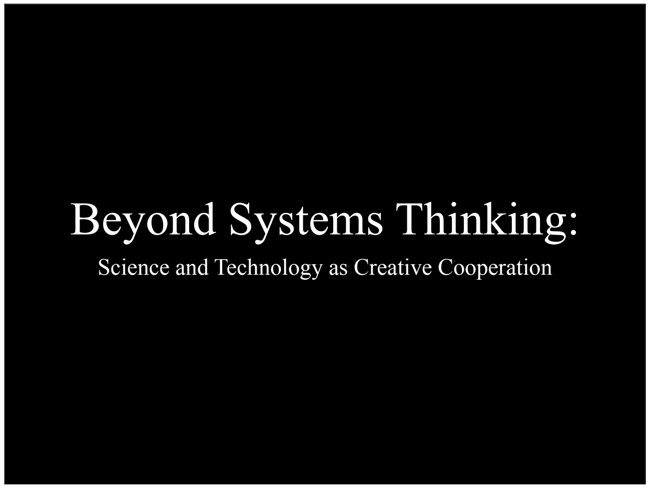
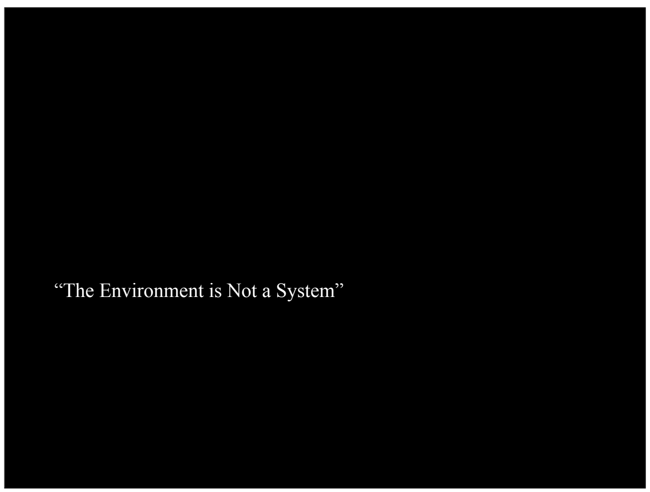
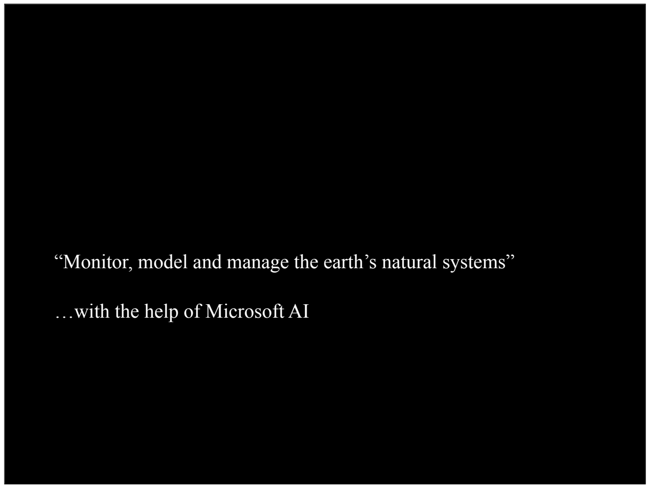




A few months ago I encountered an article titled “The Environment is not a System”, written by Tega Brain.

I was intrigued by the title, but for many this is likely to be a perplexing claim: of course the environment is a system!

You may even be wondering why it would matter whether or not the environment is a system, and that will in fact be our point of departure.



So why does it matter whether the environment is or is not a system?

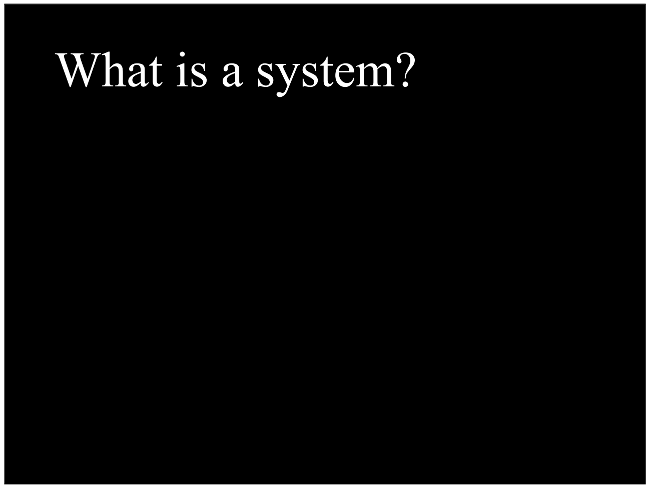
We are concerned here with ways of relating to the environment which presuppose that it is a system

