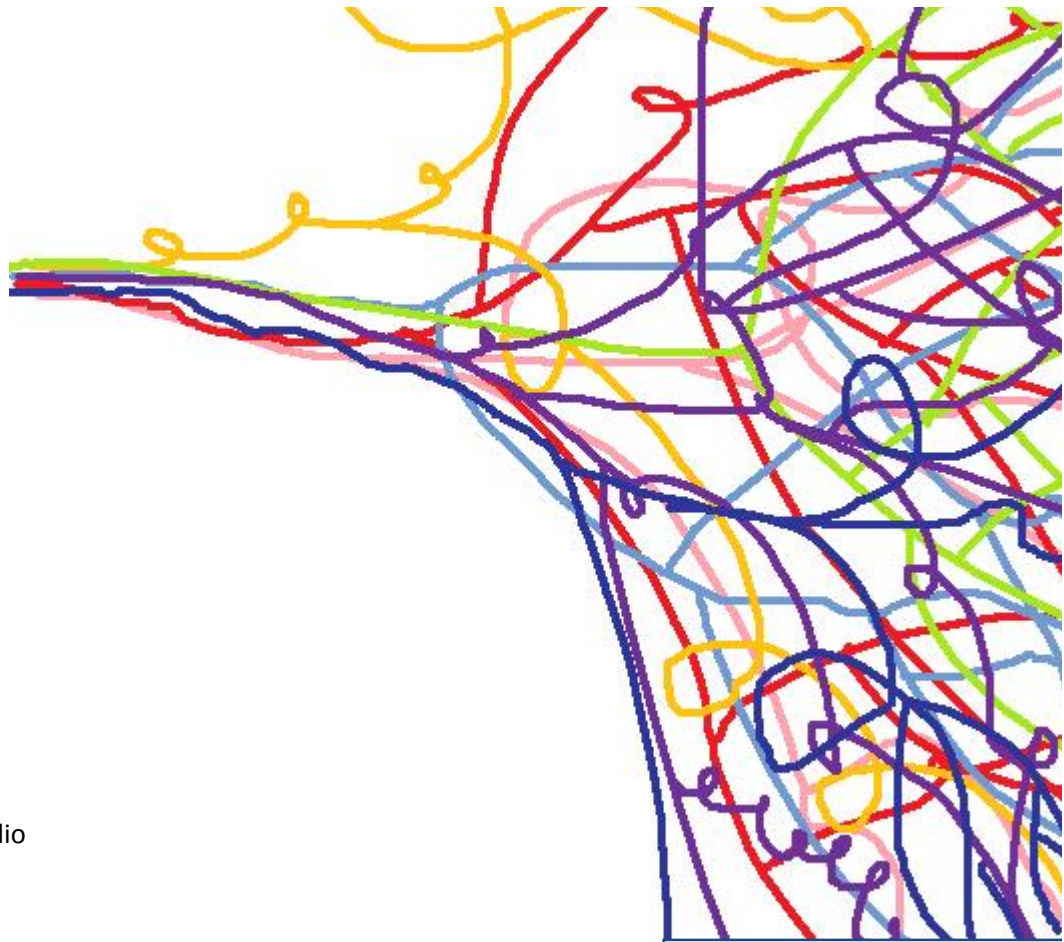


Unravelling Complexity



VCUG3001: Learning Portfolio

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My artistic Interpretation of Chaos Theory as encountered in my previous Maths study. This is the first thing that came to mind when I thought of 'complexity'.

Introduction: Unravelling Complexity

The thrust of this course is very interesting and intriguing, born out of an article about the role of universities and their ideal as a place for discussion, discovery and inspired learning. I have long been dismayed at the tendency for students to sit back and follow the mantra of “P’s get degrees”, and even the other end of the scale where students study relentlessly for exams and essays restricted by very narrow outcomes. During my university life I have found that I have learnt and grown the most when I have engaged in discussion with other students, be that in a tutorial setting, giving presentations or during the rare occasion outside the classroom when people have felt comfortable to be ‘a bit of a nerd’ and talk about big ideas. The introduction of a course that deals with the big and complex ideas in life with a cohort of interested students from many backgrounds is a great way to stimulate the best type of learning.

