

**A<sup>2</sup>HPS<sup>3</sup>**  
Australasian Association for the History,  
Philosophy and Social Studies of Science

*2017 Biennial Conference – Program*

**University of Wollongong**

**22–24 November, 2017**



## AAHPSS 2017 CONFERENCE PROGRAM v14

Wednesday 22 November		Thursday 23 November			Friday 24 November	
9:00-10:30	<b>Registration</b>	S 5 (4) <b>67-104</b> <i>Early modern mechanics and natural philosophy</i>	S 6 (4) <b>67-102</b> <i>Environmental change, governance and activism</i>	S 7 (4) <b>67-203</b> <i>Reproductive technologies</i>	S 17 (3) <b>67-203</b> <i>Reproducibility and Open Science</i>	S 18 (3) <b>67-102</b> <i>Constructing and decolonizing Australasian knowledge systems</i>
10:30-11:00	<b>Welcome to Country</b> Opening remarks	Morning Tea 30 min break			Morning Tea 15 min break	
11:00-13:00	S 1 (4) <b>67-102</b> <i>Working from the ground up: doing difference in collaborative research in Northern Australia</i>	S 8 (3) <b>67-208</b> <i>Australian science and industry in the early 20th century</i>	S 9 (3) <b>67-102</b> <i>Science, policy and the state</i>	S 10 (3) <b>67-203</b> <i>Scientific and technological imaginaries</i>	S 19 (4) <b>67-203</b> <i>Classifications</i>	W 2 <b>67-102</b> <i>Bringing dialogue to public engagement in science and technology</i>
13:00-14:00	<b>Postgraduate Meet &amp; Greet</b> LUNCH 1 hr break	AAHPSS AGM LUNCH 1 hr break			LUNCH 45 min break	
14:00-15:30	W 1 <b>67-102</b> <i>HPS/STS Postgraduate Workshop S1</i>	S 11 (4) <b>67-208</b> <i>Psychology, epistemology and scientific practice</i>	S 12 (4) <b>67-102</b> <i>From the ground up: indigenous knowledge, performance and technology</i>	S 13 (4) <b>67-203</b> <i>Universities as frontiers of innovation and its eco-system</i>	W 3 <b>67-104</b> <i>Emerging Issues in Science and Technology Conversations between natural science, social science and humanities</i>	
15:30-15:45	Afternoon Tea 15 minute break	Afternoon Tea 30 min break			When did Australia's human history begin?	
15:45-17:15	W 1 <b>67-102</b> <i>HPS/STS Postgraduate Workshop S2</i>	S 14 (3) <b>67-208</b> <i>The role of understanding in science</i>	S 15 (3) <b>67-102</b> <i>Technoscience as corporate strategy</i>	S 16 (3) <b>67-203</b> <i>Science communication</i>	Can precision medicine live up to its promise?  Will it ever be possible for artificial intelligence to do wrong the right way?	
17:15-18:30	<b>Reception</b>				<b>Conference Dinner</b>	
18:30-20:00	<b>Dyason Lecture:</b> Emma Kowal, <i>Spencer's Double: The ghostly afterlife of a museum prop</i>	<b>Rooms</b> <ul style="list-style-type: none"> <li>UPSTAIRS: 3 classrooms . . . Rm. <b>67-203</b> (30-40 capacity); Rm. <b>67-208</b> (capacity 30+); Rm. <b>67-209</b> (25 capacity; use for storage, etc.)</li> <li>DOWNSTAIRS: foyer (registration, book displays, tea and coffee and snacks) + one 50 capacity classroom adjacent (Rm. <b>67-101</b>; lunch) + one additional 50 capacity classroom (Rm. <b>67-102</b>; talks) + plus a lecture theatre (Rm. 67-104; 200 capacity)</li> </ul>				

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## DYASON LECTURE

Wednesday 22 November 6.30 pm  
McKinnon Building, University of Wollongong

### Emma Kowal

Professor of Anthropology  
Alfred Deakin Institute for Citizenship and  
Globalisation

AAHPSSS is pleased to announce that this year's Dyason Lecture will be presented by Emma Kowal, Professor of Anthropology in the Alfred Deakin Institute for Citizenship and Globalisation at Deakin University, Melbourne. Emma is a cultural and historical anthropologist who has previously worked as a medical doctor and public health researcher in Indigenous health. Her research interests include Indigenous-state relations and settler colonialism, racism and anti-racism, and science and technology studies. She has authored over 60 peer-reviewed publications including her monograph, *Trapped in the Gap: Doing Good in Indigenous Australia*. She has held visiting positions at Yale University, the University of California, Berkeley, the Max Planck Institute for the History of Science, Berlin, Nanjing University, China and the Universidade Federal de Santa Catarina, Brazil. She is an award-winning researcher and educator, receiving the 2014 Academy of the Social Sciences in Australia Paul Bourke Award for Early Career Research, a 2015 Thomson Reuters Women in Research Citation Award, and a 2013 National Citation for Outstanding Student Learning. Her current book project is entitled *Haunting Biology: Science and Indigeneity in Australia*.



### Spencer's double: The ghostly afterlife of a museum prop

In the mid-1990s, at the high point of postmodernism, staff at Museum Victoria planned the new Melbourne Museum. The Indigenous Gallery was a major focus at a time when Te Papa and the National Museum of the American Indian were forging new ways of organizing and displaying the Indigenous past. Named *Bunjilaka* (meaning the place of the ancestral eaglehawk, Bunjil), the permanent Indigenous exhibit was a bold expression of community consultation and reflexive museum practice. At the heart of the exhibit, and its most controversial part, was a life-size seated sculpture of Baldwin Spencer, anthropologist and co-author of *The Native Tribes of Central Australia* (1899). Under the curatorship of anthropologist John Morton, Spencer was placed in a glass case with a model of *Varanus spenceri*, the lizard named for him, at his feet.

When *Bunjilaka* was redeveloped in 2012 and replaced with a wholly Indigenous-designed and curated exhibit of Aboriginal Victoria, the giant glass case was dismantled and repurposed, but the sculpture was retained by museum staff. Initially sitting awkwardly on a trolley in a narrow room where objects were processed for accession, Spencer himself remained unrecorded in any database. With no official existence but considerable gravity, he ended up housed in the secret/sacred room, surrounded with restricted objects that Spencer the man had collected.

This paper will trace the history of the statue from postcolonial pedagogical tool to pseudo-sacred object. It asks: Why was Spencer retained and what might he mean to museum staff? Finally, I consider my own influence on Spencer's fate as my recent enquiries have inadvertently amplified these questions within the museum.

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# Papers

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## Natasha Abrahams

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Monash University

### News reporting of scientific understandings of “baby brain”

This paper explores news reporting of scientific investigations of chronic forgetfulness affecting pregnant women and mothers of infants. This phenomenon is known as “baby brain” in popular parlance. I contend that “baby brain” rhetoric relies upon limited and equivocal scientific knowledge, which is presented in definitive terms in news reporting to provide a biological rationale for mothers’ exclusion from the public sphere. The concept of “baby brain” explicitly connects women’s reproductive function with cognitive capacity. This analysis contributes to wider understandings of the workings and endurance of biological explanations for gender roles.

In this paper, I draw upon a sample of 103 Australian news articles, from a seventeen-year period, which each report on research pertaining to the effects of motherhood on the brain. I first contextualise the concept of “baby brain” as part of greater scientific efforts to find essential differences between male and female brains. I then utilise the sample of news articles to examine how understandings of hormones and human evolution are mobilised to present “baby brain” as natural and even beneficial for infant survival. I argue that hormonal mechanisms are privileged in conceptualising “baby brain”, at the expense of considering other explanations such as sleep deprivation. The emphasis on hormonal action reinforces that “baby brain” is inevitable for new mothers, and therefore obscures the impact of social factors in producing the condition.

Next, I turn to the smaller subset of articles which report on scientific studies which disavow the existence of “baby brain”. I argue that journalists systematically challenge these study findings by inserting anecdotes about new mothers’ experiences of absent-mindedness. I furthermore compare the types of evidence most commonly used for each category of reporting, finding that articles reporting scientific support for “baby brain” are most commonly based on one-off

memory tests and neuroimaging studies; while articles presenting scientific evidence challenging “baby brain” are more commonly based on longitudinal studies. I conclude that the treatment of these opposite findings is not symmetrical in news reporting, with a tendency towards uncritically reporting scientific knowledge that coheres with existing gender roles.

This paper engages with the conference themes of science communication (through considering how scientific knowledge is filtered to the public via news reporting) and sociology of science/medicine (by investigating how scientific findings are utilised to naturalise aspects of the gender order).

### Biography

**Natasha Abrahams** is a doctoral student at Monash University in the School of Social Sciences. Her research takes place in the intersection of gender, science, and the mass media. Her dissertation argues that the sexual division of labour within the household is promoted by news reporting of scientific findings pertaining to sex differences.

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## Mita Anggaryani

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The Australian National University

### Should science communicators learn from the Yogyakartaans?

This paper serves as a literature review of the particular issue of people’s behavior, volcanic hazards, disaster risk, and science communication. The perception and concept of risk itself can be varied. There is still a debate on the assumption that hazard knowledge, risk perception, and people’s behavior are closely related to volcanic activity, which is conditional. In some cases, local people tend to ignore the scientifically estimated risk. However, as some volcanic activities occurred periodically and affected the residents living in volcanic prone areas, they may have a different perspective towards risk that can be useful in developing risk communication strategy. This paper is concerned with the way in which the Indonesian people living on the slopes or near active volcanoes behave in the face of volcanic



threats. Taking Merapi as a case study, this paper sets up a conceptual background and briefly reviews the existing literature on volcanic eruptions, Merapi in Javanese culture, and the local people's perspective. It also provides a brief assessment of the role of science communicators in promoting awareness of disaster risk reduction.

**Keywords:** Science communication, volcanic hazards, risk, behaviour, and Javanese culture.

## Biography

**Mita Anggaryani** is a PhD candidate at the Australian National Centre for the Public Awareness of Science. Mita's primary area of expertise is science education. Prior to commencing her Ph.D. studies at the ANU, she taught undergraduate courses in the Physics Department, Faculty of Mathematics and Natural Sciences, at the State University of Surabaya, Indonesia. Her interest in natural hazards is based on disaster occurred frequently in her country, Indonesia, and her experience in teaching earth science for undergraduate students in Surabaya.

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## Tatiana Andersen

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University of Wollongong

### A finance model of biomedical research: Insights from military biotechnology

This paper examines the political economy of the life sciences, focusing on dynamics of financialization, differential accumulation, and private property relations. The U.S. Department of Defense grants multi-million dollar contracts to private companies, which conduct biomedical research with the explicit aim of privatizing inventions and capitalizing on market opportunities. Clinical research is often conducted on U.S. military personnel, who have limited opportunities to refuse consent. If a product is manufactured, it is sold to the civilian sphere at prohibitive prices. Frequently, products never reach the end of the pipeline, but firms continue to capitalize on the buying and selling of intellectual property rights. The dominant ownership of scientific knowledge reveals the role of private property and financialization in actively shaping healthcare access. The core theme of this paper is that corporations in the life sciences own claims on scientific knowledge as an income-generating

asset. This translates to private ownership of the pace, trajectory, and accessibility of technoscientific development. Dominant firms maximize differential accumulation by actively restructuring the legal and regulatory landscape in which they operate. This paper presents a robust case for interdisciplinary collaboration between STS and critical political economy, a project inherently necessary to investigate science and technology in the 21st century.

## Biography

**Tatiana Andersen** is a graduate student at the University of Wollongong, Australia. She graduated in 2016 with a Dean's Scholar Double Degree in International Studies and Arts, double majoring in Politics and Science & Technology Studies. She is currently completing a Bachelor of Arts (Honours) in International Political Economy and Science & Technology Studies. In her research, Tatiana examines financialization, capitalization, and private property relations in the life sciences.

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## Michael Arnold

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University of Melbourne

### da Vinci and me

This talk provides a brief autoethnography of the experience of my 2016 robotic surgery, and describes some aspects of the postphenomenology of the relation between the surgeon, the da Vinci robot, and my body. In particular:

1. What is the nature of the postphenomenological articulation of the surgeons and the robot? That is, what are the interfaces that co-join the surgeon and the robot, and enable this hybrid "SurgeonRobot" to act in the world of my body, to cut, suture, cauterise and so on?
2. The da Vinci series IV robot used in this case is described by its manufacturers as a "master – slave" system whereby the robot faithfully obeys the instructions of the surgeon. And yet the performance of the robot is governed not just by the surgeon's input, but also by over one million lines of computer code. What does this code contribute? What does it do to mediate and translate the surgeon's actions in the world?
3. What is the nature of the relation between the SurgeonRobot and its actions within the world of my body? This involves in particular, a description

and analysis of the performance of the four arms of the robot, and of the EndoWrist® instruments that operate inside my body.

4. What are my multiple ontologies in the context of the surgery? That is, my corporeal, biological body is a focus of concern, for it is this body that will live or die, and will bear the marks of the clinical successes and failures of the surgery. But in the performance of the surgery the biological body is displaced by the body as a data-source for the construction of high-definition 3D representations; the surgeon neither sees my corporeal body, nor touches my corporeal body. The biological body is also repositioned to act as a data-source for the construction of a different set of representations used by the anaesthetists. These abstracted, constructed representations of the body are the key vectors for the interactions of the human, non-human and hybrid actors participating in the surgery, and the relations of these constructed representations to one another, and to the corporeal body, remains an open question.

**Note:** video of the surgery will be shown during the presentation.

### Biography

Michael Arnold is Associate Professor and Head of the History and Philosophy of Science Programme at the University of Melbourne. His on-going research activities lie at the intersection of contemporary technologies and daily life; currently, robotic surgery; technologies associated with commemoration and memorialisation; and studies of digital technologies in the domestic context. Michael is also interested in theoretical approaches to technologies, in particular, Heidegger, Actor Network Theory, and Object Oriented Ontology. Michael has been first-named investigator on 5 ARC funded research projects and dozens of other projects, and has authored or co-authored three research books and over 120 peer reviewed papers.