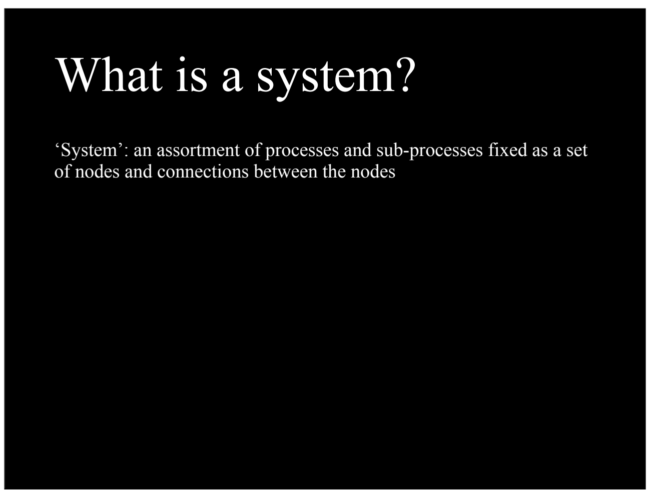
In 2017 Microsoft initiated their "AI for Earth" program, with the mission of increasing the usage of Microsoft-developed artificial intelligence technologies in environmental science and engineering projects, ultimately in order to help “monitor, model and manage the earth’s natural systems”

Lucas Joppa, the founder of AI for Earth, stated in 2017 that “for every environmental problem, governments, nonprofits, academia and the technology industry need to ask two questions: ‘how can AI help solve this?’ and ‘how can we facilitate the application of AI?’”

From the perspectives of both Tega Brain and myself, among others, the notion of using artificial intelligence to help 'solve' environmental problems via expansive quantification and subsequent control of environmental systems is problematic.

As I will show, what is at work here are a couple of fantasies which have a long history in Western culture: exhaustive quantification, and control. A critical intersection of these fantasies is the concept of 'system' .



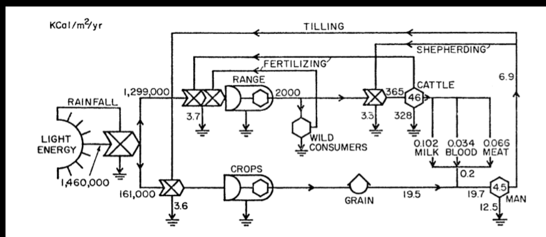


The understanding of 'system' under scrutiny here is that of the related fields which emerged in the mid 20th century: "cybernetics", "systems theory", and "system dynamics". For simplicity I will use 'systems thinking' to refer to all three.

In the context of systems thinking, a system is essentially a network of nodes.

What is a system?

'System': a set of nodes and connections between nodes



(Image is of a "tribal cattle system" in Uganda)

'Systems Thinking':

- Analysis of information/energy flow in a system →
- Determining how to most effectively control ('optimize' or 'regulate') that system

The overall theme of systems thinking is the analysis of various kinds of phenomena (physical, social, biological, etc) in terms of information or energy flow, with the goal of establishing how to most effectively maintain a state of optimal equilibrium for that system.

This all may appear pretty innocuous. So in order to understand the dangers of systems thinking, we need take some steps back and some steps sideways...

History of Truth

Truth as grounded in the divine → truth as grounded in nature

Lets talk about morality; in particular, about Friedrich Nietzsche's account of the history of Western morality.

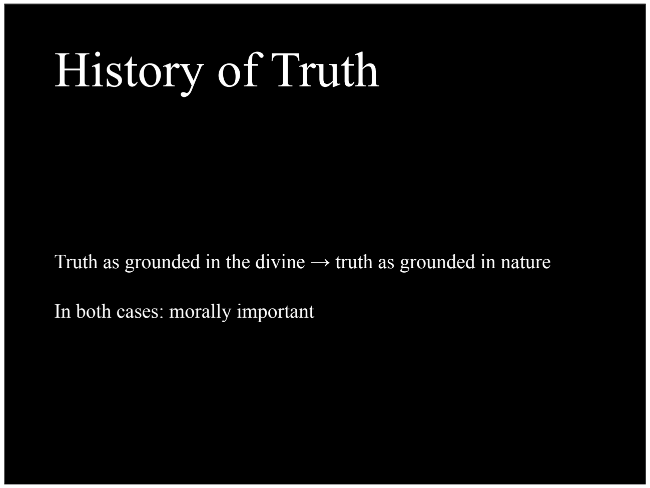
The aspect of Western morality which is most important for the current discussion is the moral significance of truth.

