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Imagination and scholarship: The role of creativity and complexity

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It is no secret that Brendan Sargeant was one of my favourite people at The Australian National University.

On a superficial level, he and I were an unlikely pair. He had grown up in the world of public sector administration and defence strategy. I had little interest in management and struggled to distinguish one end of a submarine from another. He had spent most of his career in Australia, contemplating our nation's place in the region and the world. I had spent most of my career outside Australia and tended to adopt an international perspective more readily than a national one.

On a deeper level, however, Brendan and I shared striking commonalities in our approach to the world. We struck up a friendship after he began attending meetings of the Geoeconomics Working Group that I chaired. Our conversations were wideranging, from ideas about complexity and strategy to our shared interest in fostering creativity. Our proclivities were often similar, including our tendency to zoom up to consider issues in broader ways and over longer time frames than was often encouraged in our environments.

Brendan and I had a meeting of minds that turned into a friendship, as often happens between academics.

We talked about the macro-changes facing the world, such as the problem of climate change and how China's rise was producing tensions with the West—in particular, the United States. We spoke about the importance of stepping away from the hustle and bustle of short-term demands to pursue innovative longer-term projects with uncertain payoffs. We considered the strategic capabilities our nation should develop to navigate the next few decades, marked by increasing and colliding geopolitical threats and natural hazards. And, of course, because it was Brendan, we talked about William Blake.

In this short essay, I want to introduce two themes about imagination and scholarship that animate my thinking as an academic and typify the types of discussions I had with Brendan. The first is the importance of preserving or reclaiming imaginative, artistic and creative ways of thinking in the academy. The second is how to understand and act in a complex and unpredictable world. As you will see, long time horizons play a crucial role in both themes. And, because I am inclined to think with images, I employ two images that capture the essence of my points.

I am often struck by how our ideas of what it means to be a scientist or a social scientist tend to focus on the lefthand side of the image in Figure 5.1. We are taught to be rigorous and empirical. We create and test hypotheses. We separate and analyse. We compare and contrast. We count and calculate. We scrutinise and rationalise. We distinguish causation from correlation. We evaluate explanations and identify causal mechanisms. We present things as orderly and linear: a problem, a hypothesis, a test, findings, a discussion and a conclusion. We play by the established rules.

This is what it means to be rigorous in our thoughts.

But it can also lead to rigor mortis in our thinking.

Figure 5.1 Creativity: Thinking with both sides of our minds

Source: John Hain, pixabay.com/illustrations/mindsets-approaches-knowledge-3988226/.

I frequently feel like a conceptual artist caught in the confines of academia. In looking at Figure 5.1, I identify more readily with the righthand side. My work is often intuitive, attempting to sketch complex, emerging and contested phenomena by embodying multiple mindsets. I like to transcend particular debates by zooming up to the macroscopic level to see what is revealed and obscured by the different perspectives. I enjoy playing with metaphors and analogies for both theory generation and conceptual communication. Having too much accumulated expertise in an area makes me feel weighed down; breaking free in search of new grounds makes me feel animated and alive.

To develop good scholarship, we must use both sides of our brains—individually and collectively. We must recognise the importance of 'night science', not just 'day science'. We need to engage in exploration as well as exploitation. So, what do I mean by these two juxtapositions?

François Jacob used the phrase 'day science' to capture the hypothesis-testing mode of science that operates within the confines of a scientific field or intellectual paradigm. Highly specialised experts design experiments and follow protocols to move step by step from a hypothesis to a conclusion, incrementally advancing the state of knowledge in a field. The moves are relatively predictable and the returns are reasonably probable. Day science tends to be compartmentalised and disciplined. It is a classic case of the exploitation of existing knowledge and capabilities.

By contrast, Jacob invokes 'night science' to describe the much less structured process through which new ideas arise and questions and hypotheses are generated. Less linear, night science is more creative and associational. It is interdisciplinary, often involving the connection of disparate insights or fields. It is where intuition takes hold and large leaps of logic occur. Nothing is certain or predetermined in night science; with no map, a prescribed and predictable route cannot be followed. Instead:

> Night science wanders blind. It hesitates, stumbles, recoils, sweats, wakes with a start. Doubting everything, it is forever trying to find itself, question itself, pull itself back together. Night science is a sort of workshop of the possible where what will become the building material of science is worked out.[1]

Night science is to exploration what day science is to exploitation. The explore–exploit dilemma is a classic problem that we face in our lives and work—within and beyond the academy. It revolves around the question of how to balance exploiting existing opportunities and capabilities with exploring new ones. As the organisation scholar James March explained, exploration includes the various behaviours captured by terms such as search, variation, risk-taking, experimentation, play, flexibility, discovery and innovation. Exploitation is captured by terms such as refinement, choice, production, efficiency, selection, implementation and execution.[2]

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1 François Jacob, *The Statue within: An Autobiography* (New York: Cold Spring Harbor Laboratory Press, 1988).