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## Luciano Boschiero

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Campion College

### Machines, motion and the Académie des Sciences (1666–1687)

In the two decades following the foundation of the Académie des Sciences in 1666, the Parisian academicians dedicated their work to servicing the

needs of the Crown. This was most famously manifest in the academicians' contributions to resolving engineering challenges associated with the construction of the Versailles palace. An orientation towards utility during this time is also evident in the Académie's publication of new mechanical inventions. However, while this focus on engineering and machinery was fulfilling a practical obligation to the Crown, the academicians seemed motivated more by theories and speculations in mechanical natural philosophy, especially in addressing perceived problems with Descartes' laws of motion

### Biography

**Luciano Boschiero** is Dean of Studies at Campion College. His interests are in the history of early modern scientific institutions. He is the author of several articles in this area and a book: *Experiment and Natural Philosophy in Seventeenth-Century Tuscany* (Springer, 2007).

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## Heather Bray

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### Gene editing in the Australian media

Gene editing is a term used to describe the use of a suite of recently-developed tools used by molecular biologists to precisely alter genomes. The most well-known of these tools is the CRISPR-Cas9 system. Gene editing has already been used to modify human embryos (Liang et al 2015), as gene therapy in humans and numerous other in vitro studies aimed primarily at the prevention of human diseases. However, there is some ambiguity in the regulation of gene editing in most countries, and in particular whether current restrictions that relate to genetic modification should also be applied to gene editing. Concern within the scientific community led to a meeting in Washington DC in December 2015 to call for a voluntary moratorium on the use of gene editing to manipulate human embryos (Olsen et al 2016); a move that has been compared to the Asilomar conference on recombinant DNA in 1975. Whether gene editing is a single step along a continuum of innovations in molecular biology, or a major disruptive technology, is open to debate.

To explore how gene editing is being “made public” in Australia, I examined over 146 news

articles found using the Factiva database using the search terms “gene editing” or “CRISPR”, and limiting the region to Australia that were published before 31/12/2016. Each article was coded using open coding to identify triggering events, themes and frames using the Generic Inductive Qualitative Model (Maxwell, 2005).

The earliest article found was published on the 17th of April, 2013. 50 of the articles were published in the major metropolitan newspapers and 44 of the articles were published in *The Conversation*, and consequently were written by academics, including many from outside of Australia (although these were identified by Factiva as having been published in Australia). 29 articles were ABC news or radio transcripts.

Gene editing, and in particular the CRISPR-Cas9 system, was frequently described as a “breakthrough” using a “cut and paste” metaphor, and as more precise, cheaper and easier than other manipulation methods. Articles about the use of gene editing to “fix genetic mistakes” and prevent inheritable human diseases dominated the collection, with reference to fears of “designer babies” among the ethical issues raised by gene editing. Other applications included the development of human-animal chimeras for organ xenotransplantation, modification of mosquitos to prevent malaria and zika, and agricultural and food applications. Frames included economic and scientific progress, regulation and trust, and caution.

The implications of how gene editing is being made public will be discussed further in the presentation.

## Biography

**Heather Bray** is a Senior Research Associate in the Food Values Research Group, School of Humanities at the University of Adelaide. Her background is in agricultural science and she worked as an animal scientist in both Australia and the Netherlands before moving into science communication, developing community engagement programs for agricultural research centres that use complex and controversial technologies. Her current research focuses on understandings of and attitudes to science and technology in food production and how these are shaped socially, culturally and historically. Her particular focus is on biotechnology in both crops and animals and welfare and other issues in animal farming. She also teaches into Science Communication and History of Science courses at Adelaide.

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## Alexander Brown

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University of Technology, Sydney

## Anti-nuclear politics after Fukushima: Environmental risks and grassroots activism in Tokyo

In this paper I describe the strategies and tactics of the anti-nuclear movement in Tokyo after the Fukushima nuclear disaster of March 2011. A little over a year after the disaster, the anti-nuclear movement grew to become the largest social movement in the archipelago in more than half a century. The compound effect of the earthquake and tsunami and the nuclear accident at Fukushima intensified existing dissatisfaction not only with the nuclear industry but with the decaying institutions of Japan’s capitalist developmental state. In this paper, I use autonomist Marxist perspectives to situate the disaster against the backdrop of a breakdown in capitalist developmentalism and the transition to a post-industrial society. The images of Fukushima’s smouldering nuclear reactors reminded Tokyo residents of the way urban life in the developmental state had come to depend on the exploitation of the rural periphery for resources such as the cheap electricity generated by nuclear power plants. I describe the way anti-nuclear activists staged their opposition to nuclear power in the streets of the metropolis through carnivalesque street protests where they expressed their emotional responses to the nuclear disaster; developing an infrastructure of activist spaces to support their protests; strengthening their relationships with one another; and experimenting with new forms of democratic politics. In doing so they challenged not only the nuclear industry but the institutional arrangements that have characterised Japan’s developmentalist form of capitalism for most of the post-war period.

## Biography

**Alexander Brown** researches the intersection between anti-nuclear politics and post-industrial society in contemporary Japan. In 2007, he completed his undergraduate studies in Science, Technology and Society at the University of Wollongong where he completed an honours thesis on the history of homoeopathic medicine in nineteenth century Sydney. In 2015 he completed a PhD on grassroots responses to Fukushima at the University of Wollongong. His work has appeared

in *The Asia-Pacific Journal and Emotion, Space and Society* as well as a number of edited collections. He is currently completing a monograph for Routledge titled *Anti-nuclear Protest in Post-Fukushima Tokyo*. Alexander is also a NAATI-accredited Japanese to English translation and specialises in the translation of contemporary social science texts. His translations have appeared in *The Asia-Pacific Journal* and *The International Journal of Japanese Sociology*. His translations of contemporary Japanese social science on the Fukushima disaster are forthcoming from Trans Pacific Press. He is currently lecturing on contemporary Japan at the University of Technology, Sydney.

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## Paul Brown

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UNSW Environmental Humanities

### Atomic survival: The role of the creative arts in imagining the long nuclear future

A three-year community arts program has linked creative artists with indigenous and veterans communities who have experienced the atomic bomb in Australia, Japan and the UK. Culminating in installations and a showcase of immersive projections, paintings, ceramics, bronze work, soft sculptures and photographs, the program and its artworks represent new findings from the unruly experiment that was and still is British nuclear testing at Maralinga, Emu and Monte Bello Islands. Politically, the creative arts enable a call to action from atomic survivor communities, evident in the recent campaigns against nuclear waste repositories in South Australia. The work is also rebellious knowledge-making through community cultural development – prompting questions about the role of the artist in society and the arts-science interface. Artworks made to endure, and their long-range iterative creative processes, help chronicle and re-imagine the nuclear future.

### Biography

**Paul Brown** is Creative Producer for Alphaville, a Sydney-based community arts company specializing in projects with environmental and scientific themes. Work includes a multi-arts program linking artists and communities that experienced atomic bomb tests. In academic and research circles, Paul is a geologist, social scientist

and policy consultant, teacher of Environmental Studies and an adviser on Environmental Education policy. As an analyst of creative arts practice, his books include *Art and Wellbeing* and *Verbatim: staging memory and community*. Paul was foundational Head of the School of Humanities at UNSW and currently holds an adjunct position within the UNSW Environmental Humanities group.

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## Roderick D. Buchanan

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University of Melbourne, Australia

### The remarkable Oscar Adolph Oeser: Social psychologist, wartime spy and intelligence analyst

Psychology took a while to come to the University of Melbourne. When it finally did arrive in 1946, it came in the exotic form of Oscar A. Oeser. As founding Professor, Oeser shaped the new department's structure and teaching, and put a distinctive stamp on its research profile. His cosmopolitan background ensured he cut a sophisticated profile on an antipodean campus, and he came across as somewhat mysterious and slightly intimidating to colleagues. If only they knew, for Oeser was a man with a secret past.

Oeser was born in Pretoria, South Africa, in 1904. He was an exceptionally precocious polymath. By age 21, he had already obtained degrees in mathematics, languages and teaching, and had taken an M.Sc. in physics. While lecturing physics Rhodes University, Oeser became interested in individual differences in observation, and turned to psychology. He obtained a D.Phil. in experimental psychology in Marburg, Germany, in 1927, and then a Ph.D. at Cambridge two years later. In the mid-1930s, Oeser was appointed Lecturer in psychology at St. Andrews University and finally found his true calling – applied social psychology.

The outbreak of war would interrupt Oeser's career in an extraordinary fashion. In September 1940, he volunteered for service in the Air Force, but was quickly transferred to intelligence work, as were many others with Cambridge links. It was not hard to imagine why: as well as being trained in a range of physical and social sciences, Oeser was fluent in German and familiar with Germanic culture, and was proficient in several other languages. He rapidly rose to the rank of Wing

Commander heading a special section working in Hut 3 in Bletchley Park. Working with the cipher messages decoded by Alan Turing and his cohorts, Oeser team interpreted and prioritized the enormous flow of intercepted signal traffic. Needless to say, this was time-sensitive and strategically crucial work. Oeser also undertook two covert intelligence missions in 1943 and 1945 to oversee the recovery of communication and encryption equipment. The latter excursion included a raid on Hitler's mountaintop retreat at Berchtesgaden in last weeks of the war. Oeser's TICOM team returned with a huge haul of signals equipment, including an advanced electronic device capable of intercepting Soviet tele-printer messages that Bletchley Park was yet to break. This remained 'live' intelligence in the first years of the Cold War. In the aftermath of hostilities, Oeser headed the Allied German Personnel Research Section in Berlin, tasked with "de-Nazifying" German civil personnel.

In 1946, Oeser returned to the banalities of civilian life, arriving in Melbourne the following year to build a psychology department like no other. He was the public face of psychology in Melbourne, regularly broadcasting on the ABC and representing the discipline in the region through the BPS and UNESCO. However, the full details of Oeser's intelligence exploits have remained hidden. Although he had played a short-lived but pioneering role in the development of intelligence gathering and analysis, that story that can only now be told.

### Biography

Rod Buchanan has Ph.D. from the History and Philosophy of Science program, University of Melbourne, where he is an Honorary Fellow. He has taught at Swinburne University and Deakin University, and was a Wellcome Trust Postdoctoral Fellow at the University of Groningen. He has published on the history of psychology and psychiatry (e.g., *Playing with Fire: The Controversial Career of Hans J. Eysenck*, OUP, 2010) and evolutionary biology (e.g., "Darwin's 'Mr. Arthrobalanus': Sexual Differentiation, Evolutionary Destiny and the Expert Eye of the Beholder," *Journal of the History of Biology*, 50 (2017): 315-355).

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## Martin Bush

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### The nineteenth century astronomical lantern set and the visual communication of popular science in Australia

This paper traces the development of the nineteenth century astronomical lantern set and its use in Australia, with a focus on the cultural interpretations of popular astronomy.

Magic lanterns were one of the most significant media forms of the nineteenth century – the lantern largely created the screen culture that was inherited by the cinema. Despite increased attention in recent years, lantern practice remains largely obscure in historical memory, buried in the category of pre-cinema technology. The astronomical magic lantern show was particularly familiar for nineteenth century audiences. For many of these, magic lanterns projecting slides of stars and planets were a telescope on the universe, providing the most involved education in astronomy they would receive. The familiarity of this form was based, in part, on the development of a small number of standard commercial astronomical slide sets, with stabilised physical form, content and trading chains.

The magic lantern, astronomy lectures and the standard astronomical slide set were all common in colonial Australia. Astronomical presentations were performed by the full range of lecturers from small town schoolmasters and clerics to visiting international celebrities like Richard Proctor and Professor Pepper. This paper will outline the history of the nineteenth century astronomical lantern set within Australia, tracing its development and deployment.

The paper also draws a number of lessons for understanding how scientific ideas circulate in cultural practice. Firstly, the magic lantern was just one example of the persistent association of popular astronomy with visual media. This persistence suggests that the differing cultural tropes, or schemata, on which different traditions of popular science are based create very different practices for their audiences. Much as theorists now understand "science" as a heterogeneous assemblage of practices, so too should we understand "popular science" as such. Secondly,

the stable form of the commercial astronomical lantern set was a basis on which the influence of astronomical ideas could be extended, both geographically and in terms of cultural schemata. An example of the former is the existence of astronomical lectures in rural Australia, an example of the latter the centrality of astronomy to the natural theology–freethought debates of the late nineteenth century. Thirdly this stability of cultural trope appears particularly strange when set against the rapid pace of scientific discovery. This presentation of ever-changing fact within a long-lasting framework of cultural schemata remains an unusual feature of popular science to this day.

## Biography

**Martin Bush** recently completed a PhD on the history of popular astronomy in Australia in the era of the lantern slide. Prior to this, he worked at Museum Victoria for thirteen years, including as Curator of Scientific Instruments and Antarctic History, and as Technical Programmer and Scientific Communicator on the Melbourne Planetarium production team. These interests in astronomical visualisation and historical apparatus have combined in his fascination with astronomical magic lantern slides. In 2016 Martin was joint winner of the Mike Smith Student Prize for History of Australian Science or Australian Environmental History for his essay ‘The Proctor-Parkes Incident: Politics, Protestants and Popular Astronomy in Australia in 1880’. Martin is currently a Research Assistant in the Department of History and Philosophy of Science at the University of Melbourne as well as being a Research Associate at Museums Victoria.

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## Alan Chalmers

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## Newton’s hydrostatics

As has been thoroughly explored in the literature by reference to his early notebooks, Newton’s innovations in mechanics emerged in the context of his engagement with Descartes’ *Principles of Philosophy*. Descartes’ corpuscular mechanisms were transformed by Newton into the mechanics of ‘heavy bodies’, bodies rolling in dishes, swinging on the end of a string and colliding with other bodies. It is not long before the earth, moon and planets were included on the class of heavy bodies the motions of which were to be comprehended within Newton’s mechanics. Whatever merit there

is in understanding Newton’s mechanics as emerging out of an engagement with Descartes, it will not do for his hydrostatics.