Impressions from the first panel were mixed. In many ways it was a typical introductory lecture: not many critical ideas were discussed or addressed and there were a tad too many buzz words (‘complexity’, ‘multidisciplinary’...) bandied about. Despite this a sense of excitement hung about the crowd, and you could tell that the room was filled (mostly) with intellectually curious students just waiting to chew on some juicy ideas. This week was about touching on a few bases, creating an overarching aim (dealing with complexity) and waiting for the real discussions to start. The strongest aspect of this panel was the introduction of the idea of unknown unknowns as a central problem in complex systems.



Like the many facets of an insect’s eye there are many different and valuable perspectives around any complex issue.

In the tutorial there was some good debate around the implementation of the ideas presented in “What are Universities For?” bringing to light a crucial issue of applying and focussing theoretical ideas. Coming from a background of Philosophy I am often confronted with the issue of whether or

not it is useful or not, and the place of such subjects in a university degree. I agree with the point raised in the article that the university is there to provide society with useful knowledge, but that the idea of what is useful or not should be kept broad (p8).

Preferred name: Louisa Osborne	
Degree (Major/s): BA/BSci (Philosophy, Mathematics) , DipAsia (Indonesian)	
Insights for a complex issue from your academic area	<p>Philosophy tries to explain complex problems about the nature of the world and our experience. eg how do we show that other conscious beings actually exist? To explore such problems you need:</p> <ul style="list-style-type: none">- consistency- clarity- start with what you know, and build up from there- need to engage in argument to test theories- can build upon earlier ideas <p>Often there are many different approaches to the same problem, and each can have there benefits and inhibitions.</p>

Q: What place will multidisciplinary studies hold in universities of the future?

Wicked Problems

This week's panel saw the introduction of a few key ideas underpinning many complex issues. I think it is important to remember that this is not an exhaustive list of issues. These are some of the points I found interesting:

- The contrast of complicated systems versus complex systems is a useful distinction, and in many ways quite illuminating. We need to remember that an issue is complex if it is both complicated and dynamic. A complicated system can be fully described and predicted, whereas a complex system cannot.
- The idea of the adaptive system. This means that the description of this type of complex problem must also change with time, and similarly attempts to solve the problem must be adaptive.
- The place of uncertainty. Steven Cork described uncertainty as arising from complexity. I would elaborate on this explanation and say that uncertainty also causes complexity. For example, the uncertainty of the effects of actions when looking at ethical theories based on consequentialism like Utilitarianism.
- The Black Swan. You need to try and recognise randomness and not be fooled into mistaking it as a pattern.
- When people form societies they lose the capacity to plan for multiple futures. I think this is linked to the idea of an adaptive system and black swans, as a society we are bad at being adaptive and dealing with unexpected futures.

In the readings this week I was struck by Nassim Taleb's criticism of policy making as lacking imagination and lacking the ability to handle outliers. Taleb's assertion that we need to focus on what we don't know is true, but perhaps not very useful. For policy issues you can only make policy on what you know; your preparation is limited to creating a system that is adaptive and open for rapid change if a black swan event did indeed arise.

The "Wicked Problems" reading did not seem highly constructive. It talked about wicked problems as being hard to define and address, and the problem of using past events as a basis. This seemed like a fairly usual understanding of complex issues based in the social sciences.

ticket:

Complexity A Guided Tour by Melanie Mitchell

In the Preface the study of complexity is opposed against a reductionist approach to problems. Reductionism is described as the traditional approach within science, and is defined through the words of Descartes as "to divide all the difficulties under examination into as many parts as possible". It is asserted that this approach is thoroughly inadequate when examining "seemingly irreducible complex systems".

The first chapter aims at providing a quantitative description of the author's view on the defining features of complexity. By looking at colonies of social insects, neurons in the brain, the immune system, economies and the internet, the author draws common features between these systems. Each consists of simple parts, eg. ants, neurons, people's decisions, and forms a larger whole that demonstrates complex and sophisticated behaviour.

Three properties are explicated: "complex collective behaviour", "signalling and information processing", and "adaptation". The author asserts that the central question when looking at complex systems is how the "emergent self-organised behaviour" comes about.

