal changes, with its healing and regenerating capacities was mapped onto metaphors of generation and complexity which intertwined with the social and living and non-living world. These knowledges, practices and metaphors were excluded from the new science laboratories with their practitioners.

Instead of many conversations and practices to develop knowledge about the earth and the universe, one form developed; that of controlled rationality. The monoculture of that approach has delivered much and is now potentially being devoured by the limitations of its own project. The earth has never been monocultural. Its deep metaphors are about diversity. Deep knowledge does not reside in the 'truth' of a set of laws but in the awe of the complexity of the phenomenon of life and matter. Being within, not above.

The need to name the limits of monocultural thinking practices is now.

How are we constantly massaged by the universal grammar of the 'control and split' metaphor? The scientific method is the deep structure for this, and other episodes of it are now as deeply infused in the language and thinking throughout the world. There are several messenger metaphors carrying this code into the culture. One is DNA, and 'gene'. Another is the energy within the atom.

The scientific method is powerful, but submerged. It delivers 'truth' statements, dispersed through the 'fairy story, knight in shining armour' myth pattern, offering salvation and hope.

DNA is visible, universal, and has taken on the status of the 'god' code messenger. It is anywhere, anytime, and can do anything. Its Robin to the Batman is the 'gene', also the clean, precise, deliverer of hope.

The development of nuclear 'power' is another eminent metaphor of control 'over' the world. This development, over the past century, was launched in conflict, and still carries deep messages of threat to the living world. The capacity to stay in a threatening form for thousands of years, which was not a threat a century ago, needs to be determined not by scientific analysis but by cultural interpretation. Not, we can do this, but, do we want to?



DNA is the most 'read' and recognised acronym in the world. The letters do not need to be spelled out, as the actual name of the molecule is now one of its lesser meanings. The spiral helix is long passe, no longer required. The DNA code has become firmly fixed in our consciousness as science-in-action. It almost always appears in the 'subject' position when it is used—it is the 'process' controlling the action. This subject position also replicates a great deal of gendered power still operating in the culture, the power of the place in the grammar controlling the action, rather than being the receiver of the action. Closed binaries of power are reproduced, reducing the capacity for all members of a society to engage with diverse and complex metaphors.

DNA is now a universal metaphor for engineering in its most complete form. Its consistent and universal meaning is that humankind is the universal engineer. We can DNA our way into the past, the present and the future, and it will deliver any kind of knowledge that we want, from huge to small scale.

We regularly read about its potential capacity to bring back the ancient dead species, the dinosaurs, or the recently extinct, the thylacene. It can identify human remains found from a war a century ago. It can identify people damaged beyond recognition in accidents. A trace left at a scene can identify criminals. Parents of children can be identified and in the world of mix and match surrogacy, the laws and courts are far behind in keeping up with the combinations of egg and sperm, carrier of the foetus and eventual caregivers of the child, but DNA analysis can trace lineage. We will soon have DNA gadgets so that we can check whether we are getting the right species of food we order in a restaurant. The term is now a meta-metaphor which has migrated into every corner and code of the earth and its populations.

The meaning of this metaphor is that we, as humankind, can cut and paste and identify anything we want to in the world. We are triumphant engineers, no knowledge is now hidden from us.

The DNA code has extended to the metaphorical and real power of the 'gene', the unit of individual characteristic. The 'cut and paste' control mechanism communicated about the power and possibility of the gene is as universal as DNA. There is a belief that each gene 'controls' one characteristic. If one gene is removed and replaced then we assume that there has been a 'switch' of one characteristic, and that the organism is still intact, plus or minus one change. This belief is mapped onto the belief system within science, that it is about discrete facts that existed before humans started trying to understand how the world worked. We are constantly being told that a single gene change in an organism can have a single, predictable, controllable outcome. The 1-1 correspondence of changing one gene to change only one aspect is no longer tenable when considering the complex interaction of the whole organism

An alternative to this 'mythology' of science (mythology is used here not as a derogatory term but as a descriptor of the complex interactions by which meanings are constructed and sustained in social contexts—it is employed as a term of critical analysis) is a view put by Barbara McClintock, a Nobel prizewinner for genetics.