The first of the two versions of hydrostatics to be found in Newton’s work appeared in his unpublished manuscript usually referred to by its opening words, *De Gravitatione*. (The second version appears in Book II of the *Principia*.) In it Newton made a largely successful attempt to derive propositions describing the behaviour of liquids in equilibrium from the definition of a liquid. He was able to capture the isotropic character of pressure in liquids. A crucial feature of Newton’s characterisation of liquids that he explicitly acknowledged was that they are continuous. Any portion of a liquid, however small, is likewise liquid. Newton’s proofs were dependent on this assumption. The continuity of liquids rules out a corpuscular structure for them. The effects of corpuscles pushing on corpuscles act largely in the direction of the push and are not isotropic.

The source of Newton’s hydrostatics must have been the hydrostatic tradition that began with Archimedes and had been developed in the modern era by Stevin, Pascal and Boyle. Newton would have been alerted to this tradition by Boyle’s ‘hydrostatic paradoxes’, published in 1666. In that tradition liquids were treated as continuous, in a common sense of that term. Attempts were made to relate hydrostatic effects to the common sense fact that liquids flow, attempts which, in retrospect, can be read as contributing to the gradual emergence of the technical sense of pressure at work in Newton’s *De Gravitatione* tract.

At the opening of *De Gravitatione* Newton distinguished between the mathematical method, which involves deriving propositions from unproblematic postulates, and the experimental method, which involves illustrating propositions by experiments. He insisted that his hydrostatics conformed to the former method. Newton’s distinction makes immediate sense if it is taken as describing the difference between Stevin’s and Pascal’s respective treatises on hydrostatics. Newton likens his hydrostatics to Stevin’s attempt to derive the propositions of hydrostatics from unproblematic postulates but saw himself as improving on the latter’s efforts by including a definition of the liquid state that gave his theory content that Stevin’s lacked. The view here expressed, that hydrostatics is a theory proved mathematically rather than supported experimentally, clashes with the insistence by Newton, in the *Principia*, that all knowledge is to

be 'derived from the phenomena'. In the *Principia* version of his hydrostatics the meta-discussion, such as that involving the distinction between the experimental and mathematical methods, do not appear. Newton simply states the definition of an incompressible fluid and derives various propositions from them. These include a range of 'corollaries' describing known hydrostatical phenomena. Had Newton been confronted with the question of the epistemological status of his hydrostatics he could have readily responded that it was mathematical insofar as its propositions were mathematically derived from the definition of a liquid, whereas the match between those propositions and experiment indicated that his definition was right or adequate.

In his pneumatics, referred to extensively by Newton, Robert Boyle insisted that he was attributing 'spring' to the air and demonstrating the breadth of experimental phenomena that could be explained by appeal to it, insisting that he was not claiming to be able to explain spring at a deeper level and that his case did not require that he do so. The mature Newton explicitly took a similar stance with respect to gravity. The development of hydrostatics in the seventeenth century culminated in Newton's articulation of a technical sense of pressure capable, in conjunction with weight, of identifying the causes of hydrostatic phenomena. All three causes, spring, weight and pressure, qualify as what Boyle referred to as intermediate causes, as opposed to ultimate causes such as those that the corpuscles of the mechanical philosophers were meant to identify. The history of hydrostatics can be understood in terms of the search for the intermediate causes of hydrostatic phenomena, with early attempts such as those of Archimedes being hampered by an inappropriate emphasis on weight and with the gradual addition of a second intermediate cause, pressure. It is true that Newton's mechanics did begin with and emerge out of an engagement with Cartesian metaphysics. But the tradition in hydrostatics that Newton brought to a successful conclusion bypassed such metaphysical issues altogether.

## Biography

**Alan Chalmers** is an Adjunct Associate Professor in the School for History and Philosophy of Science at the University of Sydney, having retired from his full-time position in 1999. He was largely responsible for building up HPS at Sydney University from the single lectureship it was in 1986 into a Unit with three and a half staff members, thus setting the scene for further expansion. He is the author of four books, the best-

known of which is *What is this thing called science?* and the latest *One hundred years of pressure: Hydrostatics from Stevin to Newton*, and around seventy articles on the history and philosophy of the physical sciences.

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## Matthew Chrulew

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## Captivity histories

In this era of extinction, of trafficking and management between zoos, labs, farms and parks, new ways are sought to identify and remediate the transformative, often deleterious effects of human activity on nonhuman communities. The hybrid genre of captivity histories takes up the challenge of chronicling a species' encounter with human institutions and practices (such as zoological gardens and wildlife management). This demands a very particular sort of interdisciplinary work across the animal sciences and humanities, work that is capable of understanding both human and animal cultures, the differences within and between them, and their entanglement. Only such analysis of the cultural and behavioural destructions and transformations undergone across generations in captivity can adequately support and refashion rehabilitation and conservation practices, and comprehend the impoverished and remade subjects and communities that emerge through and despite them.

## Biography

**Matthew Chrulew** (@negentropist) is an ARC DECRA research fellow in the Centre for Culture and Technology at Curtin University. His current work focuses on the history and philosophy of ethology, zoo biology and conservation biology. Recent publications include the edited collections *Extinction Studies: Stories of Time, Death and Generations* (Columbia University Press, 2017, with Deborah Bird Rose and Thom van Dooren), *Foucault and Animals* (Brill, 2016, with Dinesh Wadiwel), and *Animals in the Anthropocene* (Sydney University Press, 2015, with the HARN collective). He was founding Associate Editor of *Environmental Humanities* journal from 2012–2017.

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## Darrin Durant

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### Post-truth, hyper-guardianship, and climate change

The notions of Post-Truth and Alternative Facts appear have become essentially contested concepts so quickly that W. B. Gallie is probably turning in his grave as we speak. STS has responded to the advertised dangers of a Post-Truth era in its typically disunified way. Like a classical economics text, some suggest deflation (we have always been Post-Truth), while others suggest inflation (map the new modes of epistemic and political obfuscation). Some absolve STS of any complicity with the patterns (be they old or new), and others admit some guilt (usually of their distant colleagues). In this paper, based on extensive empirical research in the tradition of grounded theory – specifically trolling the bars and hallways and some presentation forums in Boston while 4S 2017 was underway – I identify a key conceptual mistake that undermines the ability of STS to respond appropriately to Post-Truth shenanigans. I'll call it 'Symmetry Refracted through the Law of Complexity', or SLoC for short. I suggest we can use SLoC as a looking glass through which to understand why Post-Truth appears Cheshire-cat-like on our moral radars. I apply SLoC to some cases because I know you love to haggle over empirical minutiae when faced with high church meeting low church. Just how mad should we be that wind power was blamed for South Australia's 2016 blackout? Is Oreskes unfairly one-sided in decrying merchants of doubt rather than examining high versus low proof climate regimes? While I probably won't have time, I'll introduce the concept of hyper-guardianship to indicate a possible route forward.

### Biography

**Darrin Durant** is a lecturer in historical and philosophical studies at the University of Melbourne. His research focuses on disputes between experts and publics. He has published widely on controversies involving nuclear waste management, nuclear power, public policy about energy options, and more recently is investigating climate change policy-making.

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## Thomas Green

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### Space regulation and policy

The increasing use of Low Earth Orbit (LEO) for earth observation and communication satellites over the course of the last sixty years has led to the LEO environment to become crowded with space debris of various types (Weeden, 2009). The 2009 collision between the then-operational Iridium-33 and the nonresponsive Kosmos-2251 satellites showcased one hazard of this congested environment, being collisions between active satellites and inactive debris. The debris shower created by the Iridium-33 and Kosmos-2251 collision created further issues, as many of the fragments were large enough to pose serious hazards to other orbiting bodies (Chow, 2012), with the risk of creating a debris cascade. This debris cascade, dubbed the 'Kessler Syndrome', continues to pose a legitimate risk to the continued use of Low Earth Orbit.

A variety of measures have been proposed for the capture and elimination of debris to mitigate the chance of collision of obsolete satellites with operational satellites via controlled de-orbits. However, focus on deorbiting of satellites may also require consideration of sociological, historic and regulatory imperatives as not all obsolete satellites will be viewed as waste by the general public or the scientific community. For example, some satellites may possess some historic significance, either to a nation specifically, or to the field of scientific research, and may therefore be exempt from de-orbiting practices but require alternative methods of preservation.

Additionally, some satellites, although unresponsive, may still remain the property either of nations, corporations; or, with the rise of low cost cube sats, even private citizens. In such an instance, the definition of what constitutes 'abandoned' may have to be reassessed where a controlled de-orbit is required. Further to the questions of abandonment, will be questions related to the rights of salvage of an inoperable satellite.

Finally, where a nation, corporation or private citizen is non-compliant in a directive for de-orbiting, legal questions related to what constitutes theft may also need to be considered as well as which international body, and under what power, would have the right to de-orbit the satellites.



In answering these questions, this paper aims to provide a balance between the principal need to mitigate orbital debris while ensuring that cultural preservation and use remains a principal focus in regulatory responses.

## Biography

**Thomas Green** is a PhD student at University of Wollongong where he is examining the intersection of new technologies with regulatory reform. He also works as a research and policy analyst for Neumann Space.

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## Tim Johnson-Newell

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PhD Candidate, STS, University of Wollongong

### Psycho meets science: Professionals for all seasons, but a profession for none?

Work in Progress: Psychotherapy has been a profession in the making for over a hundred years now, arriving soon after Freud's modernist project in fin de siècle Vienna. Its practitioners have always considered it to be one and they have most of the hallmarks of professionals. Some of them are also psychologists, psychiatrists, G.P.s, social workers and mental health nurses. Psychotherapy is a very personal, subjective, and somewhat mysterious process. It is practiced by people who are mostly highly educated and have undergone a psychotherapy themselves. These days such a process is counter cultural.

In Australia there was a crystallizing moment in 2006 when those professionals above, not already eligible to offer Medicare rebates by virtue of being doctors, were deemed eligible for treating, on a short term basis, a small band of psychiatric conditions. This was the introduction of the Better Access to Psychiatrists, Psychologists and General Practitioners through the Medicare Benefits Schedule Initiative or the Better Access Initiative (BAI). The remainder of psychotherapists do not receive that benefit nor, effectively, the government's imprimatur. The question being posed is what was thrown into bas relief in 2006 in Australia and what might be learnt about professions, psychotherapy, science, evidence based practice and the way that professionals elide, emphasise or alter their presentation of themselves in order to ensure survival? How has this particular group of people fared in terms of making its

practices, expertise, tasks and jurisdiction apparent in Australia?

Meanwhile across the Tasman all psychotherapists are registered by the Government, in the U.K. such an attempt fell at the last hurdle and in most of the rest of the world the psycho-professions are confused and confusing about the psychotherapy.

Craft, art or science has been a question that has been avoided since its beginnings, as its progenitors tried to retain their status as doctors or psychologists. To question whether psychotherapy was anything like medicine or psychology would have put those professionals' "dual citizenship" at risk with all the attendant loss of status and income. In Australia today this is, perhaps, at the cost of the technique's survival.

## Biography

**Tim Johnson-Newell** has been a Sydney based psychotherapist and psychodynamic consultant to organisations for over 30 years. He trains psychotherapists, members of organisations dealing with the public and detainees of Corrective Services, NSW. As the past president of the national psychotherapy and counselling Federation, PACFA, he became interested in if and how psychotherapy was a profession and how it fitted with the other psycho-professions. Currently he's also a PhD candidate in STS at the University of Wollongong.

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## Douglas Kahn

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UNSW Art and Design, University of New South Wales

### Bachelard's Blue Sky in a new light: energy, materialism and poetics

Gaston Bachelard is known for his work in the philosophy of science and theory of material poetics, the former typified in *The New Scientific Spirit* (1934) and the latter in the five volumes on the four classical elements: *The Psychoanalysis of Fire* (1938), *Water and Dreams* (1942), *Air and Dreams* (1943), *Earth and Reveries of Will* (1948), *Earth and Reveries of Repose* (1948). The schism he maintained between these two projects was criticized by his former student, the philosopher Michel Serres, and was duly noted by many other writers. The general assessment is well founded but fails to acknowledge where they do in fact intersect, that is, in blue sky. Moreover, Bachelard

associates both the scientific and poetic blue skies with materialism, immaterialism and ‘dematerialized materialism’ generated through the relation between matter and energy and in a shift from the nineteenth century physics of Rayleigh scattering to the twentieth century quantum physics in Raman scattering. My paper will search for Bachelard’s influence on the artist Yves Klein and his International Klein Blue and, more importantly, question the role of quantum phenomena in an experiential world that presents itself along the lines of classical physics, following C. V. Raman’s own search for why seas, glaciers and skies are blue.

### Biography

**Douglas Kahn** is Professor of Media and Innovation, National Institute for Experimental Arts, UNSW Art & Design, University of New South Wales. His books include *Noise, Water, Meat: A History of Sound in the Arts* (MIT Press, 1999); *Earth Sound Earth Signal: Energies and Earth Magnitude in the Arts* (UC Press, 2013); and *Energies in the Arts* (MIT Press, forthcoming). He received an Australian Research Council Future Fellowship (2012-2016) and a Guggenheim Fellowship (2006).

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### Robert M. Kaplan

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### Freud in the Antipodes

Australia may have been a long way from fin-de-siècle Vienna, but ideas could travel faster. A group to encourage psychoanalysis arose in Sydney and invited Freud to submit a paper to the 1911 BMA congress. The circumstances of Freud’s only publication in Australia are interesting and played a part in the ending of his relationship with Carl Jung.

### Biography

**Robert M Kaplan** is a forensic psychiatrist at the Graduate School of Medicine, University of Wollongong. A writer, speaker and historian, he has written on crime, neuroscience, medical history and biography. He is currently writing a biography of the New Zealand psychiatrist Mary Barkas.