According to Nietzsche, the valuing of truth stemmed from a desire to reliably distinguish between 'appearance' and 'reality'; our faculties of perception are susceptible to various errors, which gives us the (warranted) impression that the full extent of what really exists exceeds the scope of what we can perceive.

For Nietzsche, an enshrining of the appearance-reality distinction is interwoven in the origins and effects of Christian beliefs. Truth, as understood in historical Christian terms, regards the divine: that is, the infinite (unchanging) God which transcends the finite (always changing) material world of our experiences.

The Christian value framework thus situated the pursuit and sharing of truth as a moral imperative.

Nietzsche argues that the emphasis on truth eventually developed, in Western culture, into "a profound skepticism: the requirement that beliefs, convictions, and ideals be tested rigorously to determine whether or not they are justified and certain." This skepticism initiated a turn away from religion as the authoritative source of truth, and a turn towards science as a replacement.



In the transition from truth being grounded by religion to it being grounded by science, the moral weight of truth remained, albeit with the source of authority having been shifted from the Christian God to the scientific intellect and with the unchanging essence of God having been shifted to a secularized view of nature.

A major focus for Nietzsche's analysis of truth is his assertion that, as a result of the conditions of its historical development, modern Western culture presumes that there is a singular, comprehensive, timeless understanding of reality which science will eventually produce.

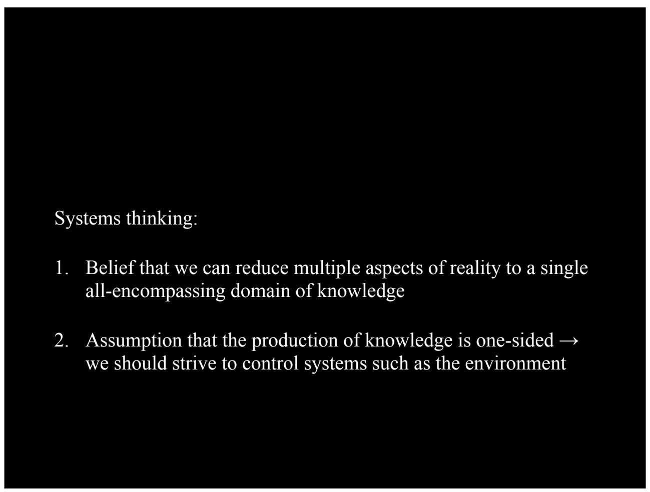
Nietzsche contends that we have no guarantee that there is such an understanding available to us, and that instead we are only guaranteed access to knowledge via incomplete interpretations and re-interpretations.

Nietzsche also points out that, as a social phenomenon, every act of interpretation involves an attempt to exert power. Crucially, an exertion of power is only possible in opposition to a counter-power.

(To understand this idea, consider Newton's approach to physics wherein every force is accompanied by a corresponding reactive force: when I place my hand upon a surface, both the surface and the hand push against each-other)

[...this all means that] no process of interpretation can gain 'traction' without the presence of other exertions of counter-power, which may or may not themselves be processes of interpretation. By this account, then, it is impossible to obtain knowledge about anything without the object of knowledge being a reciprocal participant in the knowledge-making process.

A key implication of this account of interpretation is that knowledge production is always political (involving exertion of political power)

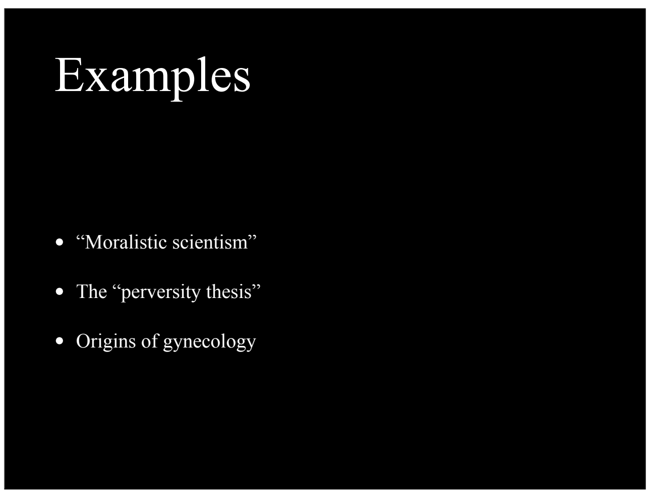


Here we finally arrive at an understanding of the dangers present in systems thinking.