The rejection of reductionism in this book is interesting in light of the approaches to Law and Psychology described in the first panel, where the disciplines and many of the problems approached in those disciplines were described as being broken down into smaller parts. However, the author makes it clear that the reductionist approach is indeed inadequate for certain complex problems.

The parallel between the structures or characteristics of different complex systems is insightful and allows for an easier application of a multi-disciplinary approach. However, one should be wary as to how far one applies principles from one discipline to another discipline.

Key Terms

complex collective behaviour

signalling and information processing

adaptation



Q: Is the platypus the ultimate Black Swan?

Collapse in Systems and Networks

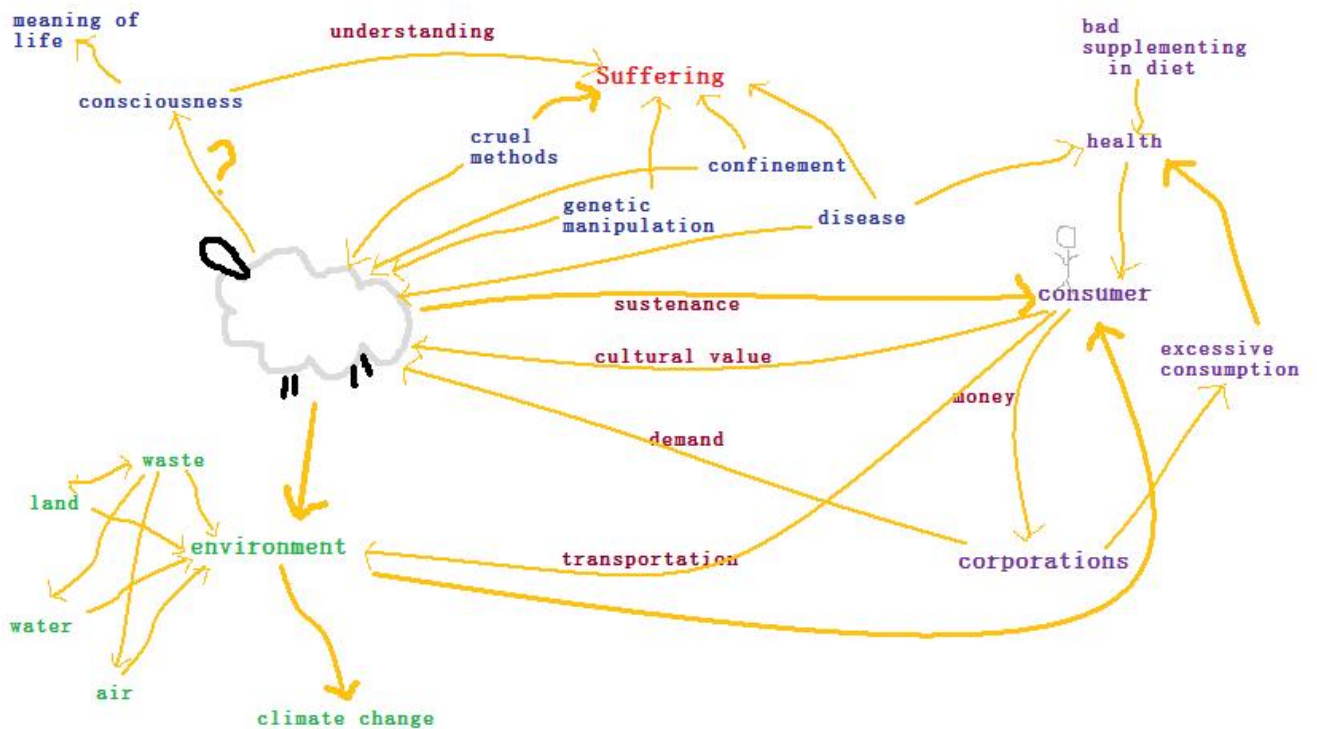
In preparation for this week's tutorial we were asked to draw a systems diagram for a complex issue from our discipline. I found this task very difficult. I thought that to represent all the intricacies and subtleties of a philosophical argument in the form of a diagram was a ridiculous task. Then I realised that the problem I was facing was that I think a systems diagram is only really effective when talking about relationships between things, particularly when looking at real world problems. To focus a philosophical argument simply on relationships between the ideas is usually too restrictive and over simplifying. As such I decided to choose an issue from the field of ethics, the most real-world based side of philosophy. I think this exercise highlighted the limitations of applying a method from one discipline to another discipline. We need to be careful to remember the limitations.

