Doing Difference Differently - Deakin STS in the late 1980s

Helen Verran

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At its beginning there was a sense that Deakin University, built on the outskirts of Geelong in 1974 as a regional university specialising in delivering distance and external education, serving students in sometimes very remote situations, was somehow playing in a different league than Australia's old universities established in the colonial era. Geelong is a small city spreading along the southwestern shoreline of Port Phillip Bay, 75 km southwest of Melbourne, sitting on the periphery in many ways. Deakin is one of the ten Australian universities established between 1949 and 1975 as, with government support, student numbers grew from around 15,000 to over 300,000.

The interdisciplinary studies of science, technology and society that were a feature of Deakin's humanities curriculum, were seen by some as harbinger, and by others as, at best, a mere complement to the studies of history and philosophy of science established soon after the second world war at University of Melbourne, an institution founded in the 1850s. Irrespective, few who were around at the time would disagree with the claim that in the years up to the mid 1990s, the intellectual vibrancy of Deakin University Science Studies Unit out-shone anything that the big-brother up the road could turn on. From the mid 1990s onwards however, universities in Australia were turned inside-out by the institutional ravages of neoliberal ideology, and the revisioning of the university as producing private good rather than public goods saw the demise of Deakin's Science Studies Unit, much loved though it was by students. I am delighted to be part of its phoenix-like re-emergence in this era when a critical science and technology studies is needed like never before in Australia.

I arrived in Geelong in the late 1980s after nearly eight years in Nigeria, appointed as a visiting fellow in the School of Humanities, and for the next five years would thrive in the intellectual atmosphere of Deakin Science Studies, albeit that in the final two years I would split my time between Deakin Science Studies and Melbourne HPS. I still wonder at my good fortune given the sheer unlikeliness of my shift from lecturer in science education at Awolowo Obafemi University in Ile-Ife Nigeria, to researcher in science studies at Deakin University in Geelong, Australia. In this essay, locating myself in the moment of those five years, I attempt to convey some of the dynamism of the collective life I was welcomed into.

What was nurtured at Deakin in the curriculum of its science studies unit, expressing as it did the new sort of 1970s university distinguishing itself from the

nineteenth century models that had dominated in Australia for over a century, was a concern with difference. From the 19th century the development of the Australian academy's curriculum was strongly influenced by the Scottish Enlightenment tradition which valued specialisation in articulating universalistic epistemics, and this style remained dominant in Australia up to the 1990s. From the beginning it was recognised that such a curriculum was quite inappropriate for Deakin with its interdisciplinary and culturally inclusive remit.

Here I point to what I see as two rather distinct flows that I came to understand as contributing to Deakin Science Studies' intellectual life at that time. Looking back at the years of my participation I perceive two ways to study difference in operation. One approach, now almost (justifiably) forgotten, continued a nineteenth century concern for universalism, the other expressed an interest in tracking some of the diverse social and cultural effects associated with different epistemic practices. In ending I ask what might be gleaned in telling such a story, three decades later.

Figure 1: Verran at Awolowo Obafemi University in Ile-Ife Nigeria.

Max Charlesworth, founding Dean of Deakin's School of Humanities, had been recruited from University of Melbourne Philosophy Department. For an Australian twentieth century philosopher he had a highly unusual training, having been inducted into a structuralist inflected 'continental' philosophy in Belgium. My temporary appointment at Deakin was one of several unlikely recruitments he engineered, but while initiating my involvement with Deakin was of course important to me, far more significant for Deakin Science Studies was his recruitment of David Wade Chambers from Montreal. Wade had pioneered an early transdisciplinary science studies curriculum working inter-institutionally between Montreal's McGill and Concordia Universities. As well as a PhD in history of science from Harvard, like many Oklahomans Wade has strong Cherokee family connections. Armed with his Harvard degrees in history of science, and Canadian experience, he brought a new and different sort of respect for Indigenous traditions of thought to the Australian academic scene, along with a deeply rooted respect for the American liberal arts traditions of pedagogy. Even a quick browse of the Deakin curriculum materials now available online,[1] reveals how significant an impact both these sensibilities carried into Deakin by Wade, had on Deakin Science Studies teaching.

While at Deakin I worked with both David Turnbull and with Wade. David was part way through building a mud-brick house near Geelong with his partner Sandy when I first met him, he was a tutor in the Science Studies Unit. Having inadvertently ended up in Geelong, after years of driving buses between Delhi and London, carrying adventurous Australians and Brits to and from Europe, with a Masters degree in philosophy from Dublin, and an all-consuming passion for understandings the workings of spatiality in human practices and thought, David exemplified the new British science studies intellectual tradition; empiricist relativising, and social constructivist. In David's case this had been honed during a prolonged visit to Deakin Science Studies of Donald McKenzie, on sabbatical leave from Edinburgh. While Donald McKenzie's visit had been before my time, the pleasures of sharing food and wine in a mud-brick house across the next few years with Steve Shapin, Simon Schaffer, Bruno Latour, and Donna Haraway, unfortunately not altogether, are unforgettable.