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### Patricia Kennedy

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Associate Professor of Social Policy, University of Wollongong

### Assisted Reproductive Technology (ART) in Ireland: Continuities and change

Adopting a path dependency framework, this paper explores critical junctures in the development of policy and legislation relating to Assisted Reproductive Technology in Ireland as a first step in placing Ireland within an international comparative context.

Despite the fact that the Commission on Assisted Human Reproduction (2005) proposed 40 recommendations specifically addressing reproductive health policy in Ireland, legislation remains absent. While there are no national statistics available in Ireland on the outcome of IVF treatment cycles, an estimated 3,000 babies are born each year following IVF and this figure is on the increase.

The key institutional players in the debate on ART in Ireland are: the Catholic Church, the State and the Medical Profession (McDonnell & Allison, 2006). ART in Ireland is governed by Medical Council Guidelines (2004; 2009). Within the medical profession, there is a concern that restrictive legislation could intrude on clinical autonomy and jeopardise future scientific developments. The Catholic Church continues to exert indirect influence over healthcare delivery and medical ethics through publically funded voluntary hospitals. Despite the fact that voluntary hospitals came under direct state control during the 1990s, they retain an overarching Catholic ethos and in relation to ART a concern that legislation will liberalise access to fertility treatments.

The lack of public debate on bioethical issues in relation to ART in Ireland has been noted (McDonnell & Allison, 2006). However, the “right to life of the unborn” is now being debated and redefined in light of ART, drawing the abortion debate into a rapidly changing bio-technological context, in particular through the *Protection of Life During Pregnancy Act* (2013) and the *Children and Family Relationships Act* (2015).

By using a path dependency framework this paper illuminates continuities and change in relation to ART in Ireland and identifies critical junctures in policy development, the key influences and

barriers to progress as well as challenges for the future.

## Biography

**Aisling Walsh** is a social scientist with sixteen years' experience in health services/systems and policy research. She is currently employed as a Lecturer in the Department of Epidemiology & Public Health Medicine at the Royal College of Surgeons in Ireland (RCSI). She is also working on the Brain Drain to Brain Gain project, supporting the implementation of the WHO Code of Practice on the recruitment of health personnel in Ireland. Aisling's primary research interests are in health systems research, maternal and child health, the ethics of health research, and assisted reproductive technology. Aisling teaches qualitative research methods on the Structured Population and Health Services Research Education (SPHeRE) Programme and also teaches at undergraduate level.

**Patricia Kennedy** is Associate Professor of Social Policy at University of Wollongong. She taught Qualitative Research Methods on the SPHERE (Structured Population and Health-services Research Education) Programme at the Royal College of Surgeons in Ireland (RCSI) from 2016-2017. Prior to that she was a Senior Lecturer in Social Policy at University College Dublin since 1995. Patricia has published 10 books including *Welcoming the Stranger, Irish Migrant Welfare in Britain from 1957* (2015); *Maternity services and Policy in an International Context, risk, citizenship and welfare regimes* (2015); *Key Themes in Social Policy* (2013). She has conducted research on a wide range of social policy areas but has focused particularly on reproductive health, maternity policy, the reproductive health of refugee and asylum seeking women and migration. Her most recent research was a participatory mixed methods national Needs Assessment of Roma in Ireland.

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## Adam Lucas

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## Trust, truth and legitimacy in the early 21st century

The professions which we now associate with the sciences have been characterized by their proponents as representing the search for truth. Consequently, they have also been preoccupied

with identifying the best methods for attaining knowledge. The ultimate goal for more than two millennia has been to reliably discern truth from opinion, knowledge from belief, and reality from illusion. STS has demonstrated through numerous case studies that scientific knowledge production is a social process with political features which only partially relies on technical considerations. Most recently, we've witnessed a debate about where and in what ways the political has a legitimate place in scientific activity. But the search for truth remains a primary goal, even if that search is now widely recognized (even by scientists themselves) as enabling them to attain only provisional truths which are always hedged with uncertainties. By way of contrast, the profession of politician is notorious for deploying untruths and deliberate deceptions in order to retain power and to achieve political goals. Nevertheless, these deceptions have to be strategically and sparingly deployed in order for them to be politically effective. Too many lies undermines public trust and the legitimacy invested in those who rule. In liberal and social democracies, one of the favoured tools of gaining political legitimacy has been the deployment of scientific and technical expertise. For well over a century, scientific and technical experts have been widely regarded as providing authoritative forms of political legitimation for decision-making by governments and other powerful institutions in most societies, regardless of their political and economic orientations. This paper examines how these relationships are being reconfigured by the politics of 'post-truth', and the role that STS scholarship can play in identifying the underlying causes of the current malaise while simultaneously reorienting the debate in favour of genuine democratic reform.

## Biography

**Adam Lucas** is Senior Lecturer in the School of Humanities and Social Inquiry, University of Wollongong. He graduated from the University of New South Wales with two masters degrees and a PhD in Science and Technology Studies and History and Philosophy of Science. Prior to taking up his current position at UoW, he worked as a senior policy analyst in the NSW Government, primarily in the Aboriginal Affairs portfolio. He is an international authority on ancient and medieval machine technology and has a strong research record in climate change and energy policy, informed by recent developments in STS, innovation studies and critical political economy. He is currently developing a long-term research project with partners in Classical Archaeology at

the University of Oxford and the School of Geographical and Earth Sciences at the University of Glasgow.

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## Nicola Marks

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### IVF in France: a less stratifying experience?

A number of scholars have highlighted how IVF and associated assisted reproductive technologies (ARTs) can be very “stratifying” (Colen, 1995): rich, often white bodies can access poor, often brown bodies in order to obtain their desired family (Pande, 2011). This is particularly the case in countries like the USA where gametes can be bought and sold through private companies (Spar 2006), and has been intensified with reproductive travel. In this paper, I will present early findings from a research project on global IVF, which suggest that the way IVF is practiced in France may enable IVF to be less stratifying. In particular, I will examine how policies, imaginaries, individual scientists and doctors, historical arrangements as well as biological material are assembled in ways that might enable more caring approaches (Latour, 2004; Puig de la Bellacasa, 2011) and to some extent guard against commodification of people’s bodies. I hope to highlight some of the key moments and features that set France apart, whilst also taking note of how seemingly caring practices may also reinforce hegemonic orderings which need to be “unsettled” (Murphy, 2015)

### Biography

**Nicola J. Marks** is Senior Lecturer in the School of Humanities and Social Inquiry, University of Wollongong. She graduated from the Universities of Cambridge and Edinburgh with degrees in Genetics and in Sociology of Science and Technology. She teaches and researches at the intersection of Sociology and Science and Technology Studies, with a particular interest in social aspects of medicine. She has published in Journals such as *Public Understanding of Science*, *New Genetics and Society* and *The Sociological Review*. Her research projects have focussed on stem cell research, euthanasia and public engagement in science. She is currently chief investigator on the Australian research council

funded Discovery Project ‘IVF and Assisted Reproductive Technologies: The Global Experience’ (DP150101081, with Prof Sarah Ferber and Snr Prof Vera Mackie). Nicola is Vice-President of the Australasian Association for the History, Philosophy and Social Studies of Science. She is also on the international Program Committee for the 2018 meeting of the Society for Social Studies of Science, which will be held in Sydney (4S SYDNEY 2018).

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## David Mercer

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### “Identity” and governance in synthetic biology: Ambivalence, norms and counter norms, in the “international genetically engineered machine competition” (iGEM))

A number of commentaries pre-occupied with the legal, social and ethical implications of synthetic biology have emphasised that an important element shaping options for its future governance will be the normative ethos that is adopted by the emerging field. One venue that has regularly been identified as central to the development of this normative ethos is the International Genetically Engineered Machine Competition (iGEM) an annual synthetic biology competition which attracts thousands of students from across the world. The ideal values promoted by iGEM of, collaboration, interdisciplinarity, sharing of results, and overt commitments to the consideration of social and ethical implications of scientific work, are frequently interpreted as offering a model for the future development of the field. In the discussion that follows it will be noted that there are multiple visions held by promoters of synthetic biology as to its most desirable and likely future paths, some of which significantly deviate from the types of values iGEM publicly promotes, and that many of iGEM’s normative aspirations are hard to convert into practice. Policy makers are invited to make a more realistic assessment of iGEM’s capacity to contribute (via generating a distinct synthetic biology normative ethos) to the future governance of the emerging field

## Biography

**David Mercer** is an Associate Professor in the Science and Technology Studies Program, in the Faculty of Law Humanities and Arts at the University of Wollongong. He has published widely on topics involving science law and expertise, the public understanding of science, scientific controversies and the history of technology. He is currently exploring the social, legal, epistemic, and regulatory implications associated with ongoing changes to what it means to be a scientist and expert.

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## Vasudha Mohanka

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HDR Scholar at University of Wollongong

### The history of IVF in India

While research on human In Vitro Fertilisation began in the early and mid 1950s, the first successful IVF birth in 1978 has redefined numerous aspects related to pregnancy and childbearing. The history of IVF has come a long way from women looking at IVF as an option that they knew they had used, to more recently aspects related to intimacy, eugenics, emotions, bloodlines and emotions. Technology has changed the way people look at hope. The history of IVF is not just of a technological and scientific breakthrough, but one that has changed how reproduction is viewed today. Biosocialities have brought about a different viewing of nature, culture through technologies such as IVF. This paper will review some of the important aspects in the history of IVF, especially in the Indian context. While there have been recent bans on surrogacy in India, it is interesting to look at how IVF has been researched and viewed in India.

## Biography

**Vasuda Mohanka** is currently enrolled in a PhD in Humanities under the ARC IVF Global History Project, at the University of Wollongong, Australia since February 2016. M.Phil in Social Sciences Tata Institute of Social Sciences, Mumbai (Thesis on Assisted Reproductive Technologies). M.A. in Social Work Tata Institute of Social Sciences, Mumbai. B.A. Christ College, Bangalore University (now Christ University).

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## Rachel Morgain

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Fenner School of Environment and Society,  
College of Science, Australian National  
University

### Destabilising anti-conservation positions in the post-truth era

The “post-truth” era has witnessed a rapid shift in the positioning of environmental and conservation science in both the US and Australia. This has arguably shown itself most sharply in a dramatic transformation of positions against climate science, from those couched in terms of scientific doubt and indeterminacy to those that describe mainstream climate scientists as ideologically blinded. These discourses of environmental science as “ideologically-driven” are now being extended to debates about other aspects of environmental research and management, including biodiversity conservation. In these debates, policy-makers arguing for the erosion of conservationist protections can be found to justify their positions as “evidence-based” decision-making, even where the evidence is slim or speculative, while ecologists and environmental scientists propounding conservationist positions are being positioned as emotional and politically motivated, and therefore as the authors of suspect or “unreliable” science. This paper explores this shifting politics of knowledge in a volatile political climate, highlighting how authorising discourses of science and the ideological framing of science as ideally rationalist and ideologically neutral is being used to bolster anti-environmental decisions. Drawing on case studies from Australia, this analysis explores the instability inherent in the boundaries drawn around appropriate scientific disposition, such as rationality and the avoidance of advocacy. While many scientists are seeking a narrow defence of “rational truth” and “scientific facts” in the face of post-truth attacks, this paper suggests that the most effective defence of environmental knowledge developed through scientific processes is one which embraces the indeterminacies, commitments and passions of scientific engagement with the non-human world.

## Biography

PhD, Anthropology, The Australian National University, awarded July 2011.

Visiting Student Researcher, University of California, Berkeley (2006-7) Thesis: Beyond

“individualism”: personhood and transformation in the Reclaiming Pagan community of San Francisco.

Bachelor of Arts with Honours I (Gender, Sexuality and Culture), The Australian National University Completed 2003; Major – Gender, Sexuality and Culture (cognate studies in Anthropology) Thesis: Witches and Webs: being and belonging in feminist witchcraft.

Bachelor of Science with Honours I (Physics), The University of Melbourne Completed 1996; Major – Physics (specialty Astronomy) Thesis: A study of General Relativistic effects in millisecond pulsar binary systems.

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## David Neil

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Philosophy Program, University of Wollongong

### Marketing addiction: the ethics of designing products to “hook” the user.

The ‘dual use dilemma’ arises when research has potentially beneficial and harmful applications. This paper discusses the dual use dilemma with regard to addiction research. Findings from addiction research have informed the design of games, apps and gambling machines, in order to enhance their addictive potential. Is it possible to regulate the commercial exploitation of behavioural addiction?

### Biography

**David Neil** is a lecturer in the philosophy program at UOW. His teaching and research interests are primarily in the areas of ethical theory and applied ethics, particularly bioethics and ethics of technology.

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## Lindy Orthia

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Centre for the Public Awareness of Science & School of History, The Australian National University

### Reclaiming the origin of science for science communication and science studies

It is commonly believed that disciplines like science communication, history of science and philosophy of science are parasitic entities, which exist only by riding on the coat-tails of science. In this paper I argue the opposite is true. I base this on a historical approach to defining “science”, which posits that science in its current, globally-dominant form had a time, place and culture of origin; specifically, western Europe in the late eighteenth-early nineteenth centuries. Historians widely agree that is when science acquired its distinct ideological and institutional identity, which differentiates it from other approaches to studying nature. But these core ideological and institutional aspects of science are more than diagnostic traits. I contend that they are causes, not effects: that this form of the study of nature has a recognisable identity today because eighteenth and nineteenth century champions successfully promoted ideologies like rationalism, and institutions like scientific societies. They achieved this through extensive public communication, their own retellings of the history of ideas, and enshrining a set of philosophical principles as the path to truth. It is therefore these activities, supposedly adjunct to science, that conjured the identity “science” into existence, and enabled it – for better or worse – to become the globally significant force we recognise today.

### Biography

**Lindy Orthia** is a senior lecturer in science communication at the Australian National University’s Centre for the Public Awareness of Science (CPAS). Her primary research interest at the moment is the history of science communication, especially in the eighteenth and nineteenth centuries. In particular she is studying the public knowledge culture of early colonial Sydney, in part as a research masters student at the ANU School of History. In the past her research has focused on studies of science in popular fiction, primarily ideological aspects of science in

the long running science fiction television series *Doctor Who*.