In the face of a dominant paradigm in the field of molecular biology that posits a linear hierarchy in which genetic DNA encodes and transmits all instruction for cellular development, the research of biologist Barbara McClintock, who spoke to Keller of her scientific approach of 'letting the material speak to you' and 'having a feeling for the organism' led her to a different view. In this view, DNA is 'in delicate interaction with the cellular environment'; master control is not found in a single component of the cell; rather 'control resides in the complex interaction of the whole system.' The focus of importance is on the organism and its environment, not on a Master Molecule. (Bleir, 1984 p48)

Instead of depending on one model of a 'single variable' and a 'single outcome' we need to bring alongside the scientific method other conceptual and practical methods which encapsulate the complexity of non-living and living forms and the ways they interact. McClintock's description: 'control resides in the complex interaction of the whole' presents a new metaphor of complexity which encapsulates the cell as metaphor and allows a larger metaphor of community as a locus for complexity. If we reconceptualised scientific work to bring alongside the given new models and metaphors and did this as a serious cultural movement we would start doing 'different' kinds of science (Harding). I also envisage a science that is open about its interconnections with economic, political, industrial and military systems.



Deep relationships deep knowledge

The water systems of Australia are connected rivers, swamps, wetlands and marshes. The water systems of Australia are a cyclic pulsing of wet and dry.

Australia has a tropical climate north, a moderate climate south, a coastal fringe and a central desert.

Plants and animals are adapted to the pulsing conditions.

European entry brought people not adapted nor adapting to local conditions.

There was little or no interactivity with conditions, systems, or knowledge.

(a forest knows how to be a forest, a pulsing river knows how to be a pulsing river, wet and dry, wet and dry, a desert knows how to be a desert, bloom and seed, wait long, bloom and seed, wait long).

I see the sun shining on a filament strand of spider web, from the plum tree to the ground, two metres long, stretching and moving in the breeze, the band of reflected light, moving up and down the strand, in shimmering joy, the colour spectrum. Complexity knows how to be complexity.

European entry brought an attitude of the time about 'harnessing' nature, by using systems to describe, approximately understand, and then to 'control' the complexities.

The scientific experiment, control and variables, created a singular, powerful, proclaiming false belief, that changing one factor resulted in control over the place of that factor in the complex interaction of the whole system. The true understanding is that to change one factor, everything else changes too, eventually. Symbols were developed to describe approximations of knowing. $F=ma$. $E=mc^2$, DNA. These symbols displaced the true understanding. The symbols and the belief in the power of the symbols became the field, and the field they were mere approximations of disappeared from view.

The human species which created these symbols, powerful and exciting as this task was, developed a belief that the human species and its capacity to make a kind of meaning to control the living and non-living systems of the world was, by the very nature of this power, more important than anything in the world. The human species started believing that through its capacity to 'control' the world it was entitled to the benefits of this control. Gradually, gradually, gradually as the species experienced more and more benefits from this capacity to understand processes (smelting metal), make objects, (bridges, buildings, heart monitors), create processes (economic systems of trade and exchange) then it was inevitable that it could keep on doing what it had started to do, and that it was, by the very fact of designing and making these systems, more powerful than the earth and living systems that these processes had emerged from.

The human species developed a belief that it was now separate from everything else that was part of the world. It believed the world existed for its own use. It believed that it could take anything that was available to it.

This belief of the human species stopped it looking at the way the complex systems of the living and non-living world interacted. Their belief in the one-way system of taking what they wanted from the world made them blind to the ways of the complex systems. The complex systems pulsed with two-way processes. The two-way binaries (paired bases in DNA, mass and energy) pulsed within the complexity of the whole cell, the whole organism, the whole species, the whole interactivity. Pulsing pulsing pulsing in its complexity. Making and replenishing. Decomposing and making. From simple to more and more complex forms. A dance of delight, of power, of process, of diversity, of colour, shape, size, beyond the scope to describe. Within this complexity of more development, we have risen above as if we were entitled. There is no above. The pulsing of decay is as important as the pulsing of life. All is within. We are within. But as we are within we are only going one way – more, and more and more.

Instead of the pulsing of light and life, life and plants, plants and animals, species in their millions, a continuum of life and life and life, we have changed life and decay into goods and destruction. We are living within our brain and its capacity to make symbols, we have become so excited about this, so entertained by this, we have shut down our mind, another system to pulse with the brain.



The mind is asking, why are you above and not within? The brain will not listen, entranced by the splendour of its world, shiny, plastic, non-living. The mind knows what to do, but it cannot act until the brain responds. The brain in its frenzy is dancing to the beat of more, more, more, the mind in its calmness is whispering, restore restore restore.