When I arrived at Deakin in the late 1980s it was a time when the new relativising, constructivist study of science and technology was perhaps at its strongest there. My own thinking was still recovering from having been seriously tripped-up by the numbers that inhabited the classrooms of Yoruba primary school classrooms, but I had regained enough intellectual poise to be arguing strongly for the contention that Yoruba numbers and the numbers of science were different conceptual constructions. How fortunate I felt to find myself as a new member of a group seeking to explain difference as difference, rather than

use difference to point to some underlying sameness of humanity, hence explicitly explaining the difference away.

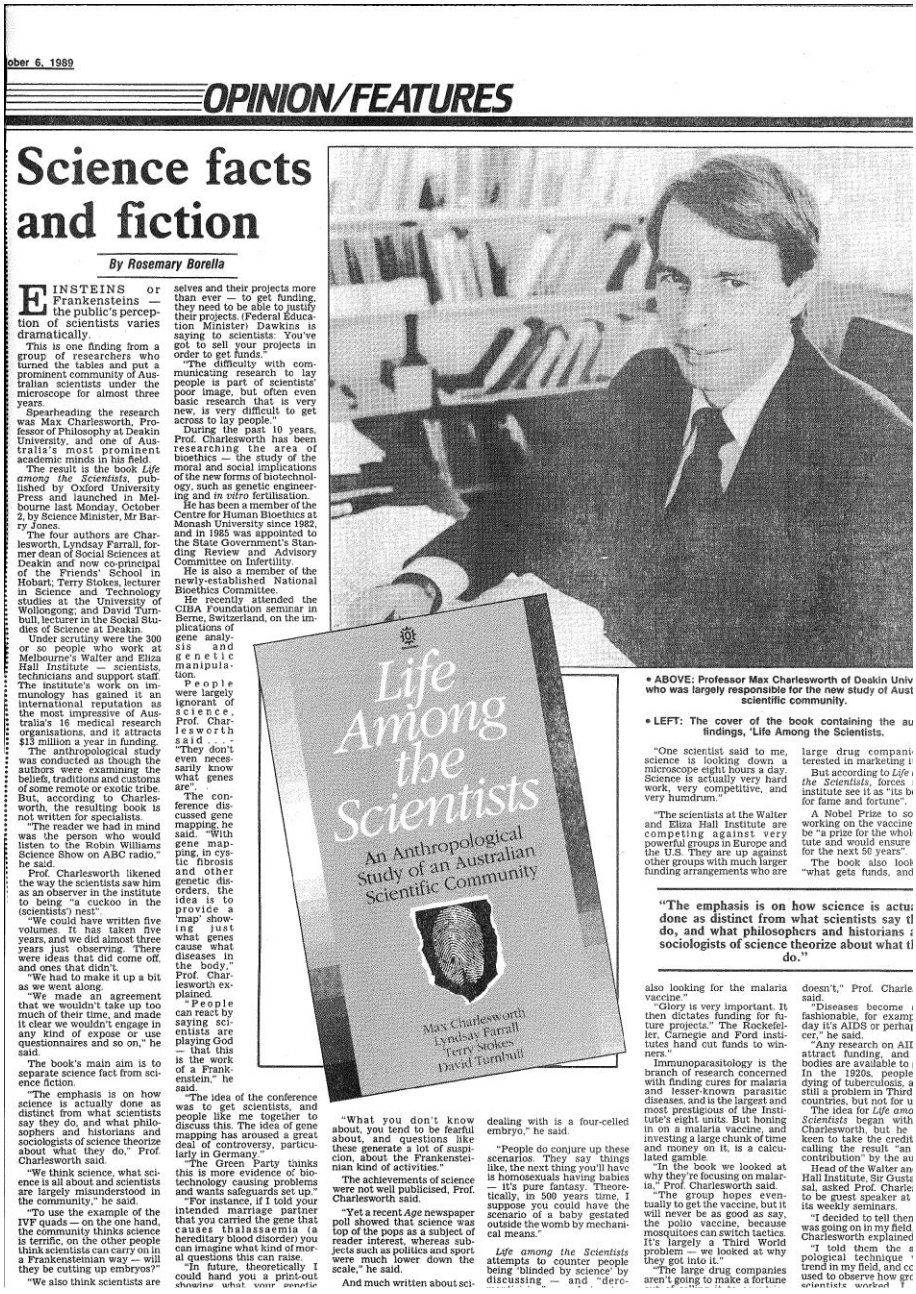
Studying Difference to Get at Humanity's Sameness

Max Charlesworth was nearing the end of his career in the late 1980s, as a philosopher his interests had always been wide ranging and had become more and more diverse. In a disciplinary sense Charlesworth worked the boundary between a philosophy and anthropology, which in the 1980s was regarded as highly innovative. I am reminded of a comment made from the other side of this philosophy/anthropology divide by Clifford Geertz.

> As befits two disciplines, neither of which is clearly defined and both of which address themselves to the whole of human life and thought, anthropology and philosophy are more than a little suspicious of each other…[A]n ambition to connect everything with everything else and thereby get to the bottom of things… leaves both of them unsure about which of them should be doing what…nothing apparently is alien to either of them.[2]

Although he shared with Geertz and his 'interpretivism' an inspiration from Wittgenstein's later writings, Charlesworth's commitment to a Lévi-Strauss inspired rationalism put him in, what at that point was seen as 'the other anthropological camp' than Geertz. Charlesworth's structuralist sympathies supported a perspectivist or historicist epistemic demeanour.