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## William Palmer

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Adjunct research associate, Fellow of the Royal Society of Chemistry and a Fellow of the Royal Australian Chemical Institute

### Harold Llewellyn Bassett (1889–1964): did World War 1 spoil this promising chemist's career?

This preliminary study will focus on the education, life and work of a little-known Welsh chemist, Harold Llewellyn Bassett. During Harold's childhood, his parents lived in Wincanton, Somerset, but they had previously lived in Pontypridd, Wales where Harold was born. Harold's secondary schooling was at Sexey's School, Bruton, Somerset. He was accepted at Trinity Hall, Cambridge and matriculated in October 1908. His academic performance at Cambridge was brilliant. He was a Foundation Scholar in 1911 and a Prizeman for Science in 1912. He was awarded a First in both parts 1 and 2 of the Natural Sciences Tripos, obtaining his BA in June 1912. Between 1912 and 1914, he published six papers (five of them jointly with Marion Wheldale) and published a successful text book with an introduction by Professor Jackson Pope.

Harold volunteered for military service at the start of World War 1 joining the Welsh Regiment, transferring to the Royal Engineers in 1916. He survived the war and received French and British decorations. He joined the staff of the University College of Wales at Cardiff in 1920 as a lecturer on organic chemistry, retiring in 1953. During his thirty-three years in Cardiff he published seven unexceptional papers, some jointly. Harold Llewellyn Bassett died in Cardiff on 19th July 1964 at the age of seventy-four.

Harold Llewellyn Bassett's career started exceptionally well; what went wrong?

### Biography

**Bill Palmer** obtained his Bachelor's degree (1959) and Teacher's Certificate at the University of Exeter (1960) and his Masters degrees from the University of East Anglia (1970) and the University of Oxford (1981); his PhD (2003) was obtained from the Curtin University, Australia.

Apart from Australia, Bill has worked in Britain, Nigeria, Papua New Guinea and Western Samoa. He was a senior lecturer in the Faculty of Education, Health and Science at Charles Darwin University, Australia from 1989 until February 2007 when he retired after nearly fifty years in science education. His main research areas are teacher education, science education and the history of science, and he continues to keep up his research as an adjunct research associate of Curtin University. In 2009, he worked as a visiting lecturer at St John's Anglican University, Dodoma, Tanzania. He is a Fellow of the Royal Society of Chemistry and a Fellow of the Royal Australian Chemical Institute. Most recently, he was an invited lecturer at the 1st International Summer School for Sciences, History and Philosophy of Sciences, Technology & Science Education (ISSHPSE-2015) in Lille, France from June 22nd-26th 2015.

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## John Reynolds

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Philosophy, UoW

### Big data, privacy, and the inference problem

The use of big data is almost ubiquitous in current society, as private corporations and state institutions rely on datasets and the algorithms that mine them to inform and make their decisions. Traditionally, privacy has been used as a tool to protect individuals from discrimination through ensuring individuals maintained control over personal information and data, but the concept of privacy is floundering when it comes up against big data. This is because privacy is fundamentally tracking the wrong thing when it comes to big data. Privacy is concerned with shielding information from others, preventing third parties from using private information for their own purposes without consent. However, there are major risks of harms, such as unfair discrimination, arising from the inferential reasoning processes that are associated with the use of big data and algorithms. As one example, individuals are often grouped through the use of big data into either distributive generalisations, where the individuals in that group all actually share a characteristic, or into nondistributive generalisations, where the individuals only have a chance of having a characteristic. While those chances are often high, those individuals are then treated as if they actually had that characteristic, which has the real potential

to lead to unfair outcomes such as discrimination. Privacy as a concept simply does not cope with that process of reasoning, and as such we need a new concept to protect individuals from the potential for harm arising from inferences and big data.

## Biography

**John Reynolds** is a current PhD student at the University of Wollongong, where he also studied his undergraduate in Law and Philosophy. He is primarily interested in digital and information ethics, as well as discrimination.

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## Toby Rogers

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Doctoral candidate, University of Sydney,  
Dept. of Political Economy

## What can the autism epidemic teach us about paradigm shifts (or lack thereof) in science and medicine?

Steve Fuller and others have noted that Thomas Kuhn's model of normal science and scientific revolutions does not hold up well against many scientific case studies. The history of medicine reveals a very different (and perhaps non-ergodic) pattern. David Wootton shows a relatively stable two thousand year period of Galenic medicine for elites that actually worsened outcomes for patients. Major innovations including anaesthesia, the microscope, the germ theory of disease, and antiseptics were either ignored or led to bullying, ostracism, and rejection (for an extended period of time) of the new paradigm. Contrary to the seamless transitions of Kuhn's model, in actually existing science and medicine revolutionary thinkers often face financial and personal ruin and new paradigms can be delayed, reversed, and diverted by elite professionals protecting their profit (and other) interests. In this paper I will compare and contrast Kuhn and Wootton against the 92 year history of the study of autism. I will show that there have been five dominant theories about autism over that time period and that they contradict and complicate existing models of change in science and medicine. I argue that what is missing from Kuhn (and to a lesser degree, Wootton) is the profound role of social, political, and economic forces in shaping what get studied,

what gets overlooked, and which ideas are considered paradigmatic.

## Biography

**Toby Rogers** is a Ph.D. candidate in the Department of Political Economy at the University of Sydney. Prior to coming to Australia Toby worked for twenty years for a variety of progressive non-profit advocacy groups in the U.S., including the successful campaign for LGBT marriage equality in the Presbyterian Church (U.S.A.). He has a master's degree in Public Policy from the University of California, Berkeley where he was a graduate student instructor and researcher for former U.S. Labor Secretary Robert Reich.

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## Alan Salter

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University of Sydney

## The bird, the poem and the apparel

In this paper I examine a curious passage from the Anatomy Lectures given by William Harvey to the London College of Physicians in 1616. I argue that the passage has been falsely transcribed from the original manuscript by the authors of the two English editions of the work. I offer an alternative reading that not only throws new light on the scope of contemporary knowledge of the natural world but also invites a new appreciation of Harvey's own attitude towards anatomical inquiry.

## Biography

MA (Cantab), PhD (Sydney)

## Research focus

The empirical practices of scientific inquiry during the Scientific Revolution, with a focus on anatomy and physiology in general and the English physician William Harvey in particular.



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## John A. Schuster

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Unit for HPS, University of Sydney

### **The laws of collision at the Royal Society, 1668–9: Case Study No.5 of the Taylor/Schuster model of ‘Organizing the Experimental Life at the Early Royal Society’**

In the late 1660s the Royal Society investigated the laws of collision. The contributions by Wren, Wallis and Huygens have long been studied by internalist historians of physics as a telling moment in the gestation of the domain of classical mechanics between the earlier work of Galileo and Descartes and the later synthesis of Newton. These events also open a portal on how inquiries were organized at the early Royal Society. To this end, the paper continues inquiry into the management of investigations at the Royal Society that Alan B. H. Taylor and I signalled several years ago, invoking case studies on May-dew, Hooke’s ‘Metals Inquiry’, Newton’s early optical work, and Shapin’s pet case, the iceberg/ buoyancy controversy.

The paper criticises Dana Jalobeanu’s interpretation of the laws of collision debate in terms of two teams of committed natural philosophers, ‘Cartesians’ and ‘Gassendists’—revealing this to be a category mistake typical of historiography of philosophy. Attention to organizational process paints a different picture: piecemeal problem-solving and the search for ‘intermediate causes’ (Alan Chalmers) in mechanics, with the retrogressive, charming and persistent Gassendist matter theorist, William Neile, being the exception that proved the rule – dismissed in the most diplomatic and gentlemanly way.

Following Taylor and Schuster, it is shown that these events bear no relation to Shapin’s picture of mutually trusting gents, witnessing experiments and certifying resulting atheoretical ‘matters of fact’ to each other. Rather, in this notable episode in the process of crystallization of the essentially mathematical discipline of classical mechanics, theorising was to fore (but not older style systematic natural philosophical theorising), with experiment playing an occluded role—as any historian trained in physics might well expect to have been the case in this instance.

## References

John A. Schuster and Alan B. H. Taylor, ‘Blind Trust: The Gentlemanly Origins of Experimental Science’, *Social Studies of Science* 27:503-536.

John A. Schuster, ‘Cartesian Physics’ in Jed Z. Buchwald and Robert Fox (Eds.) *The Oxford Handbook of the History of Physics* (Oxford, 2013, OUP), pp.56-95, Esp. Section 3.3 ‘Cartesian Physics and Classical Mechanics: Technical Problems and Shared Goals and Values’ and Section 3.4 ‘Conclusion: Mathematics, Natural Philosophy and the Path to Classical Physics’.

## Biography

**John A. Schuster**, BA Columbia, MA Cambridge, MA, Ph.D Princeton, is a Fellow of the Australian Academy of the Humanities. He studied mathematics, physics, European history and history of science, at Columbia, then early modern European history and history of science at Princeton. He taught at Princeton, Leeds, Cambridge, Wollongong and New South Wales, before retiring to full time research in 2011, in affiliation with the Unit for History & Philosophy of Science, Sydney University. He is also an Honorary Fellow of Campion College, Sydney. He was President of AAHPSSS on seven occasions. He has well defined international reputations for his ground breaking publications on the scientific career of Descartes; the process and historiography of the Scientific Revolution; and the rhetorical and political functions of scientific method. He has extensive experience in the design of curricula in the history, philosophy and sociology of science and has written two textbooks to that end.

Website: <http://descartes-agonistes.com/>

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## Kayla Slade

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University of Wollongong

### **Mapping the road to failure: From the Kyoto Protocol to the Paris Climate Change Agreement and its Impacts on the indigenous peoples of Nunavut**

Over the past few decades, the dire consequences of climate change have gained global recognition. In response, the United Nations Framework Convention on Climate Change (UNFCCC) formed in 1992 as an international regime that is

determined to lower overall greenhouse gas emissions. However, since the 1990s, states have instead increased the rates of fossil fuel energy consumption to bolster economic growth. Thus, this paper endeavours to explore the reasoning behind the ineffectiveness of the Kyoto Protocol. The argument continues to suggest that the institutional design of the Protocol has negatively impacted the Copenhagen Accord and the Paris Climate Change Agreement. Due to this chain effect between the environmental agreements, we predict that the Paris Agreement is set to fail. To illustrate the current and future impacts of deficient international environmental regimes, the Indigenous Peoples of Nunavut, located in the Northern Canadian Arctic tundra, are explored as they are particularly susceptible to the effects of global warming due to a weak economy.

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## Lisa Slater

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University of Wollongong

### Not caring like the state

Albeit not new, Australia is in the throes of a determined public campaign for Indigenous people to achieve health and socio-economic equality. In November 2008, Closing the Gap: National Indigenous Reform Agreement (CtG) was adopted by the Council of Australian Governments (COAG) as its over-arching reform agenda for improving Indigenous Australians' lives: a raft of programs to achieve health and socio-economic equality (Altman 2009: 3). COAG set specific and ambitious targets for 'Closing the Gap', such as to close the life-expectancy gap within a generation and to halve the gap in employment outcomes between Indigenous and non-Indigenous Australians within a decade (Australian Government 2010). CtG is driven by statistics: bad statistics. To Australia's great shame, and much progressive settler Australian anxiety, across virtually all the indicators in the Overcoming Indigenous Disadvantage 2011 Report, there are wide gaps in outcomes between Indigenous and non-Indigenous Australians. Arguably CtG is a form of colonial capture, which inscribes Indigenous people in a new scientific-governmental assemblage (Deleuze and Guattari 1988). My particular interest is to examine CtG as a 'caring assemblage' in which Indigenous Australians are imagined, in familiar neocolonial style, as vulnerable and 'not modern yet' and the state responds with 'progressive care'.

However, the assemblage has a force and stability, which needs much more than bad statistics and policy to be so effective and enduring. In this paper, my particular interest is in progressive settler colonial desire to help Indigenous people, or what I might call 'virtuous responsibility'. To care is to make a claim on how to live and what is a good life (Povinelli 2010). In Australia when settlers are confronted with the reality of Indigenous marginalization there is a common question or lament: the concerned citizen asks – but what can we do? What can we do about the 'Aboriginal problem' (not a shared problem in a shared time and space)? As Gillian Cowlshaw argues the 'little pronoun 'we' has the effect of sweeping us all into a governmental project of finding, or rather conceiving, overarching solutions to what some segment of the nation takes to be a problem' (2013, 245). 'We' care like the state. Following Cowlshaw, I am arguing that this is a cultural realm that Australians inhabit, a form of thick life that needs investigating as a style of care or goodwill, which reproduces colonial relations. And fails to take Indigenous people seriously. What or where are the experiments in anti-colonial relationality? Or how can 'we' not care like the state?

### Biography

**Lisa Slater** is a Senior Lecture in Cultural Studies at the University of Wollongong (UOW). She works primarily in the disciplines of critical Indigenous, cultural and settler colonial studies, with a research and teaching portfolio that is strongly interdisciplinary. Her work is committed to broadening and challenging key concepts that inform policies and politics such as 'reconciliation', 'recognition', 'wellbeing', 'community', 'sustainability' and the 'environment'.

Such challenges require concepts that help unpack the relationship between people, knowledge, power and governance, to understand the effects of privileging the ideas of particular cultures over others. Place is foregrounded in her work because politics and policies always unfold somewhere. Her recent projects have a strong focus on remote, rural and regional Australia.

### Current research projects

Aboriginal festivals and contemporary cultural practices provide a rich focus because 'Aboriginal culture' is both celebrated and problematised by settler Australia, but rarely understood on Indigenous terms. Festivals are meeting places where Aboriginal and Torres Strait Islander

people's stories, knowledge and histories take precedent. I ask, how do cultural festivals help broader Australia's understanding of Indigenous lives? In these cultural spaces, how are solutions to social problems, wellbeing and the future differently imagined?