Firstly, there is the belief that we can reduce multiple aspects of reality to a single all-encompassing domain of knowledge, e.g. networks of information.

Secondly, there is the related assumption that the production of knowledge operates via a one-sided exertion of perceptive or intellectual power, enabling the sentiment that we should strive to become masters of the various systems which comprise the world around us.

This is why we should care whether the environment is or is not a system. To be clear, I do not believe that the use or avoidance of the word "system" is especially important. The point here is that the assumption that the environment is a system—in the sense associated with ‘systems thinking’—tends to bring with it a group of additional dangerous assumptions and actions.



There are various contemporary ideologies that exemplify the aforementioned dangers. In most if not all of them, there is a marked lack of genuine consideration for ethics.

One of these ideologies, which I refer to as “moralistic scientism”, is exemplified by thinkers and figures such as Michael Shermer, Steven Pinker, and Bill Gates. Moralistic scientism is the idea that "science and reason lead humanity toward truth, justice, and freedom." Moralistic scientism assumes that Western science has an intrinsic moral orientation and is the singular epitome of knowledge.

Another such ideology is the "perversity thesis", which is the dogma that any intentional action to try and improve political, social or economic circumstances will only have the result of making circumstances worse. The perversity thesis has motivated harmful approaches to government policy and urban planning, in one case relating to a particular iteration of systems thinking called “Urban Dynamics.”

Urban Dynamics was deployed by the Nixon Administration as evidence that "its plans to slash programs created to help the urban poor and people of color would actually...help these people.”

Finally, a rather extreme example of such un-ethical approaches to knowledge can be found in the work of J. Marion Sims. Sims, the self-proclaimed 'father' of gynecology, made his scientific discoveries by performing surgical experiments on slaves, without the use of anesthesia. The grandiose fashion in which Sims's writings describes his own work, and the passivity imposed upon the women he used, indicate a one-sided, totalizing view of knowledge reminiscent of that opposed by Nietzsche.

Alternative themes

In addition to Nietzsche's ideas regarding interpretation, I believe inspiration can be drawn from ideas of the philosopher Gilbert Simondon and the 20th century biologist (and, ironically, proto-cyberneticist) Jakob von Uexküll.

From Simondon, we can incorporate the notion that no system is fully closed and immune to what he calls 'phase shifts', which are fundamental changes in functional structure.

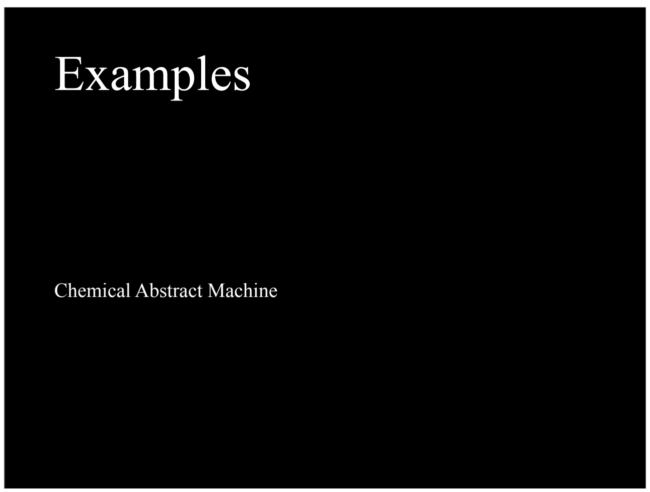
From Uexkul, we can utlize the concept of ‘Umwelt': "Every object becomes something completely different on entering a different Umwelt. A flower stem that in our Umwelt is a support for a flower, becomes a pipe full of liquid for the meadow spittlebug ...who sucks the liquid to build its foamy nest. The same flower stem becomes an upward path for the ant, connecting its nest with its hunting ground in the flower. For the grazing cow the flower stem becomes part of a tasty morsel of food for her to chew in her big mouth"

In light of everything that I have discussed so far, it should be clear that we stand to gain much, both ethically and epistemically, if we prioritize alternative themes in our approaches to science and engineering. These themes include: reciprocity, responsibility, explanatory pluralism, 'strong objectivity'. We can also benefit from a de-centering of hegemonic themes such as linearity, hierarchy, and identity.