In the strictest sense my diagram was more of a mind map rather than a systems diagram. But by mapping out the relationships between things it did help to highlight which factors different people valued as important, and where the different ethical arguments stem from. This activity was very stimulating and quite effective at highlighting the complexity of a problem, if perhaps a little ineffective at actually solving or even adequately describing much of what was complex about the issue. I think that the main value of this method would be to identify feedback loops.

Ticket:

I considered applying a network diagram to ethical issues (under a non-Kantian ethical system), to work out the impacts of a particular ethical decision upon the real world. This looks at the network between anything that may be significantly impacted by an ethical decision, the purpose being that the positives and negatives of such consequences could then be weighed up clearly, and the place personal values clarified. The particular ethical decision I chose is whether or not (or to what extent) to eat animals.

The figures on my network diagram include: the animals and their suffering, genetic integrity, possible consciousness, disease; the corporations with their financial investment; consumers (and farmers) and their health, cultural heritage and culturally/historically significant information; and also the environment.



The most striking point from the panel this week was the description of feedback loops, and their place in describing (and perhaps creating) complex problems. For example, the existence of negative feedback loops hinders the implementation of solutions as it means that the problem has changed, or worsened, since the solution was formulated. There is a need to identify feedback loops and move information or action quickly around these loops when dealing with the real world. An example of this is in climate policy.

Also, I found open source software to be a good example of an adaptive system like Steven Cork mentioned in the last panel. Open Source software is a system that is purposefully open to rapid changes and implementation of innovative ideas. This allows the system to be highly adaptive and responsive. In many ways this is a good analogy for an effective method of solving real world complex problems, if some comparable way of organising and synthesising ideas could be found.

This was the first of the student run tutorials and I thought the opening activity of building marshmallow and spaghetti towers was interesting. I think as an explanation of systems it was not particularly insightful, but as a task that demonstrated the process of teams tackling a problem, it was very insightful. After class I looked for the TED talk relating to marshmallow towers, and in that talk Tom Wujec talked about the role of experimentation, of trial and error. Kindergarten kids' daring to go in and try solutions quickly, and modify where there were errors was seen as highly successful, often it is hard to foresee where something will fail. Furthermore, the place of a management role to guide and oversee the communication in the team was seen as highly valuable. I think that these observations can be extended in a general sense to the solving of complex problems: the need to test many different solutions quickly, and the need for cohesion and communication.

Q: How widely are systems diagrams used outside Engineering?

Collapse of Empires

This was a very interesting panel (though unfortunately I missed the first half and there is no recording of it), it was refreshing to be able to dive into a (relatively) specific complex problem and move beyond talking only generally about complexity. Here are some observations from the panel:

- Sometimes it is harder to ask the *right* questions than it is to find the right answers. Often the question needs to be reformulated or re-evaluated along the way.
- The discussion of truth and the idea of “*Wikiality* (n.) A reality where, if enough people agree with a notion, it becomes truth; truth established by consensus (rather than by fact).” (Stephen Colbert). This was interesting in its reflection of ideas in Schopenhauer and Nietzsche that I have been studying this semester. Nietzsche talks about systems of thought governing the way we take value from our life and our perception of what is real. He also tries to trace the genealogy of the progression of certain ideas throughout history. This idea of genealogy of ideas links into Paul Burton’s comments about the most popular theories around Rome changing with the influence of new historians.
- The debate about the use of history to predict future behaviour was quite interesting. Paul Burton offered up the traditional view that a dose of could cure many current mistakes. He conceded, however, that this is an easy observation in hindsight, and that many current historians take the view that the idea of history repeating in patterns is a mistake and can impede the ability to think outside the box. Using the terminology of earlier panels and reading it makes it harder to predict black swans. However, I think that perhaps if you looked at past similar events and identified where they were different then perhaps this could lead to a clarification of where unexpected things could pop up.
- This linked into the idea of language that was raised, that we work our way into a trap by using old words and paradigms, it frames the way we *can* think about things. (“I like to use conflict rather than war” – Joan Beaumont) This is very interesting from a philosophical point of view and ties into previous study of many philosophers particularly Wittgenstein. Wittgenstein drew a strong link between language, our thoughts and our perception of the world, and concluded that our language and thus our ability to describe certain problems, or ask certain questions, is fundamentally limited.
- Joan Beaumont’s assertion that people are attracted to tragedy was an interesting aside, and rather surprising. This links closely to a point within Nietzsche’s philosophy about the importance of tragedy. Much of Nietzsche’s criticism about Christianity was centred on the way they viewed tragedy and how that has distorted our view of life. Tragedy for Nietzsche is aligned with Joan’s comments as being a dramatic and transformative experience. Tragedy informs all our lives and shapes the way we approach it, for Nietzsche to properly recognise the place of tragedy this would mean helping to unravel the truth of reality (a thoroughly complex problem indeed).
- Who is the ‘we’ that learns from history? For every wrong judgement there is usually the correct knowledge out there.
- I thought their comments about history becoming more and more micro focussed was quite interesting. It seemed to be a move away from daring to tackle the big ideas. Perhaps some