2 James G. March, 'Exploration and Exploitation in Organizational Learning', *Organization Science* 71, no. 2 (1991): 71–87, at 71, doi.org/10.1287/orsc.2.1.71.

Exploitation involves obtaining short-term rewards from existing opportunities and capabilities. Exploration involves searching for new opportunities or building new capabilities that could bring future rewards. Given that individuals and organisations have finite time and means, they often must decide how to allocate limited resources between these two sometimes conflicting goals. But over-focusing on pole one at the expense of the other can be problematic. '[M]aintaining an appropriate balance between exploration and exploitation is a primary factor in system survival and prosperity,' March concluded.[3]

The same holds true for academics and academic fields. We must balance exploration of new knowledge and fields, which often spurs innovation and creativity, with exploitation of existing knowledge and fields, which often allows for rigorous testing and refining of ideas. Some of us will incline more towards exploration or exploitation, based either on our proclivities or on external incentives and constraints present or absent at different stages of our careers. But for our academic ecosystems to be sustainable and resilient as a whole and over time, we must maintain a healthy balance between these two approaches.

We need both night and day science.[4] Night science fuels our imagination, encouraging us to think up new directions and ideas; day science restrains us to laboriously test, apply, extend and qualify them. Both types of science matter, but our method courses and the method sections in our academic papers often focus only on the day science aspect of our experiences and fields. Day science is treated as scientific and something that can be taught, whereas night science is viewed as something spontaneous that either happens or does not. Further, night science tends to be hard to discuss in academic company because it is not seen as fully 'academic'.

Even though paradigm shifts in science often arise from moments of inspiration in night science, somehow, we neglect these moments in our understanding of the scientific method. Einstein's insights about the theory of relativity came to him while he was engaging in thought experiments

3 ibid., 71.

4 Itai Yanai and Martin Lercher, 'Night Science', *Genome Biology* 20, no. 179 (2019), doi.org/10.1186/s13059-019-1800-6; Itai Yanai and Martin Lercher, 'What Is the Question?', *Genome Biology* 20, no. 289 (2019), doi.org/10.1186/s13059-019-1902-1; Itai Yanai and Martin Lercher, 'Renaissance Minds in 21st Century Science', *Genome Biology* 21, no. 67 (2020), doi.org/10.1186/s13059-020-01985-6.

about jumping in an elevator.[5] Darwin developed his theory of evolution by sketching multiple metaphors to help capture his thinking, including the tree of life (which took off as the governing metaphor) and the coral of life (which did not gain traction then but may be re-emerging as a more accurate understanding of evolution).[6] Innovation often results from making wild associational leaps, connecting one field or set of ideas to another.

Too much focus on filling one's day with the production of demonstrable outputs risks crowding out the space and time necessary to think big thoughts, search for new ideas, stray far from the beaten track and play with concepts unrestrained. In the short term, this focus on efficiency might produce a promising yield. In the long term, however, it seems destined to sap one's creativity and stifle innovation. It does not surprise me, for instance, that levels of productivity in science have gone up in recent decades while measures of disruptive innovation have gone down.[7] What looks efficient in the short term often looks inefficient in the long term and vice versa.

I often think about this dilemma through analogies to farming and ecosystem management. Quantifiable metrics in academia often encourage young academics to focus on planting and yielding a certain number of readily harvestable carrots each year. But this insistence on short-term and efficient deliverables crowds out the space to plant and nurture slower-growing plants like oak trees. And 100 yearly crops of carrots do not an oak tree make. Instead, monocropping and overfarming can lead to desolate and depleted lands. As Jenny Odell observes in her book *How to Do Nothing*:

> Just as practices like logging and large-scale farming decimate the land, an overemphasis on performance turns what was once a dense and thriving landscape of individual and communal thought into a Monsanto farm whose 'production' slowly destroys the soil until nothing more can grow. As it extinguishes one species of thought after another, it hastens the erosion of attention.[8]

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5 Sabine Hossenfelder, 'Lost in Thought—How Important to Physics Were Einstein's Imaginings?', *Scientific American*, 1 September 2015, www.scientificamerican.com/article/lost-in-thought-how-important-to-physics-were-einstein-s-imaginings/.