Here I examine two of his late scholarly texts *Religion in Aboriginal Australia*,[3] and *Life Among the Scientists*[4]. As the sole philosopher among a group of anthropologists, in 1984 Charlesworth had edited *Religion in Aboriginal Australia. An Anthology*, contributing to consolidation of a significant cognitive shift in Australian intellectual life in the second half of the twentieth century. From "the melancholy mixture of neglect, condescension, and misunderstanding… influenced by nineteenth century neopositivism…and the dominant evolutionary model which led anthropologists to see Australian Aboriginal [thought] as the simplest, least developed, most infantile form of human consciousness,"[5] the study of the many Aboriginal Australian traditions of thought had by the 1980s become serious, rigorous, and systematically relativising anthropology. By 1988 this intellectual movement had "Aboriginal Conceptions of the Workings of Nature" identified as (literally) the first chapter of *Australian Science in the Making*.[6]



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OPINION/FEATURES

Science facts and fiction

By Rosemary Borella

EINSTEINS or Frankensteins — the public's perception of scientists varies dramatically.

This is one finding from a group of researchers who turned the tables and put a prominent community of Australian scientists under the microscope for almost three years.

Spearheading the research was Max Charlesworth, Professor of Philosophy at Deakin University, and one of Australia's most prominent academic minds in his field.

The result is the book *Life among the Scientists*, published by Oxford University Press and launched in Melbourne last Monday, October 2, by Science Minister, Mr Barry Jones.

The four authors are Charlesworth, Lyndsay Farrall, former dean of Social Sciences at Deakin and now co-principal of the Friends' School in Hobart; Terry Stokes, lecturer in Science and Technology studies at the University of Wollongong; and David Turnbull, lecturer in the Social Studies of Science at Deakin.

Under scrutiny were the 300 or so people who work at Melbourne's Walter and Eliza Hall Institute — scientists, technicians and support staff. The institute's work on immunology has gained it an international reputation as the most impressive of Australia's 16 medical research organisations, and it attracts $13 million a year in funding.

The anthropological study was conducted as though the authors were examining the beliefs, traditions and customs of some remote or exotic tribe. But, according to Charlesworth, the resulting book is not written for specialists.

"The reader we had in mind was the person who would listen to the Robin Williams Science Show on ABC radio," he said.

Prof. Charlesworth likened the way the scientists saw him as an observer in the institute to being "a cuckoo in the (scientists') nest".

"We could have written five volumes. It has taken five years, and we did almost three years just observing. There were ideas that did come off, and ones that didn't.

"We had to make it up a bit as we went along.

"We made an agreement that we wouldn't take up too much of their time, and made it clear we wouldn't engage in any kind of expose or use questionnaires and so on," he said.

The book's main aim is to separate science fact from science fiction.

"The emphasis is on how science is actually done as distinct from what scientists say they do, and what philosophers and historians and sociologists of science theorize about what they do," Prof. Charlesworth said.

"We think science, what science is all about and scientists are largely misunderstood in the community," he said.

"To use the example of the IVF quads — on the one hand, the community thinks science is terrific, on the other people think scientists can carry on in a Frankensteinian way — will they be cutting up embryos?"

"We also think scientists are selves and their projects more than ever — to get funding, they need to be able to justify their projects. (Federal Education Minister) Dawkins is saying to scientists: 'You've got to sell your projects in order to get funds.'

"The difficulty with communicating research to lay people is part of scientists' poor image, but often even basic research that is very new, is very difficult to get across to lay people."

During the past 10 years, Prof. Charlesworth has been researching the area of bioethics — the study of the moral and social implications of the new forms of biotechnology, such as genetic engineering and *in vitro* fertilisation.

He has been a member of the Centre for Human Bioethics at Monash University since 1982, and in 1985 was appointed to the State Government's Standing Review and Advisory Committee on Infertility.

He is also a member of the newly-established National Bioethics Committee.

He recently attended the CIBA Foundation seminar in Berne, Switzerland, on the implications of gene analysis and genetic manipulation.

People were largely ignorant of science, Prof. Charlesworth said.

"They don't even necessarily know what genes are".

The conference discussed gene mapping, he said. "With gene mapping, in cystic fibrosis and other genetic disorders, the idea is to provide a 'map' showing just what genes cause what diseases in the body," Prof. Charlesworth explained.

"People can react by saying scientists are playing God — that this is the work of a Frankenstein," he said.

"The idea of the conference was to get scientists, and people like me together to discuss this. The idea of gene mapping has aroused a great deal of controversy, particularly in Germany."

"The Green Party thinks this is more evidence of biotechnology causing problems and wants safeguards set up."

"For instance, if I told your intended marriage partner that you carried the gene that causes thalassaemia (a hereditary blood disorder) you can imagine what kind of moral questions this can raise.

"In future, theoretically I could hand you a print-out showing what your genetic

• ABOVE: Professor Max Charlesworth of Deakin Univ who was largely responsible for the new study of Aust scientific community.

• LEFT: The cover of the book containing the au findings, 'Life Among the Scientists.