historians should think like the Kindergarten students in the marshmallow challenge and just give it a go.

- “multifariousness of human experience” – Paul Burton. The Achilles heel of history is its selective, interpretative nature and the desire to draw causal links.
- My favourite comment is Paul Burton’s final comments about history being fun, and that in the end for him it doesn’t matter if history is ennobling or not, it is simply fun. An aspect of research and intellectual discovery harder to justify in more practical terms or fitting into the model of ‘useful knowledge’ as discussed in the first tute.

The first task in the tutorial meant that we had to defend the perspective of another person, assuming their viewpoint and trying to find the value of their argument. I think that in with the necessarily multidisciplinary study of complex issues this is an important skill. It reminds me of an article I have read for philosophy about ways in which to read a philosopher; reading by trying to find the value in their argument was described as one of the hardest ways. This also links into my study of Indonesian translation this semester, the translation from one language to another must tread between a literal and often clunky translation and a more readable, but less faithful translation. When we critique translations we are encouraged to try and understand why the translator did it a certain way, and through that identify methods that would be useful in our own translation, even if we don’t adopt the whole translation.

The task to describe how a certain aspect of our discipline had changed through time was interesting. I thought Byron’s example of particles and waves was interesting in that it highlighted the problem of language in guiding and restricting thought that Joan talked about in the lecture. My Physics lecturer described the problem of waves and particles in terms of the real phenomena being neither, but that when working with problems we choose the appropriate formulation of the phenomena that we can find in our language and descriptive powers. I think this can be generalised to other complex problems if looked at in terms of perspectives and descriptive powers. Different perspectives or disciplines can describe a complex problem in different way, and thus can help to formulate solutions in different ways.

Ticket:

Kennedy’s main points and assumptions:

- Links military power and economic success together in a sort of feedback system.
 - Places war as the central agent of the collapse of an empire.
- Relative strength between nations “never remains constant”, this is linked to the uneven rate of growth in societies and the uneven impact of technological advances on different societies
- The relatively conducive environment to change that was present in early European societies led to greater economic growth, and thus greater military advantage, and the ability to dominate around the world.

An example of an empire:

<http://hungrybeast.abc.net.au/media/beast-file-woolies-and-coles>

An example of an empire can be seen in the commercial powers of Woolworths and Coles, who are essentially competing supermarket chains, who are expanding their territory and acquiring greater and greater economic power. They are an empire in so far as they are seeking to dominate to exclusion over the competition, and acquire power through economic acquisitions. They implement tactics similar to notions of divide and conquer. This includes buying out smaller supermarket chains, buying and restricting the use of land by other chains, making deals with shopping centres to exclude competing chains, and wielding their great economic power to control the prices of food to reduce the ability of other chains to compete in the market.

A concept from Mathematics that has changed over time, and the variables of change:

Within Mathematics our understanding of geometry has changed over time. In the modern era we can see the development of the Cartesian plane and the dominance of Euclidean Geometry. This evolved to include the complex plane (imaginary numbers i), and then later evolved to include alternate geometrical systems such as hyperbolic geometry and projective geometry, and even later the emergence of fractal geometry. These ideas however have not superceded each other, rather they now complement each other, and allow for new ways of understanding and new fields of exploration.