6 Olivia Judson, 'Our Earth, Shaped by Life', *Aeon*, 18 November 2022, aeon.co/essays/the-insight-of-darwins-work-on-corals-worms-and-co-evolution.

7 Michael Park, Erin Leahey, and Russell J. Funk, 'Papers and Patents Are Becoming Less Disruptive over Time', *Nature* 613 (4 January 2023): 138–44, doi.org/10.1038/s41586-022-05543-x; 'Is Scientific Progress Slowing? With James Evans', *Big Brains Podcast*, Episode 89 (31 March 2022), news.uchicago.edu/scientific-progress-slowing-james-evans.

8 Jenny Odell, *How to Do Nothing: Resisting the Attention Economy* (New York: Melville House Publishing, 2019), xix.

Given the current state of our academy, we must do more to highlight and encourage the night science part of academia and to bridge the gap between and incentives to pursue exploration and exploitation. If we do not, we may find ourselves in a world of diminishing scientific returns. While a focus on short-term exploitation often leads to incremental improvements, this can displace the sort of exploration that increases the chances of both failure, from which we can learn, and true breakthroughs. Being too risk averse in the short term increases risk in the long term. For our innovation ecosystems to be healthy in time, we need both exploration and exploitation. It is not a question of either/or. It is a question of both/and.

Complexity

'Both/and' thinking is the basis of complexity theory.

Brendan told me that when he was young he worked in a laundromat. During long hours working alone, he found himself engrossed in reading one book again and again. It was *Steps to an Ecology of Mind* by Gregory Bateson.[9] Before Brendan died, he loaned me his copy of this treasured book.

Much of what Bateson says resonates with my thinking on creativity: '[A]dvances in scientific thought come from *a combination of loose and strict thinking*, and this combination is the most precious tool of science.'[10] Bateson liked to draw on wild analogies and metaphors: is a system radially symmetrical like a jellyfish or symmetrical in a transverse way like a lobster? He also aimed to build a 'double habit of mind' that involved developing wild hunches (loose thinking) and then subjecting those to rigorous examination (strict thinking).[11] What he describes is an internal embodiment of the cyclical movement between phases of night and day science.

Scientific advances often begin with loose thinking, followed by building structures on unsound foundations, then making corrections through stricter thinking and finally substituting new underpinnings beneath the already constructed mass, Bateson argued. We must first sketch something big before we can nail down the details, I would say. If we impose tests of rigour too early and too broadly, we will undermine the confidence of

9 Gregory Bateson, *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology* (Northvale: Jason Aronson Inc., 1987).
10 ibid., 85 (emphasis in original).
11 ibid., 85.

and incentives for our academics to think in more creative and imaginative ways. We must value people who sketch the big picture as much as those who nail the smaller details because each approach is suited to different problems or aspects of problems at different stages in the evolution of thinking and fields.

Part of what fascinated Brendan about Bateson's book was its ecological way of thinking about the world. All systems were viewed as their own ecologies—whether an individual, a government, a university department or a country—and they nested within broader ecologies: individuals nested within families and communities, faculties nested within universities, departments nested within governments and countries nested within regions and the world. How those ecologies evolved was complex, depending on a myriad unpredictable interactions between a multitude of actors and factors. The question was not just one about parts, it was about how those parts related to create a whole.

In these ecologies, coevolution is common: actors shape and are shaped by their environments and their interactions. 'I pictured the relations between ethos and cultural structure,' Bateson mused, 'as being like the relation between a river and its banks—The river molds the banks and the banks guide the river.'[12] This coevolutionary dynamic pervaded Brendan's thinking about strategy. China was its own complex ecology, he would say, and not only were other countries having to respond to China's rise, but also China was having to evolve its approaches given its external environment was becoming more hostile. China affected other countries and other countries affected China.

Our world's complexity led both of us to have some doubts about the way in which many quantitative methods were being employed in the academy. Attempts to focus on one narrow element of the whole without understanding how it operated within a broader context seemed strange to us. How could you study the economy and treat political events as external shocks to the system when some of those political dynamics arose from the economic system itself? Efforts to hold everything else equal to investigate whether X caused Y often seemed problematic to us. We were instinctively drawn towards thinking in wholes rather than parts and towards focusing on complex, unpredictable and coevolutionary interactions rather than linear 'if X then Y' causal logic.