"One scientist said to me, science is looking down a microscope eight hours a day. Science is actually very hard work, very competitive, and very humdrum."

"The scientists at the Walter and Eliza Hall Institute are competing against very powerful groups in Europe and the U.S. They are up against other groups with much larger funding arrangements who are

large drug compani terested in marketing i

But according to *Life the Scientists*, forces institute see it as "its b for fame and fortune".

A Nobel Prize to so working on the vaccine be "a prize for the whol tute and would ensure for the next 50 years".

The book also look "what gets funds, and

"The emphasis is on how science is actu done as distinct from what scientists say t do, and what philosophers and historians sociologists of science theorize about what t do."

also looking for the malaria vaccine."

"Glory is very important. It then dictates funding for future projects." The Rockefeller, Carnegie and Ford institutes hand out funds to winners."

Immunoparasitology is the branch of research concerned with finding cures for malaria and lesser-known parasitic diseases, and is the largest and most prestigious of the Institute's eight units. But honing in on a malaria vaccine, and investing a large chunk of time and money on it, is a calculated gamble.

"In the book we looked at why they're focusing on malaria," Prof. Charlesworth said.

"The group hopes eventually to get the vaccine, but it will never be as good as say, the polio vaccine, because mosquitoes can switch tactics. It's largely a Third World problem — we looked at why they got into it."

"The large drug companies aren't going to make a fortune

doesn't," Prof. Charle said.

"Diseases become fashionable, for examp day it's AIDS or perha cer," he said.

"Any research on AII attract funding, and bodies are available to In the 1920s, people dying of tuberculosis, a still a problem in Third countries, but not for u

The idea for *Life amo Scientists* began with Charlesworth, but he keen to take the credit calling the result "an contribution" by the au

Head of the Walter an Hall Institute, Sir Gusta sal, asked Prof. Charle to be guest speaker at ita weekly seminars.

"I decided to tell then was going on in my field Charlesworth explained

"I told them the pological technique trend in my field, and cc used to observe how gro scientists worked. I

"What you don't know about, you tend to be fearful about, and questions like these generate a lot of suspicion, about the Frankensteinian kind of activities."

The achievements of science were not well publicised, Prof. Charlesworth said.

"Yet a recent *Age* newspaper poll showed that science was top of the pops as a subject of reader interest, whereas subjects such as politics and sport were much lower down the scale," he said.

And much written about sci-

dealing with is a four-celled embryo," he said.

"People do conjure up these scenarios. They say things like, the next thing you'll have is homosexuals having babies — it's pure fantasy. Theoretically, in 500 years time, I suppose you could have the scenario of a baby gestated outside the womb by mechanical means."

Life among the Scientists attempts to counter people being 'blinded by science' by discussing — and "dere-

Figure 2: Max Charlesworth in a newspaper article on *Life Among the Scientists*. This item is included in the STS Across Border Archive.

Towards the end of his introduction to *Religion in Aboriginal Australia*, graciously noting that an enormous debt of gratitude is owed the ethnographers and anthropologists with their close-range, empirical descriptions of Aboriginal practices, Charlesworth regrets that so few scholars with interests in philosophy take an interest in Aboriginal Australian thought.[7] What this means is not specified, it seems likely to me that following Lévi-Strauss, Charlesworth assumed that universal forms of logic in metaphysics could be discerned by studying differences, furthering the attempt to establish the nature of the human mind.[8]

When I arrived at Deakin in the late 1980s Max Charlesworth was the chief investigator of an Australian Research Grants Committee (ARGC) funded research project: an empirical anthropological study of what was at that time,

certainly Australia's most prestigious scientific laboratory, the Walter and Eliza Hall Institute of Medical Research (WEHI). There was no doubt that the fractious team of investigators "four people with very different scholarly backgrounds in the history and philosophy of science"[9] was only just holding together long enough for data to be generated, albeit with what seems to have been rather haphazard methods, so that a book could be written.

One of a large clutch of laboratory studies inspired by the emergence of ethnomethodological sociology turning its attention to scientific laboratories in the 1970s, including Latour and Woolgar's *Laboratory Life,*[10] the study of the WEHI scientific lab, *Life Among the Scientists* is perhaps the oddest. The biggest oddity is the first person singular 'I' of the author in the text and 'her' (or so it seems) voice. With her haughty literary detachment, it seems unlikely that such an author has ever actually *entered* a laboratory. This is the voice of a Lévi-Straussian anthropological philosopher unable to escape 'her' own cultural and historical origins.[11] And the very large portrait images of "Sir Macfarlane Burnet" and "Sir Gustav Nossal" reproduced as a double spread on pages 22 and 23 leads me to suggest uncharitably, that this is more a laboratory hagiography than a critical, empirical sociology of knowledge. Here Charlesworth's anthropological philosophy—for the author in the text is clearly his voice, fails him.