Another strand of her current research examines the cultural politics of 'recognition' and 'equality' by analysing what 'well-intentioned' settler Australians see and feel when they interact with Aboriginal people. To do so, she examines various cultural artifacts – memoirs, film, cultural tourism and policy – to map settlers' emotional responses to Indigeneity. Her particular interest is in the anxiety that arises when settlers are confronted with, what they perceive as politics when they wanted to learn about 'culture'. She asks why does Aboriginal political will continue to provoke and disturb? How does settler anxiety shape and inform public opinion and political solutions to Indigenous inequality and issues of social justice? How is 'culture' imagined and understood by different peoples? Through this work, Lisa also investigates models for moving through and beyond settler anxiety to learn to be at home together in difference. Monograph in progress, working title: Close to Home: Anxieties of belonging in settler colonialism.

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## Gemma Lucy Smart

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University of Sydney

### Totally addicted to love

In this era of online and app based dating and sex, suggestions that use of such services could become disordered have cropped up in both the media and academic work. Both "sex addiction" and "love addiction" have an established history in the Twelve Step framework, neither love nor sex are considered addictive targets within clinical Psychiatry. Drawing on a combination of my analysis of Internet Gaming Addiction and my own experiences, this paper critically examines the claim that love and sex, particularly when coupled with apps like Tinder and Grindr can be "addictive". The pathologisation of complex, but normal behaviour is a common thread in the critique of Psychiatry by Philosophy. The narrative of addiction provided by the psychosciences encourages people to self-define as disordered – both individually and within communities. This paper touches on the issues of identity, selfhood and relationships both within and outside of the

gamification of dating and sex. I argue that by pathologising certain kinds of sexual encounters and dating styles the psychosciences are in part postulating a homogeneous conception of appropriate interpersonal relationships, which is both inaccurate and potentially harmful.

## Biography

### Selected professional experience

2017: Macquarie University, Lecturer and co-convenor for 'What is Science'

2009-Present: The University of Sydney, Lecturer and Tutor in upper level Philosophy and History and Philosophy of Science. Courses including: 'Philosophy and Psychiatry'; 'History and Philosophy of Psychology and Psychiatry'; 'Science and Ethics and Society', 'Environmental Ethics' and 'What is this thing called Science?'

2009-2012: Evolution & Ecology Research Centre, UNSW Centre, Manager and Administrator

2008-2009: UNSW Research Assistant for University of Western Australia-funded project on indigenous homelessness.

### Education

2009 – Present | The University of Sydney Master of Science (Part-time by Research) in the History and Philosophy of Science. My thesis focuses on the proposed disorder: Internet Addiction.

2001 – 2008 | The University of NSW, Bachelor of Environmental Science/Bachelor of Arts (Honours First Class). Majoring in Human Geography and History and Philosophy of Science respectively. My Honours project took me to PNG where I worked on the social implications and limitations of an integrated pest management project.

### Publications

Murphy, Dominic and Gemma Lucy Smart (in press) "Mechanistic Models of Addiction", *Routledge Handbook of Addiction*

Murphy, Dominic and Gemma Smart (2010) "Review: The Disordered Mind: And Introduction to Philosophy of Mind and Mental Illness", *Notre Dame Philosophical Reviews*

Smart, Gemma and Charles T Wolfe (2010) "Review: The Physiology of Truth", *Metapsychology Online Reviews*

Christina Birdsall-Jones, Nalita Turner, Vanessa Corunna, Gemma Smart, Wendy Shaw (2010)

“Indigenous Homelessness: place, house and home”, *Australian Housing and Urban Research Institute Research Policy Paper*

Shaw, W, S.M. Inu & G. Smart (2008) “Ethnographic Geographies of Coffee Production in Papua New Guinea”, *Insula: International Journal of Island Affairs*, volume 17, number 1, pp. 13-22

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## Eden Smith

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University of Melbourne

### Using concepts as experimental tools: Mental imagery and hallucinations

Equivalent neuroimaging data can support conflicting knowledge-claims – a puzzle highlighted by experiments identifying the neuroanatomical correlates of sensory-like mental phenomena using the concept of either mental imagery or hallucinations. In examining this puzzle, I will draw on intersecting approaches to studying scientific practices: the first approach highlights how material instruments actively contribute to scientific knowledge; the second describes how concepts are used as tools in experimental practice. These two approaches converge through analogies likening the uses of conceptual tools with the uses of material instruments. Building on these analogies, I will argue that it is through their structured uses (as tools for investigating specific goals) that the concepts of mental imagery and hallucinations actively contribute to experimentally generated knowledge.

### Biography

#### Education

Current PhD Candidate (History and Philosophy of Science) Supervised by: Associate Professor Michael Arnold and Dr James Bradley School of Historical and Philosophical Studies, University of Melbourne

2012 Postgraduate Diploma in Arts (History and Philosophy of Science) School of Historical and Philosophical Studies, University of Melbourne

2011 Bachelor of Science (Neuroscience), Faculty of Science, University of Melbourne

### Employment

Research Assistant: School of Historical and Philosophical Studies, University of Melbourne – 2017, Problem Development Team, CREATE Project

Guest Lecturer: School of Historical and Philosophical Studies, University of Melbourne – UNIB10013 Catastrophes as Turning Points (2015 & 2016) Tutor: School of Historical and Philosophical Studies, University of Melbourne – UNIB10013 Catastrophes as Turning Points (2013, 2014, 2015, & 2016)

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## Michaela Spencer

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Charles Darwin University

### Evaluation as cosmopolitical work in northern Australia

Taking seriously the suggestion that social science methods produce the realities that they purport to know (Law, 2004) opens up potential for political intervention through the careful conduct of collaborative research and evaluation practice. In this presentation I focus on a project centred around *evaluating government engagement* in several Northern Australian Indigenous communities.

This project has been running for a little over a year, and throughout there has been a number of tensions. In particular, a tension between the insistence of government that they wanted to get an assessment ‘how well we are doing’ when engaging with people in Remote Aboriginal communities, and community members who were equally insistent that engagement wasn’t really just about the government, but about ways of collaboratively producing better futures for coming generations.

Beginning without any shared commitment or agreement about what counted as engagement or what counted as evaluation, both of things needed to be continually re-negotiated as we went along. Drawing on some of the video and other materials produced within this project, I’d like to reflect on some of the ways that these materials seem to manage the tricky task of ‘doing remote witnessing’ as required by government, at the same time as beginning to mess with and loosen up these sense of a one-way flow of information as a default mode for engagement and evaluation.

Looking for ways to accommodate these materials as evidence for policy practice has seen me drawing on a growing body of work within STS and anthropology grappling with the notion of cosmopolitics. Considering means by which our evaluation research might be recognised as not only reporting on the performance of a singular given world, but participating in the production multiple polities as well as the conditions of their coexistence.

## Biography

### Education

2010 – 2014: Melbourne University, Australia  
PhD in School of Historical and Philosophical Studies

2005-2006: Lancaster University, UK MA in Environment, Culture and Society – Distinction

1997 – 2004: University of New South Wales, Australia B. Environmental Science/ B. Arts – 1st Class Honours

### Current Employment

2014 – Present: Post-Doctoral Fellow, Northern Institute, CDU Relevant Projects

Feb 2016 – Jun 2017: Remote Engagement Coordination – Indigenous Evaluation Research (REC-IER). Funded by NT Government.

May 2015 – Apr 2016: Helping and Caring, not only our family: NT Indigenous perspectives on volunteering. Funded by the Red Cross.

June 2015 – Jan 2016: Disaster Management. Resilience and Preparedness in Aboriginal Communities in Darwin and Palmerston. Funded by the Australian Red Cross.

Jun 2014 – Dec 2015: Indigenous Governance and Leadership Project (IGLDP). Funded by NT Government.

### Recent Publications

Spencer, Michaela, Michael Christie and Ruth Wallace (2017) *Disaster Resilience, Management and Preparedness in Aboriginal and Torres Strait Islander Communities in Darwin and Palmerston – Stage 2 Report: Indigenous Researcher Development*

Spencer, Michaela (2016) 'Emplacing and Economising: Neoliberalising Australian Landscapes of Democracy' in eds. Timothy Neale and Eve Vincent, *Unstable Relations: Indigeneity and Environmentalism in Contemporary Australia*

Spencer, Michaela, Michael Christie, Andrea Lee and Ruth Wallace (2016) *Helping and caring, not only our family: NT Indigenous perspectives on volunteering, Final Report*, Charles Darwin University.

Spencer, Michaela, Michael Christie and Ruth Wallace (2016) *Disaster Resilience, Management and Preparedness in ATSI Communities in Darwin and Palmerston*.

Spencer, M., 'Book Review: Experiments in Holism: Anthropology and the Predicaments of Holism by Otto Ton & Bubandt Nils (eds) in *Science and Technology Studies*, 2016, 29(1): 83

Spencer, M and Helen Verran (2015) "Developing Collaborative Learning Technologies in Association with the Creation of Local Indigenous Services Products" *Refereed Proceedings of the 18th New Zealand Association for Cooperative Education Conference, 15th – 17th April, 2015*, hosted by Massey University, Wellington, New Zealand.

Oppermann, E., Spencer, M., & Brearley, M. (2015). Emotional Athletes, Brainy Workers and other Hot New Developments: Multiple (re)problematizations of Heat Stress as an object of governance in northern Australia. *Learning Communities: International Journal of Learning in Social Contexts*. Special Edition: Objects of Governance, 15, 32-39.

Spencer, M., 'Book Review: Alien Oceans by Stephan Helmreich' in *Science and Technology Studies*, 2013, 26(3): 127-9

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## Rey Tiquia

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University of Melbourne

## Thomas S. Kuhn and the linguistic turn in the philosophy of science

Proponents of TCM (traditional Chinese medicine) and Western biomedicine are like speakers of different languages. The vocabulary of the two systems of medical knowledge may look identical at times, as in the use of technical medical terminologies like the 'heart', 'lungs', 'blood vessels', 'brain', etc. However, most of these technical words function in very different ways within each system. This is one of the major limits in attempting a translation or communication work that moves between the two traditions of healthcare. Considering these ideas about

language and its application to cultural concepts, at the present time, being a threshold of a new epoch of transmodernity, where modernity and its negated alterity co-realise themselves in a process of mutual creative fertilisation, I propose that a new translation space between biomedicine and traditional Chinese medicine be constructed in Australia. Throughout my clinical work and medical anthropological research in Australia, I have found myself translating between two languages: the ancient and contemporary Chinese spoken and written forms, and contemporary academic English. The practice of translation between languages is pivotal in my work, and pivotal to understandings that form the basis of clinical practice. Hence, I consider it here as a special instance of translation, deserving of special attention in a translating knowledge space.

### Biography

**Dr. Rey Tiquia** is currently a technoscience researcher with the School of Historical and Philosophical Studies, University of Melbourne. He is a qualified practitioner of Traditional Chinese Medicine (TCM). He took his BA from Manuel Luis Quezon University, Manila, Philippines, and his MSc and Ph.D. degrees in History and Philosophy of Science, University of Melbourne, Australia. His dissertation was entitled *Traditional Chinese Medicine as an Australian tradition of health care* (2005) wherein he proposed the construction of a symmetrical translating knowledge space between traditional Chinese medicine and Western scientific medicine in Australia. He has lectured on the history and philosophy of TCM at both University of Melbourne and Victoria University of Technology. In 2000, the Wellcome Trust invited him to facilitate a workshop for the Closed-Door Research Conference on Complementary and Alternative Medicine in London, UK. Since 1997, he has been an Honorary Professor at Shanxi College of TCM, Taiyuan City, China.

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## Gerhard Wiesenfeldt

### Classification by Language? Dutch, Latin and Arabic Mathematics in Leiden after 1600

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HPS, University of Melbourne

During the first half of the seventeenth century, Leiden University housed three different kinds of

mathematics - associated with the different languages it had been written in. While each kind related to a different culture of knowledge and a different social setting, translations between Dutch and Latin and from Arabic into Latin changed the relation between the knowledge cultures.

The traditional Latin mathematics had been shaped by Rudolf and Willebrord Snellius in the framework of Ramist philosophy, which stood against the humanist mainstream of the university that was primarily represented by the philological work of Justus Lipsius and Julius Scaliger. While Scaliger had already branched out into mathematics, the humanist tradition in mathematics acquired a more important role with the appointment of Jacobus Golius as professor of Arabic in 1625 and was then based on the mathematical writings that Golius had brought back from his travels to Morocco and Syria. Finally, there was the Dutch mathematics, which had been set up to teach practical mathematics in the vernacular to craftsmen aspiring to become surveyors or military engineers. Represented by Ludolf van Ceulen and Frans van Schooten, its academic status was precarious, yet it enjoyed support among the student population and the Leiden City Council. In my paper, I will explore the classification of different kinds of mathematical knowledge and mathematical practices that were associated with the different languages present in Leiden.

### Biography

**Gerhard Wiesenfeldt** is a lecturer in the History of Science at the University of Melbourne. He holds an MSc in Physics and a PhD in History of Science, both from the University of Hamburg. He has published extensively on the history of experimental natural philosophy and the role of the sciences in early modern universities, with a focus on the Dutch Republic and protestant German countries. He is currently working on a book on the relation between practical mathematics and natural philosophy in the Dutch Republic.

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## John Wilkins

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Fellow, SHAPS, University of Melbourne

### Noah's Ark and species

Until the 16th century, there was no fixed rank for "species" in natural history. Terms like genus and *species* were simply used to mean "kinds" or

“sorts” of animals and plants. Johannes Buteo attempted to specify the kinds of animals that went on the Ark as literal interpretations of the Bible became fashionable, and in so doing, he introduced, inadvertently, a “created kind” category that later influenced the early modern natural historians like John Ray. In this paper I will attempt to delineate this process in order to understand why “species” came to denote a fixed rank of organic organisation, and thus why we have “the” species rank today.