12 ibid., 93.

It struck me that many methods lauded in the academy as scientific involved looking at the past to say with some degree of certainty how we got to where we are now. Economics suffered from 'physics envy' and sought to align itself more with the rigour of a traditional natural science. Political science started doing likewise. But both seemed to be orienting themselves to the wrong type of physics, focusing on Newtonian stability and equilibrium rather than quantum-like probabilities and entanglement. Meanwhile, academia's focus on efficiency and optimisation brought forth the implicit mental model of a well-oiled machine rather than the unpredictable and ecological methods required for innovative thinking that are better reflected by metaphors of gardening.

Understanding our past does not always prepare us for the complexity and uncertainty we face when we look to the future. In thinking about this difference, I use Figure 5.2 to depict our relatively linear-seeming past and compare it with our complex and unpredictable future. The past often looks almost obvious or determined when viewed in retrospect; a lot of the contingency and complexity of what might have been seems to be forgotten or fades into the background. It can be hard to imagine how small changes at critical points could have led to a completely different present. With 20/20 hindsight, it is almost impossible to put yourself back into the fog of uncertainty that existed as events unfolded.

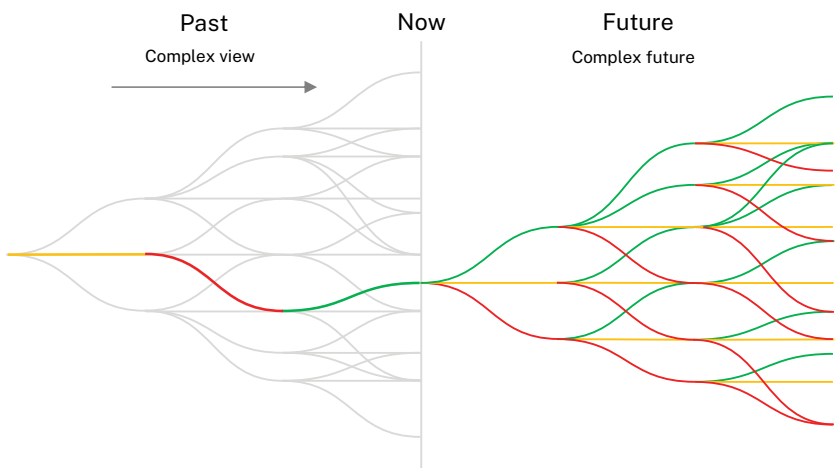

Figure 5.2 Looking backward and forward in complexity
Source: Anthea Roberts.

If often seems to me that academia is geared more towards methods for looking backwards so that we know with greater certainty how we got here, while policymaking, business and defence are geared towards developing tools and techniques for moving forwards in complex and uncertain environments. 'There is no data about the future,' the business professor Roger Martin likes to say.[13] The emphasis on rigour and modelling that I observed in economics and political science departments at many universities seemed a world away from the strategies I saw for coping with complexity and uncertainty on the battlefield or in business. It did not surprise me that Brendan, with a background in defence, chose to study at Wharton Business School rather than in an economics or political science department.

A cross-cultural element suffuses these differences as well. Linear ways of thinking are common in the West but less common in many other parts of the world. Many East Asian religions such as Buddhism or indigenous approaches have a stronger complexity basis, with a focus on the whole instead of the parts, on complex interdependencies and longer-term horizons. And some of the best books I have read that help to explain the evolution of the Chinese economy, for instance, have an explicit or implicit complexity basis with a focus on policy experimentation and adaptation rather than efficiency and optimisation. *How China Escaped the Poverty Trap* by Yuen Yuen Ang is one example, while *How China Escaped Shock Therapy* by Isabella Weber is another.