Looking back at these late works of Charlesworth, I see that setting out on these two intellectual ventures, both philosophically risky, does actually make sense in the classic structuralist recomposing methodological framing. Here difference is used to reveal a sameness: the common logic of human thought, so that as Geertz put it, scholars of the Western academy could tell themselves that they 'were getting to the bottom of things'. Although it seems highly implausible now that the enthusiasm for structuralism has faded, perhaps for Charlesworth a careful and respectful empirical articulation of the structural logic of the "secret-sacred religious and ceremonial myths" of Aboriginal Australians[12] could usefully be set alongside a revelation of the structural logic of science that went beyond what "received scientific mythology *says*… and what philosophers of science *suppose* [scientists] do",[13] through showing how a group of elite scientists actually do science. By doing so, a common logic in human thought would be revealed, and a tolerant, open humanism could be founded. This nineteenth century vision of what a university offers was clearly alive and well as the twentieth century was drawing to an end. In its clinging to what was already in the 1980s a fading structuralist paradigm, the text as a whole, fails to deliver on its promises, and if the project was conceived as a means of connecting the two intellectual traditions that had life in Deakin Science Studies, it failed on this count too. Yet it is important to remark this tradition in the history of the Australian intellectual concern with difference. In recognizing and focussing on the intense

commitment to intellectual work that was and is a feature of Aboriginal Australian life, the work of Charlesworth should not be passed over in telling the story of science studies at Deakin.

Studying How Differences are Generated in Humans Going-on Together

A rather different concern with difference is what we see expressed in Deakin STS pedagogical materials. As an intellectual project it connected up strongly with the mainstream of Anglophone social studies of science. In the second half of the twentieth century that movement had emerged rather differently in the US and the UK. In the US the interventions of ethnomethodologists were crucial.[14] But the works of sociologists clustered around Howard Becker, committed to a form of American Pragmatism which saw the emergence of symbolic interactionist studies that focused on the work of scientists, were what dominated in terms of volume.[15] These American approaches were certainly incorporated into the emerging Deakin curriculum, but it was the new social studies of the scientific generation of knowledge emergent in Britain in the 1970s, which exerted a strong influence in the framing of the pedagogical project.[16]

Writing in 1993, the ethnomethodologist Mike Lynch puts things this way.

> In the early 1970s, Barry Barnes, David Bloor, Michael Mulkay, David Edge, Harry Collins and other British sociologists confronted the structural-functionalist sociology of science developed by Robert Merton and his followers and assembled a loosely federated array of constructivist, relativist, and discourse-analytic programs. Since then, related variants of a "new" sociology of science proliferated on the Continent [of Europe], in Australia, and in North America.[17]

Beginning in the mid 1970s, the study material produced by the Deakin Science Studies Unit to drive an integrated study of sciences' socialities, along with its histories and philosophies, were among the first pedagogical materials systematically expressing the new empirical, relativising, constructivist studies of science, and they remain the most complete. The materials were much praised as scholarly contributions at the time and reviewed in two leading journals in the 1980s, *Isis* and *Technology and Culture*.[18] I see these materials as the outcome of vibrant and focussed research, deserving of recognition as a brilliant originary moment in the history of science and technology studies in Australia. The group who participated in this work was quite large, pointing to a significant community of thinkers.[19] The pedagogical texts are theoretically and empirically innovative, deserving of recognition as legitimate expressions of a significant research program in empirical knowledge studies, mobilizing an analytic framing that a few

years hence, would come to be associated with Shapin and Schaffer's science studies classic *Leviathan and the Air-Pump*.

This is how Chambers and Turnbull characterised the analytic framing of the course materials in their 1983 paper published in *Social Studies of Science*.

> [W]hat we are arguing for is in no sense a social reductionist approach - rather, as we argue later, the notion of society as distinct from human practices has to be abandoned. Society is constituted by our practices, including scientific ones, and the task of analyzing it is open to as many approaches as there are problems…[When] everything is social there can be no society against which to set science or technology or anything else. [20]

Thirty years later, in a new introduction to their 1985 text, Shapin and Schaffer would write

> *Leviathan and the Air-Pump* was an attempt to see the problem of knowledge and the problem of order as the same problem. Wherever and whenever groups of people come to agree about what knowledge is, they have practically and provisionally solved the problem of how to array and order themselves. To have knowledge is to belong to some sort of ordered life; to have some sort of ordered life is to have shared knowledge.[21]

From the beginning the Deakin science studies curriculum materials sought to investigate the problem of knowledge and the problem of order understood as a single problem, and to do so in a very wide array of situations. Below I briefly consider two 1984 publications authored by David Wade Chambers, and two titles by David Turnbull published in 1991, to give a taste of this quite large corpus of materials.

The analytic formula Shapin and Schaffer would mobilize to achieve their re-presentation and re-interpretation of the historically famous disagreement between Thomas Hobbes and Robert Boyle in Restoration 17th century Britain had been in use for some time before their brilliant exposition of it. As I see it this formula had been first articulated in ethnomethodological studies, adopted as a means of studying the workings of society in the present from the point of view of the actors. In the process, probably unwittingly, drawing on structuralist anthropology they reconstrued what had long been a problem for historians.[22]

The ethnomethodologists' formula which I see as embedding a decomposing moment hinged to a recomposing moment, [23] was picked up and modified by relativising constructivists who were interested in expanding the categories through which the problems of order might be articulated. Their modifications meant that the second moment of analysis no longer expressed the purview of

the actors whose knowledge practices had been (re)described in the first moment, Rather, they expressed wider and differently focussed analytic concerns. There is of course much to be said in discussion of this formulation of what characterised the analytic outcome of confronting the then dominant functionalist sociology, but this is not the place to do that. What does need to be recognized however is that it informs my readings in this piece.