This change occurred due to limits of the previous systems, this led to an exploration of imagination and the proof of consistency/plausibility and also applicability of the newer systems. This second factor in particular relied on developments of thought in other areas, such as in physics and the theory of relativity demonstrates the need for hyperbolic geometry to help explain natural phenomena. Similarly the development of computers has enabled fractal geometry to become a useful tool in explaining and predicting behaviour of many systems.

What is Development?

The most striking point about complexity that was made was in a throw away comment from Stephen Howes when he said that each question asked was the equivalent of a whole lecture given in his course. This serves as a reminder that when we look at other discipline's complex problems and their lessons we should remember that we are often just gleaning over the surface of the issue and that it is the depth of the issue that makes it complex. Be careful of short and easy answers.

I was interested by Stephen's depiction of the role of investigative journalists as being somewhat like researchers in the field finding the links between the work of aid agencies and their effects in the community, both bad and good. This was linked to a central issue in the complex problem of development, that of knowing the actual effectiveness of aid. I think that in many ways this is a problem with any complex issue; access to real world data and being able to accurately draw causal links and thus learn from past actions.

The tutorial this week led to a few key ideas being discussed. The first was the need for a unity of vision in solving complex issues, or for trying to solve branches of complex issues. This was drawn from Jeffrey Sachs' role in Poland, where it seems that perhaps the largest factor in his success was that he was able to inspire unified and rapid action. It was posited that perhaps this is the value of the UN's MDGs: they offer clarity of vision and a defined goal.

The other strong point I drew from this discussion was the role of politics in complex issues. Jeffrey Sachs, and both panellists were critical of the inability of most political leaders to act beyond the goal of re-election. Furthermore, politics introduces more complications to the issue of development (and any other transnational complex issue).

The question: "Is there still a third world?" reminded me of Joan Beaumont's comments about language as carrying unseen paradigms. In the tute we concluded that there is still distinctions between countries, but it is no longer the same type of distinction that could be drawn in the past. It is a case where we need to re-evaluate our assumptions (particularly paradigms inherent in our use of language) to reflect changes in the real world.

Lies, Damn Lies and Statistics. Partly the use of statistics in this kind of problem is misleading due to its limited capacity to describe the situation, and partly due to the fact that they are out of date by the time that they are used: you are handling a reality that no longer exists. This is an example of a negative feedback loop, perhaps the use of journalists as described by Stephen could help to alleviate this negative feedback?

Ticket:

Jeffrey Sachs' articles:

1) *What kind of view does this person have about development?*

- productivity linked to theory

Sachs views development as a positive process that strengthens an economy and lifts people out of poverty.

2) *Who or what is he critical of?*

- described the failings of previous efforts as being only half-measures etc. "And instead of vision in the West, there's coyness and there's confusion."

- critical of US Aid as being linked too closely to foreign policy and not enough as a world leading development force. And in this way has lost its strategic nature.

- too much talking and making promises, and not enough real action.

3) *How does he think that this problem can be solved?*

- the economy is closely linked to politics

- wow, his work in Warsaw and Bolivia sounds really gutsy

- found what looked like the best solution and acted quickly, and decisively.

- "It's a series of discrete challenges that add up to a recovery and development strategy."

- Sachs draws from previous experiences, study of previous experiences and knowledge of the history of the political situation

- Sachs views these problems as needing long term solutions, that start now, and have a strong focus upon building an independently strong economy.

- calls for the G8 to be replaced by the G20

- calls for clear and transparent accounting

- for people to remember the "utter seriousness" of the issue of poverty and the human face suffering from the politician's empty rhetoric.

Public Forum: 2010 Elections in Burma

The panel of speakers talked about the complex issue of holding “free and fair” elections that both reflects the will of the people and leads to the desired outcome of democracy or even improved human rights and development. The nature of the situation leaves people at the ANU to be delegated merely to the analysis role; citing observations, predictions and hopes. Because the environment is far from free the consequences of actions become hard to predict and compare to other countries. The limited access to information means that many factors are unknown and this complicates the ability to predict outcomes. This is where the analysis must formulate many possible futures similar to the method discussed in week two. This lecture brought into question what difficulties might surround any election, even an Australian election.