Examples

Here we will take a look at some approaches to knowledge and engineering that demonstrate to some degree the alternative themes I just mentioned.

The first instance is the Ndee (Western Apache) tradition of maintaining historical knowledge through geographically contextualized re-tellings. Ndee history is very intentionally not collected in a written form, because, from their perspective, written knowledge representation is at odds with the situatedness of events and dynamism of reality. The Ndee tradition of history sharing, then, involves both story tellers and story receivers traveling to the place where the event being recounted occurred in order. Crucially, the story teller imparts their description of history in the form of a present-tense chronicle of events. Here we find a vision of knowledge as unabashedly interpretive.



The next example is a model of computation: the Chemical Abstract Machine, an alternative to the Turing Machine. The Turing Machine is the standard imperative model for describing computations in formal terms as singular linear sequences of instructions. The Chemical Abstract Machine demonstrates a de-centering of linearity and hierarchy in its approach to understanding what computations are, since it describes them as non-sequential sets of relations.

Examples

Neuro-phenomenology

The third example is the empirical method of neuro-phenomenology. Neuro-phenomenology exhibits reciprocity, playfulness, and strong objectivity by involving the subjects of study in an intersubjective process of building vocabularies to describe replicable experiences of being shown certain images, and then rigorously correlating these vocabularies with electronically quantified brain events.

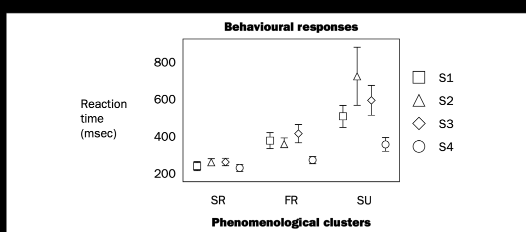


FIGURE 2.3 Correlation of behavioural responses and phenomenological clusters.
Note: for four subjects, reaction times were faster in SR, slower in FR, and slowest in SU.
Source: Lutz et al. (2002), reprinted with permission.

Neuro-phenomenology exhibits reciprocity, playfulness, and ‘strong objectivity’ by involving the subjects of study in an intersubjective process of building vocabularies to describe replicable experiences and then rigorously correlating these vocabularies with electronically quantified brain events.

Conclusion

Finally, we return to Tega Brain's article, "The Environment is not a System"

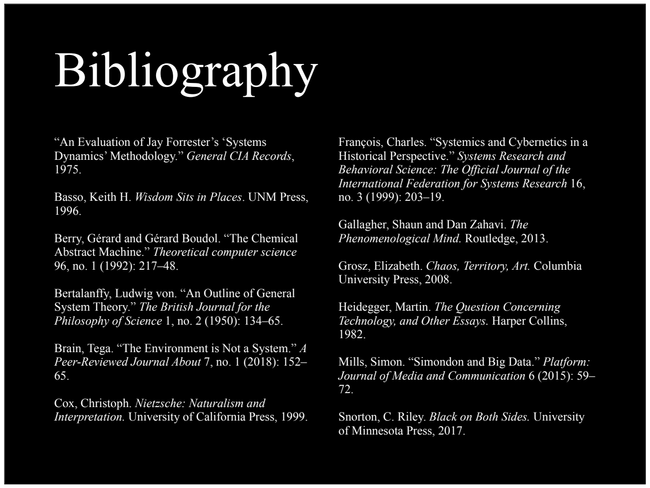
Brain asserts that “adaptation through technology or the development of green capitalism…does not thoroughly address the long history and memory of environmental destruction…nor the asymmetry of power.” , and furthermore, that "Contemporary environmental challenges directly emerge from violent histories of colonialism, imperialism and the ongoing exploitation of marginalized communities or those living in the global South"

"if these logics go unquestioned, mounting environmental challenges will not only continue to accelerate change in an already stressed biosphere, but also further augment environmental injustices."

The AI for Earth program wants us to solve global warming so that we can maintain the status quo rather than making radical changes to our economies and ways of life.

But, as Brain says and I agree, this is a reproduction of the kind of thinking that led to the environmental problems in the first place, and will likely result in an exacerbation of these problems rather than fixing them.

If we are truly committed to working towards a better future, we must do so with careful consideration for the kind of thinking we enact in doing so.



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