Enter this discussion through *data information knowledge wisdom*

What is the platform of mediation? How are we to become the future?

Is it within the scientific/technological frame of control, benefit, entitlement, which positions itself above and beyond nature?

Is it within frames of knowledges, contaminated/illuminated by beliefs and values, choosing to realign with pulsing systems, within and through nature?

Do we engage with the ethics of the question: We can, but should we?

Do we realise limitations? Do we reflect on where we are on the curve of the exponential?

Population

1859	Darwin	1 billion
2000		6.5 billion
2040		10.4 billion

Do we consider how we have changed the resources of water and food from something available for human need to something commodified, corporatised, capitalised, where the shareholder is more significant than nature in its complexity.

Do we know we are doing this?

Do we remember how we lived with enough?

Can we now shift our focus from thing, comfort, entertainment, exploitation?

Can we choose what is already available, in creativity, thinking, mind, art, culture, activity, interactivity, knowledge within and beyond?

Fifth analysis: the voices I bring to this submission

What is my background in presenting this submission? I present a case involving ethos, logos and pathos. As a citizen I am presenting my informed voice to be heard. I have an informed, emotional and ethical connection to South Australia, and to the future of the earth. I have organised the submission through a range of disciplines, using the strategic tools of analysis within those disciplines.

What 'voices' am I drawing on to speak as a citizen?

I am drawing on the post-CP Snow analysis, of *The two cultures* –the analysis showing the separation in thinking and action between those operating within the fields of the humanities and those operating within science and technology. I am a committed scholar across the disciplines, and as a teacher since 1970 teaching across the disciplines. My masters thesis was constructing a curriculum for humanities students to understand how science worked and how science could, but does not work. I taught communication strategies to science, technology and engineering students.

I speak as a voice from the privileged generation within South Australia born in 1947, post WW2. I was raised in a small farming community which enjoyed the boom times of the 1950s. My mother, a teacher, was the project manager to build the local war memorial hospital. My father, a farmer, left school at 14 and continued his own education reading voraciously and widely for the rest of his life. Both parents supported full education for their daughters, and sent us to university while financially challenged developing a farm for their son.



I enjoyed full employment, early promotion, opportunities to diversify my career, and was part of the world-leading education movement in South Australia in the 1970s and 1980s. I joined the new University of South Australia in 1991, and with another woman, wrote a completely new BA degree – a world first – in Professional Writing and Communication. The team of five which taught this degree was awarded the prime minister's award for excellence in university teaching in the humanities, and was joint winner of the overall award for excellence in university teaching, in 2000.

As a researcher within and across disciplines, and with a critical discourse analysis and critical ethnographic approach to research, for the past decade I have worked with communities dealing with environmental challenges. I affirm the local knowledge of people who have lived and worked in a community, often with knowledge gained over generations. This work has involved the River Murray (in SA) and the Murray Darling Basin while drought, and more significantly, overuse of water extraction for irrigation required new understanding and action.

I have been involved with community groups analysing and rejecting the rationale for a desalination plant on Gulf St Vincent. I am currently working with a group analysing the causes of coastal degradation in South Australia – and presenting, with this group, radically different strategies for managing these problems, to a relevant government committee. I am an applied researcher, committed to taking academic knowledge into the communities to join with the knowledge local people have to bring about an improved situation in the living environment.

Another voice for this submission is that of a researcher who has chosen to apply a method and philosophy of applying principles to my own life and situation, to reflect the challenges the whole world is facing with the threats to the living environment. I have posed the research question: how much can I reduce resources and energy before it becomes too much to bear? I live in the generational shadow of those who have endured and survived a Depression and a world war. I use their life experiences as knowledge of survival, resilience, and a chosen capacity to thrive and contribute to their communities. I find as I 'live lean' that I am not under unendurable duress. My health and happiness has increased significantly. I live by choice in a small shack, swim daily, have no hot water in the house apart from boiling a kettle. I take no medication. I am fit, able, mindful and engaged.

I am challenging the dominant economic belief that progress has to be based on an expansionary system of production. That is a destructive project in the current set of circumstances. I cannot proclaim other possible models if I am still dependent on a state of economic expansion and production of goods and a state of mind of entitled comfort.

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