In 1984 with singular elegance and economy characterising both moments of this form of analysis, achieved on the one hand by making 'exhibits of visual material', and on the other by offering minimal yet relentlessly open-ended re-interpretation, Wade Chambers' *Putting Nature in Order* and *Beasts and Other Illusions* effected an exposition of the method every bit as brilliant as Shapin and Schaffer, yet at the time even more bewildering to academic colleagues, albeit loved and cherished by the Deakin students in their far-flung, unlikely locations of study.

Putting Nature in Order is aimed at second year undergraduate students, the first of a series of four texts designed to scoop up the reader and carry them to then end of a course of study. It begins,

> "Most people think that the world is a cosmos rather than a chaos. That is to say they believe nature is ordered and that its order is intelligible to men and women"[24]

The seven sections of the book which follow treat themes which modify and/or qualify this contention. The first asks whether such order is inherent or imposed, and the next three offer examples of how orders might be conceptualised: Systems? Form and symmetry? Unity and particularity? Clearly introductory, the text winds in social, historical, philosophical, literary, and political topics in a unique and delicate combination of visuals and words.

In a prefatory section, readers have been warned. It is clear a vast amount of informed and careful work has gone into putting together the exhibits, but in making something of it, readers are the ones who must do the work. Notice is given, and challenge is issued with quotation from the poet Ezra Pound who in 1934 work of literary criticism made an "exhibit" of English poetry.

> Exhibits
> The ideal way to present the next section
> of this booklet would be to give the
> Quotations WITHOUT any comment
> Whatever. I am afraid that would be too
> revolutionary. By long and wearing experience
> I have learned that in the present imperfect
> world, one MUST tell the reader.[25]

But the poet goes on, he will not tell everything, indeed he will be very demanding. True to this spirit *Putting Nature in Order* demands much, but at the same time offers much. The visuals are brilliantly assembled rendering particular collective practices apparent, pulling and pushing readers along. In the interpretive text the author both talks *to* the visuals and talks *from* them.[26]

Beasts and Other Illusions[27] is the final text in the series. It wonders at ways that animals have been, and are seen, across many centuries and civilisations. It can be said to resemble a travel guide, following a route through many times and places, again by way of and elegant display of visuals. Taking us through five exhibits, it leaves trails of open questions. Far more than a series of chambers of wonders, which for me is somehow implied in the title, it offers insights into how animals have participated in knowledge making in fine art, history, philosophy, morality, and literature. It both succeeds as performance doing a relativising study of knowledge making, and exceeds studies of science and technology, exemplifying the best of American liberal arts traditions.

The later publications authored by David Turnbull as additional offerings in the first-year course "Knowledge and Power", exemplify for me 'the Australian variant of the "new" sociology of science' that Lynch identifies as coming to life in 1970s Britain in their insistent emphasis on describing practices in particular times and places. For example, in the two books I focus on here, the time-place of Micronesian navigational practices which had flourished up to the end of the nineteenth century when European colonisers put a stop to what they saw as a competing trade network, is set alongside the time-place of the late twentieth century marine laboratory. Each set of practices is precisely described in its own terms. *Mapping the World in the Mind*[28] simultaneously details the knowledge practices of Micronesian navigators and the ordering effected across vast swathes of the Pacific and Indian Oceans. *Technoscience Worlds*[29] considers the ways knowledge practices swarm out of modern laboratories to order modern worlds. These texts ask about disparate epistemic practices that at once do knowledge *and* do the political practices that order space in particular ways. The take-home message is that we are all participants in the happenings of our worlds, technoscientific or otherwise, and that is the only position we can act from.

In *Mapping the World in the Mind*, the second section of the book is readings from others' empirical studies of Micronesian navigation, exerts of an historical ethnography discourse that flourished in the early 1970s. The first section of the book, Turnbull's interpretive recomposing of this empirical material, offers startling insight into a series of topics common in discussions of order: 'the great divide'; collective intention and exploration; local versus global; oral versus written; metaphor and spatiality.

In developing his focus on the epistemic practices and the orderings effected by the sciences, in *Technoscience Worlds* Turnbull points to a

> doubly-confounding paradox. Not only are our scientific and technological inquiries manifestly both very productive and very destructive, but we will inevitably come to depend on them to resolve the very contradictions they have created. What compounds this even further in that we know very little about the nature of inquiry[30]

In the text that follows scientific knowledge is first presented as a social phenomenon. Then detailed exposition of the practices by which the life of a scientific laboratory actually goes on in the day to day blend easily into interpretation drawing in historical, philosophical, social, and cultural moments to bring us to powers of ordering worlds outside laboratories. Ten years of insights from laboratory studies is neatly reduced to around ten pages, then technology is presented in a similar manner "bringing science and technology together with a sociological perspective focussing on… instrumentalities and practices."[31]

Australia changed in the 1970s and 1980s.[32] The social order that held when neoliberalism first started to cut deep into our collective life in the mid 1990s was very different than that of the early 1970s when Gough Whitlam had galvanised a young increasingly well-educated post war generation. My fantasy is that in countless small pockets, remote from each other but connected through access to external study at Deakin, this change had in part been fuelled by Deakin's innovative curriculum in science and technology studies.