Some of the scholars who embrace complexity in their analysis also apply it to their scholarly approach. Take Ang as an example. In a discussion of one of her books on *Freakonomics Radio*, she and host Stephen Dubner had the following exchange:

> DUBNER: You write in the book that, 'data sets that are easily downloaded and plugged into regressions have shaped concepts, theories, and policies more profoundly than we'd like to admit'. So that sounds like a somewhat polite way of saying that academics and then perhaps policymakers talk about the things that are based on data that's easy to find. And if it's not so easy to find, we either

13 Roger Martin, 'Overcoming the Pervasive Analytical Blunder of Strategists: There Can Be No Data about the Future', *Medium*, 17 May 2021, rogermartin.medium.com/overcoming-the-pervasive-analytical-blunder-of-strategists-a5a4c52289b4; Roger Martin, 'Letter to the CEO', in *Strategy@work: From Design to Delivery*, edited by Brightline Initiative and Thinkers50 (London: Thinkers50, 2017), 43–44, thinkers50.com/wp-content/uploads/Thinkers50_Stratgey@Work_ONLINE-new.pdf?x30203&x72597.

> forget about it or pretend it doesn't exist. And to me, that would describe a lot of the corruption that you're talking about. It's very hard to measure anything illicit, but especially illicit in the hands of the powerful because they have the means to prevent scrutiny. So to me, that's where you are unorthodox.
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> ANG: It's true that it's much easier to condemn corruption among the poor. Very difficult to talk about influence politics among the rich, it's a topic that people do not generally like to touch upon. I see this practical reality, that people will pick agendas that are easy. The analogy I would use is, have you heard of the term 'machine-friendly crops'?
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> DUBNER: I have not.
>
> ANG: So, there are certain crops that are easily harvested by machines. And so, farmers would choose these crops simply because they can be easily mechanized. And I think that in the knowledge industry, we sometimes or maybe often see a similar dynamic, and I would call it a publication-friendly agenda. The incentives of the profession will lead people to overwhelmingly and disproportionately study certain kinds of topics in certain ways at the expense of truly important questions that frankly, very few people want to touch. I hope that doesn't get me into too much trouble.
>
> DUBNER: I hope it does. I hope it does. The right kind of trouble.[14]

Brendan was not focused on machine-friendly crops. You can see this interest in complexity developing in Brendan's journal entries from his time at Wharton. Of a lecture by David Wessels, a professor of finance, Brendan recounts:

> David made a very interesting comment. He said we live in the age of accountability. That is the story of his career—the era of ever increasing requirements for accountability in all spheres of life, including business. He said if you want people to be accountable, you then want to measure performance. So the culture drives a culture of measurement. The problem is you can measure really stupid things—measurement tends to take a very short-term focus. He said he is still thinking about this, but is wondering whether long-term performance would improve if they removed the requirement

14 Stephen J. Dubner, 'Is the U.S. Really Less Corrupt than China—and How about Russia? (Update)', *Freakonomics Radio Podcast*, Episode 481, 13 April 2022, freakonomics.com/podcast/is-the-u-s-really-less-corrupt-than-china-and-how-about-russia-update/.

> on companies or teams within companies to actually measure their performance. The comment was probably the most interesting thing I have heard so far, particularly from a Professor of Finance, and one that raises the most profound questions for me about the nature of work, the nature of accountability and performance, and the role of performance measurement.[15]

Brendan led like a gardener, implicitly understanding the value of nurturing a diverse ecosystem and allowing different plants to grow or flower over different time scales. Do not overburden that promising mid-career academic with too many meetings with government officials, he would say; instead, let them write their second book as that will allow them to make a bigger contribution in the long term. Do not require a grantee to tell you exactly what they are going to do and how they are going to do it; instead, pick good people and important problems and give those people the space, time and funding to see what they produce. That ecosystem way of thinking, and that long-range temporal horizon, will always stay with me when I reflect on Brendan's way of looking at the world.

Conclusion

As with many people within and beyond The Australian National University and the Australian Government, I will miss Brendan. He helped me to think about big-picture issues relating to creativity, complexity and change. He encouraged me to run my own race and to believe in my own instincts and skills—a gift I have come to understand he gave to many others as well. Brendan had a wisdom that I miss. He felt like a wise leader and a wise friend. So, when I have doubts or anxieties about my work and my choices, I try to ask myself: 'What would Brendan do?' It is an act of imagination, but imagination is also a source of power.

Brendan reminded us of the crucial role that imagination plays in our work. Imagination helps us to break free from the current set of possibilities and envisage new ways of being and moving forward. Brendan wanted to encourage our nation's strategic imagination, but imagination is also relevant in scholarship and thinking more broadly because it fuels creativity, helps us to better understand complexity and is useful in trying to navigate change. That sounds to me like a strategic use of time and resources.

15 On file with author.

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