## Biography

**John Wilkins** did his PhD at the University of Melbourne. He has researched and taught at the University of Queensland, the University of Sydney, the University of New South Wales, and the University of Melbourne. He is the author of *Species: A History of the Idea* (2009, the first edition of this book; the second is due in February 2018), *Defining Species* (2009), *The Nature of Classification* (2013, with Malte C. Ebach), and edited *Intelligent design and religion as a natural phenomenon* (2010). He is the author or coauthor of 28 papers and 12 book chapters. John is currently Honorary Fellow at the University of Melbourne School of Historical and Philosophical Studies, where he lectures.

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## Ian Wills

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## An Australian industrial revolution?

Political revolutions tend to be recognised and described as such by participants; other periods become revolutions in retrospect. People in Britain around 1800 may have been aware that the country was changing but it was not until 1881 that Toynbee coined the phrase Industrial Revolution to describe the period from 1760 to 1840. Similarly, it was in 1927 that Charles and Mary Beard referred to the rapid change in America in the half century following the American Civil War as the Second Industrial Revolution.

An examination of the development of Australian manufacturing industry shows significant change in the nature of manufacturing industry and in effect on Australian society. Over the nineteenth century Australia moved from a collection of largely penal colonies in which manufacturing was confined to small scale, domestically-oriented

products like bricks and beer, to a complex economy in a highly urbanised society. By 1920 manufacturing accounted for 22% of employment and 13% of GDP, a sharp contrast to the much studied mining industry which accounted for only 3% of employment and GDP.

The long nineteenth century in Australia also saw the development of large scale industries such as ship building, and iron and steel making. It also saw a flurry of innovation characterised, as in Britain and America, by the emergence of inventor-entrepreneurs including Hugh McKay (combine harvester), Frederick Wolseley (sheep shearing machinery) and George Julius (automatic totalisator). Australian inventor-entrepreneurs were significant because they not only invented but built industries based on their inventions, producing and selling to both Australian and world markets.

These changes in Australian manufacturing industry were significant but do they constitute a revolution? Given that most histories of Australia do not address the significance of manufacturing, it is a question that has not been asked and certainly not answered. This paper examines the evidence for an Australian Industrial Revolution and asks: over what period it might have occurred; what might have driven it; and, if there was a revolution, what were its consequences?

## Biography

**Ian Wills** is an honorary associate of the School of History and Philosophy of Science at the University of Sydney. His research interests lie in the areas of late nineteenth and early twentieth century technology and innovation; the relationship between the history of technology and industrial heritage; and Australian manufacturing and innovation. He is currently working on a history of manufacturing in Australia and its social and political impacts.

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## John Wright

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University of Newcastle

## The unreasonable effectiveness of scientific method

In 1960 Eugene Wigner published “The Unreasonable Effectiveness of Mathematics in the Natural Sciences”. Despite the importance of the questions Wigner raises, and the apparently

perplexing nature of the phenomena he identifies, the topic he discusses has not received a great deal of attention from philosophers. Perhaps the most extensive discussion of it to date is Mark Steiner's "The Applicability of Mathematics as a Philosophical Problem". (Harvard, 1998). In the paper a new approach to some (but not all) of Wigner's problems is discussed.

## Biography

**John Wright** is a Senior Lecturer at the University of Newcastle. Most of his published work is in the area of philosophy of science.

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## Tangyao Zhang

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The Australian National University

### Co-construction of multicultural perspectives within science communication: A learning community case study

Science communication occupies a cross-disciplinary space, where scientific culture interacts with cultures of scientifically engaged and apathetic audiences. Nuanced perspectives of culture are crucial to appreciate the complexities of such a dynamic and complex space. Often, in the Australian context, science communicators arrive to the discipline from the natural, physical and applied sciences; as is the case with science communication researchers and scholars at the Australian National Centre for the Public Awareness of Science in Canberra. A group of these science communicators embarked on a learning community approach to gain deeper insights into the academic conceptualisations of culture, by exploring inter-disciplinary discourses from anthropology, social sciences, etc. The present paper attempts to distil the essence of that

learning journey by contextualising its processes within a science communication theoretical framework. We conclude by mapping our learning journey to outcomes long the way, in order to demonstrate how the culture within the learning community itself has been complex and dynamic. We offer this paper as a model for other science communication groups in Australasia as a feasible approach to explore and extend science communication scholarship.

## Biography

**Dr Sean Perera's** science communication research and teaching explore how science is communicated with culturally and linguistically diverse audiences. He is the Sub Dean of The Australian National University (ANU) Graduate Studies Select and also convenes the ANU course on cross-cultural science communication. He also lectures at the Australian Catholic University/Faculty of Education and Arts in Canberra. Sean earned his PhD in science communication from ANU in 2010. He has a First Class, Tri-major Bachelor's Degree in microbiology, chemistry and zoology from Bangalore University, India, and a Master's Degree in agriculture from the University of Peradeniya, Sri Lanka.

### Co-author:

**Tangyao Zhang** is a PhD candidate and a sessional academic (outreach) at the Australian National Centre for the Public Awareness of Science. He graduated with a Bachelor of Engineering in Food Quality and Safety from the Shandong Agricultural University in 2011, and was awarded a Master of Biotechnology from the University of Melbourne in 2014. Currently, Tangyao is investigating the public perceptions of risk associated with genetically modified food in China through an interdisciplinary approach. He also works as a communication assistant at ANU Joint Colleges of Science.



# Sessions

## Universities as frontiers of innovation and its eco-system

### Venni V. Krishna

Coordinator

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*Eco-innovation fundamentals and university student engagement with business, by Sam Garrett-Jones and Belinda Gibbons*

Universities play a very significant role in training students and imparting skills in sustainable processes. Industries and business enterprises rely heavily on management professionals coming out of universities. Sam and Belinda explore the extent to which final year business school students from the University of Wollongong, equipped with business sustainability and 'eco-innovation' skills at the interface of university – industry relationships. This is an important dimension to the changing university's innovation eco-system.

*Process mechanisms for academic entrepreneurial ecosystems: Insights from a case study in China, by Gaofeng Yi*

Drawing on an empirical study of Zhejiang University, Gaofeng Yi explores academic entrepreneurial eco-system (AEE). Three basic elements of AEE model, namely, incentives, collaboration and capability are identified which are seen to play an important part in the changing organization and goal directions of university in promoting entrepreneurial eco-system. This paper provides a valuable insight into a leading Chinese university.

*Corporate and university links in advancing basic science: 2004–2014, by Russell Thomson*

There is plethora of research literature on university and industry relationships and the way in which universities have become the main sources of basic scientific knowledge. However, very little is known about the extent to which corporate sector and business enterprises contribute to basic science. Russell Thomson's paper drawing on the empirical research from USA

for the decade 2004–2014, draws attention to the role of corporate sector in basic sciences in the university – industry relationships. This paper presents an important dimension to the science and innovation eco-system.

*Universities in the national innovation systems: Asia Pacific diversities, by Venni V. Krishna*

Different national innovation systems in the Asia Pacific region have given rise to varying roles of universities. Universities in S E Asian countries and India continue to play a traditional role of teaching and generating human capital. Whilst universities in Singapore, Taiwan and Japan, are being transformed as entrepreneurial universities, there is evidence of new geography of innovation emerging in form of Melbourne Biomedical Innovation. At the same time, Australian universities have been quite successful in exporting higher education to the Asian region. This paper brings out diverse innovation landscapes surrounding universities in the Asia-Pacific region.

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Dr Belinda Gibbons

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## Eco-innovation fundamentals and university student engagement with business

The environmental 'sustainability transition' is one of the greatest societal challenges of our age. It presents huge opportunities for radical innovation in firms and production systems as well as for universities in training the next generation of senior managers. The paper first reviews how innovation approaches to environmental sustainability have evolved over time. On the one hand, proponents of a 'steady state economy' are too dismissive of the contribution of innovation – both technological and organisational – speaking unfavourably of the 'technical fix'. On the other

hand, despite over 30 years of research on innovation systems, the innovation management community still fails to recognise the centrality of the sustainability imperative for the management of innovation. Second, the paper gathers appropriate ambitious goals for innovation in contributing to the solutions of complex problems in business sustainability. Lastly, using these goals, we assess reflective comments from final year undergraduate business students for their awareness of the role of 'eco-innovation' in achieving sustainability. We find that, while students show a good understanding of business sustainability, corporate responsibility and innovation aimed at 'eco-efficiency', they undervalue the opportunities for long term, radical and collaborative eco-innovation at the industry sector and system levels. These findings carry profound implications both for industries and education. Business innovation should have as its primary concern the advancement of environmental sustainability; while universities must do more to train management professionals to carry through the sustainability transition.

### Biography

**Samuel Garrett Jones** holds a PhD from the Australian National University, a MSc in the Structure and Organization of Science and Technology (Manchester) and a BSc Hons. (Southampton). Sam's research and experience is in public sector management and particularly in science, technology and innovation policy development and administration. Sam has taught innovation management and entrepreneurship at undergraduate and postgraduate levels. He supervises five PhD students working on various aspects of the management of technology and innovation systems and organisations. Sam has research publications on the dynamics of the higher education research system and university-industry collaborative linkages in Australia, on evaluating the outcomes of research, and on quantifying innovation and knowledge flows. He was co-holder of an ARC Discovery Grant 'Managing Risk in Cross-Sector R&D Collaboration'. Sam has undertaken commissioned research on science and technology policy and management issues for major clients in Australia, Thailand Malaysia and Indonesia and other countries and for international organizations including UNESCO, the World Bank, Asian Development Bank, OECD, AusAID and ASEAN. He co-edited a book on *Innovation, Technology Policy and Regional Development: Evidence from China and Australia*.

**Belinda Gibbons** is a permanent lecturer in the University of Wollongong, Faculty of Business and coordinates the final year undergraduate capstone subject, in which students engage in a web-based simulation designed and developed during her thesis. Recognition of her achievements include being inducted as a Fellow of the Wollongong Academy of Tertiary Teaching & Learning Excellence (WATTLE), and receiving a Faculty team award for Outstanding Contribution to Teaching and Learning. She was also privileged to be asked to deliver the graduation ceremony address for University of Wollongong business students in July 2015. More recently, Belinda has been given a Citation for Outstanding Contributions to Student Learning, formerly known as an OLTC Citation. These citations are a part of the Australian Awards for University Teaching and are a national award at the highest level.

Dr Gaofeng Yi

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### Process mechanisms for academic entrepreneurial ecosystems: Insights from a case study in China

This research explores how a research university develops its academic entrepreneurial ecosystem (AEE) through building up process mechanisms, thereby improving the academic entrepreneurship efficiency. We propose an individual-organization-environment-process model, which we illustrate with the case study of Zhejiang University. Our findings pinpoint the importance of identifying the three basic mechanisms driving the AEE model, incentive, collaboration and capability mechanisms. The incentive mechanism is the driving force that could change the organizational framework, as well as individual research goals through the reform of the personnel assessment system and the entrepreneurial income distribution system. The collaboration mechanism is the vehicle of the AEE model that enables new entrepreneurial models and business start-up by improving university's governance structures and building up entrepreneurial networks. The capability mechanism is the element for sustainable academic entrepreneurship through a combination of different entrepreneurial capabilities in a university.

## Biography

**Gaofeng Yi** has more than 15 years teaching and research experience in the broad field of business and innovation studies. He carried out a large project on the role of universities and on innovation in Project 985. He is the dean of the School of Business and Associate Professor at Yancheng Normal University, P.R. China. He obtained his PhD degree in Management in 2010 from Shanghai Jiao-tong University. In 2016 he was a visiting scholar at Alliance Manchester Business School in the University of Manchester. His research interests include academic entrepreneurship and technology transfer which he has been involved in various research projects in these research fields.

Dr Russell Thomson

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University of Technology

## Corporate and university links in advancing basic science: 2004–2014

Many large companies publish research in peer-reviewed outlets. However, severe limitations means that little is currently known about the contribution of corporate science to advances in basic science, the motives of firms involved, or the economic impact of this activity. In particular, anecdotal evidence suggests that the extent of corporate-university collaborative research is expanding as universities are increasingly driven to engage with private sector actors to secure funding and show economic impact. We provide a systematic view of corporate science by matching publications in the Web of Science (WoS) to firm-level financial information for all large US corporations in the Bureau van Dijk Orbis database. To match the datasets, we use a novel decision tree algorithm incorporating Leventhal string similarity scores, shared keywords and corporate address information. The data reveal that more than six percent of all peer-reviewed science produced in the United States over the last 10 years are attributed to corporate partners, about half of which is the product of corporate-university collaboration.

## Biography

**Russell Thomson** specialises in the economics of science technology and innovation. He has published in leading international journals including the Review of Economics and Statistics,

Strategic Management Journal and American Journal of Agricultural Economics. In addition to academic research Associate Professor Thomson regularly undertake applied policy research for clients including the Department of Industry, Innovation and Science, Foreign Affairs and Trade and the Victorian Department of Treasury and Finance. He holds a PhD in Economics from Australian National University and a BSc (Mathematics) from the University of Melbourne.

Dr. V. V. Krishna

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## Universities in the national innovation systems: Asia Pacific diversities

Universities and HEIs in the last fifteen years have come to occupy an important part in the national innovation systems (NIS) which is a complex of ‘all important economic, social, political, organizational, institutional and other factors that influence the development, diffusion and use of innovations’ (Edquist 1997). From a broader perspective, universities, together with public R&D labs and science agencies, public policies (on industry, research, innovation and higher education, etc.) and business enterprises are now considered as important actors in the NIS of Asia Pacific economies. The rise of Asia in the global knowledge based economy in the last decade and half from mid 1990s is closely associated with the rise of knowledge institutions of higher learning and scientific research output.

Every Asia-Pacific country embraced and introduced policies relating to innovation in varying forms. Consultancy and collaborative links with industry being traditional forms of engagement, new policy and institutional measures in technology transfer and innovation to engage with society and business enterprises are gaining prominence. Policies for incubation, start-ups and spin-offs, technology transfer offices (TTOs) and science and technology parks have gained tremendous prominence in the leading Asia Pacific universities.