Concluding

My story of what I claim as an originary moment of STS in Australia has focussed on an analytic concern with difference and has made no mention of epistemology—the study of how certainty in scientific knowing is achieved. In contrast to most STS origin stories which begin with battles between philosophers and sociologists over science as the object to be known, some stories even imagining social scientists playing epistemological chicken,[33] my story begins elsewhere.

My beginning has to do with Deakin being an academic institution where a different kind of scholarly product is required, one associated with intellectuals committed to their times and places. The curriculum in Deakin and other universities established in the middle of the second half of the twentieth century was concerned with 'relevance', the institution's preoccupations no longer assumed to be strictly 'universal'. The place in which the academy as an institution was actually situated had begun to matter, and in Geelong it was clear

that this was a very different place than Melbourne (although that was probably less evident in Melbourne). Knowledge that mattered in Geelong was related to positioning on the periphery. States had begun to shift priorities, and the hold of Max Weber's vision of the state as an ideal legal-rational organization[34] was beginning to fade.[35]

What is interesting about this is that while in Deakin we were learning to do analysis which enacted commitment to the claim that the problem of knowledge and the problem of order are the same problem, *the actuality that* we were pursuing this idea, and were resourced to do so, was itself an expression of that maxim. The order of the modern Australian state was changing, and the very establishment of Deakin and other universities at that time expressed that phenomenon. As the order of the modern state changed so did the epistemic practices. I am not proposing a causal relation, rather reiterating Shapin and Schaffer's claim that order and knowledge are co-constituing, one and the same problem.

Epistemic practices lay at the core of the concerns of Deakin's Science Studies Unit, and not only the epistemic practices of the sciences, various and interesting though they were. The epistemic practices of Aboriginal Australian knowledge traditions, which unlike the sciences included religious and spiritual concerns, were also an explicit focus, from the beginning seen as both distinct from, but also as connectable to the sciences. Seeking to understand the workings of society from the point of view of the actors had practices of epistemic relativizing flourishing in Deakin Science studies, but constituting incommensurability was not the aim of the game there, so epistemology was irrelevant. It was not that epistemology talk was banned, rather that it was just boring and extraneous.

One way to imagine the effect of this abandonment of epistemology is to see that the concern with knowledge practices that developed at Deakin Science Studies was 'up-stream' from epistemology.[36] Shifting camp to the higher reaches of Australia's knowledge flows, it had become obvious that questions concerning knowledge that were prior to those epistemologists ask, had banked-up during the long era of epistemological parochialism. Such questions as "How are knowers configured?" and "What might epistemic cosmopolitanism look like?" became especially salient when significant engagement with Aboriginal Australian knowers began to emerge in on-the-ground work,[37] and the privilege of the epistemologists' removed judging observer dissolved. "What do knowers know?", the beginnings of the so-called ontological turn, and its associated query of "How do knowers know?" precipitated abandonment of method long before 'after method' became naturalized as the title of a book.[38] And these are only those questions that concern knowledge practices. The axiological and teleological concerns of ordering, "Why is this knowledge valuable" and "What is the

purpose of this knowledge" were also banked up, unaskable in the era of florid neuroses with certainty.

So, what can be gleaned from my originary story of STS in Australia, which might offer insight for the bewildering and perhaps perilous current moment in which Australian STS makes its way as an academic tradition of analysis? Like all such traditions we are increasingly finding our collective is thrown on the resources of its practitioners if it is to maintain itself as a coherent (enough) and lively tradition of analysis. In the 1970s and 1980s when what universities produced was still seen as public goods, STS established itself in Australian universities well-resourced by the state. Now, with the continuing ascendance of neo-liberal ideologies that is no longer the situation. Universities are seen as producing private goods and consumers of those goods must pay. There is much to be said on this, and this is not the place to say it, but in my view the prospects for STS are not entirely bleak.

What I take away from the story I have told here however is the recognition that we are in a moment not too different than that which Shapin and Schaffer describe, when epistemics and orderings are changing rapidly and profoundly in mutually co-constituting ways. My story proposes that it was in such a disjuncture that STS started in Australia. Of course, the moment we negotiate now is different—but it's also (a bit) the same.

Figure 3: Verran, Wade Chambers, and Turnbull photographed together.

[1] http://stsinfrastructures.org/content/sts-Deakin-university
[2] Clifford Geertz (2000). *Available Light. Anthropological Reflections on Philosophical Topics*. Princeton: Princeton University Press. (p.ix)
[3] Max Charlesworth (1984). *Religion in Aboriginal Australia. An Anthology* Max Charlesworth, Howard Morphy, Dianne Bell, Keith Maddock (eds). St Lucia: University of Queensland Press, p.1
[4] Max Charlesworth, Lyndsay Farrall, Terry Stokes, David Turnbull (1989). *Life Among the Scientists. An Anthropological Study of an Australian Scientific Community*. Oxford: Oxford University Press.
[5] Max Charlesworth (1984). "Introduction" in *Religion in Aboriginal Australia. An Anthology* Max Charlesworth, Howard Morphy, Dianne Bell, Keith Maddock (eds). St Lucia: University of Queensland Press, p.1
[6] L.R Hiatt and Rhys Jones (1988). "Aboriginal Conceptions of the Workings of Nature" in *Australian Science in the Making* R.Home (ed). Cambridge: Cambridge University Press.
[7] Charlesworth, 1984: 13.
[8] Claude Lévi-Strauss (1966). The Savage Mind. Chicago: Chicago University 4ress. p.35-36.
[9] Charlesworth *et al*, 1989: viii
[10] Bruno Latour and Steve Woolgar (1979). *Laboratory Life. The Social Construction of Scientific Facts*, Sage: Beverly Hills
[11] Philip J. Bossert (1982). "Philosophy of Man as a Rigorous Science: A View of Claude Levi-Strauss' Structural Anthropology" Human Studies, Vol. 5, No. 2 pp. 97-107
[12] Charlesworth *et al* 1984: 11
[13] Charlesworth *et al* 1989: 1
[14] Michael Lynch (1993). *Scientific Practice and Ordinary Action. Ethnomethodology and Social Studies of Science*, Cambridge: Cambridge University Press.
[15] Susan Leigh Star (1988). "The Sociology of Science and Technology"' *Social Problems*, Vol. 35, No. 3 pp. 197-205
[16] David Wade Chambers and David Turnbull (1989). "Science Worlds: An Integrated Approach to Social Studies of Science Teaching", Social Studies of Science, Vol. 19, No. 1 pp. 155-179.
[17] Lynch 1993: 39
[18] See: Melvin Kranzberg (1982). Isis, Vol. 73, No. 2, 291-292; George Bindon (1983). Technology and Culture, Vol. 24, No. 3, 548-550
[19] See for example the materials collected here: http://stsinfrastructures.org/content/knowledge-using-curricula-and-course-material
[20] Chambers and Turnbull 1983: 168.
[21] Steven Shapin and Simon Schaffer (2011/1985). "Up for Air: Leviathan and the Air-Pump a Generation On" Leviathan and the Air-Pump. Hobbes, Boyle, and the Experimental Life, Princeton: Princeton University Press p. xlix. The insight of the co-constitution of epistemics and orders of things was of course not new in 1985, having been famously developed by Foucault, published in English in 1970 as *The Order of Things. An Archaeology of the Human Sciences* (NY: Pantheon Books).
[22] This significant shift was of course was not uncontroversial, it was discussed as the problem of adopting 'the stranger's perspective' at the time. See Azadeh Achbari (2017) "The Reviews of *Leviathan and the Air-Pump*: A Survey", *Isis*, 108, pp108-116. Shapin and Schaffer discuss this issue in beginning pages 4-6.
[23] See Helen Verran (2018). "Decomposing Numbers", *HAU Journal of Ethnographic Theory* 8 (1/2): 6-19.
[24] Wade Chambers (1984). *Putting Nature in Order*, Geelong: Deakin University Press, p.2
[25] Quoted in Chambers, 1984: 1
[26] See Helen Verran and Brit Winthereik (2016). "Innovation with Words and Visuals. A Baroque Sensibility" in *Modes of Knowing Resources from the Baroque*, John Law and Evelyn Ruppert (eds), Manchester: Mattering Press 197-223.
[27] Wade Chambers (1984). *Beasts and Other Illusions* Geelong: Deakin University Press.
[28] David Turnbull (1991). *Mapping the World in the Mind. An Investigation of the Unwritten Knowledge of the Micronesian Navigators,* Geelong: Deakin University Press.
[29] David Turnbull (1991). *Technoscience Worldss,* Geelong: Deakin University Press.
[30] Turnbull, 1991: 3
[31] Turnbull, 1991: 35
[32] See for example Tim Winton (2017). *The Boy behind the Curtain,* Penguin Books
[33] H. M Collins and Steven Yearley (1996). "Epistemological Chicken" in *Science as Practice and Culture*, Andrew Pickkering (ed), Chicago: University of Chicago Press, pp301-326.
[34] Max Weber (1978) Economy and society, Volume 2, (ed) Roth, G.l and Wittich, C. Berkeley: California.959-560
[35] Glyn Davis (2003) "A Contract Stte. New Public Mnagement in Australia" in *New Public Service* R. Koch & P. Conrad (eds.), Wiesbaden: Gabler-Verlag, p.178
[36] Recognizing the need to be careful with metaphor (one of the stronger take home messages of the Deakin materials) let me explicate this one briefly. In proposing that epistemics and orderings of things have retreated into society's uplands, its wild places, so that increasingly we must follow epistemics-orderings in the wild if we are to attend to its problems, I am picking up on a contention recently developed by James Scott linking modes of governance and terrain (James C. Scott (2010). *The Art of Not Being Governed. An Anarchist History of Upland Southeast Asia*, New Haven: Yale University Press).

[37] Watson, Helen, with the Yolngu Community, and D.W. Chambers, *Singing the Land and Signing the Land*, Deakin University Press, pp.66, 1989. http://singing.indigenousknowledge.org/
[38] John Law (2004). *After Method. Mess in Social Science Research*, London: Routledge.