Different national innovation systems in the Asia Pacific region have given rise to varying roles of universities. Whilst universities in S E Asian countries and India continue to play a traditional role of teaching and generating human capital, there are countries such as Singapore, Taiwan and Japan, where in, universities are being transformed as entrepreneurial universities. Science and

innovation policies in these countries have orchestrated the goal direction of universities as frontiers of innovation. Universities in Australia and New Zealand have so far been quite successful in marketing higher education to Asian neighbouring countries. They have in recent years begun to embark on innovation and commercialisation of research.

### Biography

**Venni V. Krishna** is currently Professorial Fellow, FASS at the University of New South Wales, Sydney, Australia. He has a PhD from the University of Wollongong, Australia and has more than 30 years of research, teaching and consultancy experience in science and technology policy studies, history and sociology of science and technology, innovation studies and science, technology and developing world in leading academic and research institutions in India, Australia, Singapore, China and Canada. He was Professor in Science Policy and Chair, Centre for Studies in Science Policy, School of Social Sciences, Jawaharlal Nehru University, New Delhi for more than 20 years. He held visiting faculty positions at the National University of Singapore; McGill University, Montreal, Canada; Maison des Science De l Homme, Paris; United Nations University, Japan; Western Sydney University, Sydney and Tsinghua University, Beijing. Over the years, he published over 40 papers and five books which include: *Science, Technology and Diffusion of Knowledge: Innovation Systems in Asia-Pacific* (Edward Elgar 2007); *Scientific Communities in the Developing Countries*, (Sage 1997). His latest book is on *Universities in the National Innovation Systems: Experiences from Asia Pacific* (Routledge 2017) He is Editor-in-Chief of ranked international journal *Science, Technology and Society* (Sage). He was member of various expert committees and been consultant at UNESCO, OECD, ILO and other international agencies. He contributed to World Science Report 1998 and UNESCO Science Report 2005, and to the ILO in 2001 for its programme on the informal sector. He served as expert on European Research Council's Grand Challenges and European Union, Brussels, based networks on research and innovation policies since 1990s.

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## The role of understanding in science

### Patrick McGivern

Coordinator

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University of Wollongong

Recent work in philosophy of science and epistemology has focused on the idea that 'understanding' forms a unique epistemic category, distinct from both knowledge and explanation. This session explores recent accounts of understanding in this sense, examining some of the factors that promote understanding and evaluating some possible applications of a theory of understanding to problems in scientific reasoning.

Patrick McGivern

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### Toy models and understanding

Many sciences make use of drastically simplified 'toy models', such as the Schelling model of residential segregation. A key problem in account for the use of such models is to make sense of how they can be informative despite their drastic simplifications. A prominent suggestion is that such models can be used to develop understanding, rather than providing genuine explanations. The idea behind the suggestion is that understanding is a unique epistemic category that is not-factive: understanding a particular phenomenon doesn't require an account of how that phenomenon actually developed, but instead requires some other kind of information, such as information on essential features, counter-factual behaviour or something similar. Obviously, the value of this suggestion depends on how the plausible the associated account of understanding is: some accounts might work well in everyday epistemology, but might not apply properly to cases of scientific modelling. Accordingly, in this paper I assess this suggestion about how to understand toy models by evaluating it with regard to several prominent accounts of understanding from recent epistemology.

### Biography

**Patrick McGivern** is a Senior Lecturer in Philosophy at the University of Wollongong. His research focuses on problems of modelling and

explanation in science, in particular within physics.

Jarrah Aubourg

University of Wollongong

### **An exploration of understanding in thought experiments**

Historically, most accounts of thought experiments have focused on their ability (or inability) to generate to new knowledge. This preoccupation with knowledge is likely a result of the traditional focus on the value of knowledge by epistemologists. However,

these accounts, whilst interesting, often stray from what is significant about thought experiments. For instance, reducing them to forms of traditional argumentation strips away their characteristic narrative features (see Norton 2004). Given the contemporary shift in epistemology away from knowledge as the primary epistemic good of value, we now have motivation to explore other possibilities for thought experiments. To this end, our paper will explore the possibility that thought experiments play a valuable epistemic role by increasing our understanding of phenomena, concepts or theories. We will work from the assumption that thought experiments do increase understanding and then ask which model of understanding would best account for this. Our observation is that if thought experiments do increase understanding, then this is intrinsically tied up with their narrative features.

### **Biography**

Jarrah Aubourg is a PhD student in philosophy at the University of Wollongong, writing a thesis on the role of narrative in thought experiments. His research interests include narrative approaches to medicine and therapy, and the place of narratives in promoting understanding.

Nicolle Brancazio

University of Wollongong

### **Situated understanding and the epistemic relevance of diversity**

Epistemic virtues are those virtues that specifically aid in the production of knowledge. While diversity is often seen as a group epistemic virtue, arguments in support of epistemic diversity tend to focus on moral and political issues, such as compensation for epistemic injustices (Fricker 2007) and filtering of problematic biases (Antony 2016). Drawing from work in the cognitive

sciences, particularly work on ecological psychology (Gibson 1979, Rietveld 2014) and embodied coping (Dreyfus 2014), I will present here some reasons for thinking that group diversity itself can be epistemically valuable because it increases a group's ability to understand particular phenomena which, in turn, enhances knowledge production processes.

### **Biography**

**Nicolle Brancazio** is a PhD Candidate at the University of Wollongong, working at the crossroads of standpoint epistemology and the philosophy of cognitive science. Her research is focused on understanding the influence of social norms on cognition.

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## **Working from the Ground Up: Doing difference in collaborative research in Northern Australia**

### **Michaela Spencer**

Coordinator

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Charles Darwin University

A commitment to collaborative research between Western and Indigenous knowledge authorities throws up interesting challenges for both. Presenters in this panel draw material from a number of current research and education projects in northern Australia where Indigenous researchers and knowledge authorities work alongside government staff, service providers, scientists and social scientists.

Within the collaborative research undertaken by such diverse participants, differing epistemic traditions frequently come to the fore and demand careful attention. For example, in research where the careful production of scientific facts for policy development, may also seek to connect with and support the re-production of ancestral songlines; or in practices of natural resource management where species monitoring may, or may not, also involve the careful re-inscription of patterns and practices of Indigenous authority.

Within such collaborative research practices, attending to the performance of multiplicity in knowledge-making can be read at once as a practical, analytic and political act. By sticking close to the mundane and everyday practicalities of

‘doing difference while going on together’ (Verran, 2001), the papers in this panel ‘focus up’ means of working within and between knowledge traditions, proposing such work as an important but often under – recognised mode of collaborative epistemic practice.

**Chair:**

Michaela Spencer, Northern Institute, Charles Darwin University

**Panellists:**

Yasunori Hayashi, Yolŋu Studies Coordinator and PhD Candidate, School of Indigenous Knowledges and Public Policy, Charles Darwin University

With George Milaypuma and Leonard Bawayŋu, Traditional Owners, Milingimbi Community, Arnhem Land

Jennifer Macdonald, PhD Candidate and Research Associate, Research Institute for Environments and Livelihoods and Northern Institute, Charles Darwin University

Matthew Campbell, PhD Candidate and Research Associate, Northern Institute, Charles Darwin University

Greg Williams, Associate Head of School and PhD Candidate, School of Indigenous Knowledges and Public Policy and Northern Institute, Charles Darwin University

**Panel presenters and presentations:**

This proposed session is comprised of practitioners who have been involved in collaborative knowledge work with Indigenous co-researchers for many years. Moving from the field to academia, these practitioners are now beginning to draw on (and potentially contribute to) STS toolkits and modes of analysis within their PhD studies.

Yasunori Hayashi (*Yolŋu* Studies Coordinator, Charles Darwin University) with George Milaypuma and Leonard *Bawayŋu* (TO’s Milingimbi)

**‘Doing Incommensurability, not interdisciplinarity: Cross-cultural management of freshwater on Milingimbi Island’**

Presenting collaboratively with two Yolŋu Traditional Owners from Milingimbi Island, this paper uses the instance of a recent water management project to articulate differences in

knowledge practices that are being proposed by scientists and Yolŋu knowledge and culture authorities in Milingimbi. Responding to the insistence by Yolŋu that scientific and Yolŋu epistemic practices are radically different and cannot be integrated, these presenters ask how collaborative work might still be achieved.

Jennifer Macdonald (PhD Candidate and Research Associate, Charles Darwin University) (co-authored with Beau Austin, Charles Darwin University and CSIRO, who will not be attending)

**‘How to do the work of working together: Theorising situations of radical difference to mobilise multiple knowledge systems’**

Building on the notion of working with and through different epistemic commitments held by Indigenous and non-Indigenous land managers, this paper draws attention to moments where this may arise in collaborative knowledge work, and the implications for responsible and responsive research practice.

Greg Williams (Senior Lecturer and PhD Candidate, Charles Darwin University)

**Our work in in-between spaces: Paying close attention to the stories we tell ourselves and others**

Responsible research practice necessitates a concern for modes of analysis, representation and a willingness to engage in negotiation around shared understandings in alternative and new spaces for practising research. This presentation opens up questions around the practices and politics of research in relation to knowledge as storytelling, a narrative mode that acknowledges and values difference.

Matthew Campbell (PhD Candidate and Research Associate, Charles Darwin University)

**Ground up methods**

This final presentation details a ‘Ground-Up’ approach to research and analysis. Offering a more meta-account than the other papers on the panel, it outlines this approach as something that can be recognised within the other presentations, and takes the opportunity to elaborate further.

# Workshops

## From the ground up, indigenous knowledge, performance and technology

**Georgine Clarsen**

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Associate Professor of History at the  
University of Wollongong  
Coordinator

### Presenter names and paper titles

Dr Prudence Black

Department of Gender and Cultural Studies,  
University of Sydney

### Indigenous knowledges and the aviation industry

This paper starts with a black and white photograph of a group of people at Daly Waters in Central Australia, c. 1936. It is a jolly shot with everyone laughing including the two Indigenous Yangman elders, one smoking a pipe and the other holding a spear. Daly Waters was an important aviation stop on the Imperial Route between Australia and the UK. Indigenous labour, usually young men, was used to help fuel the planes and provide general help at the Daly Waters Hotel as the planes landed and departed. While much has been written about the 'pioneering' movement of white Australians across the continent, this paper aims to get to an aspect of the essential infrastructure making it possible, in this case how Indigenous Australians were used not only as available labour, but also for their specific expertise about the terrain, the supply and movement of water and specific knowledge of weather patterns.

### Biography

**Prudence Black** completed her PhD in the Department of Gender and Cultural Studies at the University of Sydney in 2009. The research formed the basis for the award-winning book *The Flight Attendant's Shoe* (NewSouth Books 2011) which is a design and cultural history that uses the flight attendants' uniforms to chart the links between the Australian fashion and textile industry

and versions of Australian nationalism, militarism, cosmopolitanism, and the corporate world.

In 2012 Prudence was awarded an ARC Discovery Early Career Researcher Award for, "A Modern Profession: The Australian Flight Hostess 1936 to 1984" and *Smile, Particularly in Bad Weather: The Era of the Australian Airline Hostess* (University of Western Australia Press 2017) is a result of this project.

Prudence has taught courses in the areas of cultural studies, fashion, industrial design, design history and theory at the American University of Paris, the University of Sydney, the University of Technology, Sydney and the University of New South Wales. As well as her academic roles she has worked at the Powerhouse Museum and the Australian Museum as an assistant curator and researcher for exhibitions about Australian popular culture, fashion, design and Indigenous culture.

Current research projects include a study of occupational dress for disadvantaged and incarcerated women re-entering the workforce, the Australian fashion industry in the 1960s and the history of the marketing and promotion of wool in Australia.

Along with her academic work she has had consultancies with Pacific Brands, Knitters' Guild NSW, Centre for Olympic Studies, University of NSW, Department of Foreign Affairs and Trade, Australian Museum Business Services and Global Campus Management.

She is a member of the [Gender and Modernity Research Group](#), the Australian Fashion Studies Network, the [Global Aviation Research Network](#) and the [Hawke EU Centre: Aeromobilities Network, University of South Australia](#). In 2017 she had a Visiting Research Fellowship at the Saxo Institute, University of Copenhagen.

Georgine Clarsen

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Associate Professor of History at the  
University of Wollongong

### Black as: Performing indigenous difference

The Australian criminal justice system has always criminalised Indigenous difference and performances of ongoing Indigenous sovereignty. This is particularly marked in the case of young

men, who are increasingly demonised and incarcerated in both juvenile and adult prisons at disproportionate rates. Driving-related offences constitute one of the key areas in which young Indigenous men come to the attention of the criminal justice system.

This paper considers an Indigenous expression of automobility as documented in *Black As*, a 24-episode TV series shot in an Aboriginal outstation near Ramingining, Arnhemland, about 600 km east of Darwin.

This anarchistic and comic docudrama challenges and disorients settler presumptions of life in remote Aboriginal communities and offers an alternate angle of vision on the cultures of automobility that have been so central settler power across the Australian continent.

### Biography

**Georgine Clarsen** is an Associate Professor of History at the University of Wollongong ([http://uowvivo.uow.edu.au/individual/georgine\\_clarsen](http://uowvivo.uow.edu.au/individual/georgine_clarsen)). Her research has focused on settler colonial mobilities in Australia as a distinctive constellation of mobility practices as well as histories of automobility as raced and gendered practices. She is a founding editor of the journal *Transfers: Interdisciplinary Journal of Mobility Studies* (<http://journals.berghahnbooks.com/transfers>), and editor of the book series *Explorations in Mobility*, both published by Berghahn Press (<http://www.berghahnbooks.com/series/explorations-in-mobility>).

Adam Gall  
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### Mining, cinema, indigeneity: Indigenous knowledge and histories of resource extraction in *Where the Green Ants Dream* and *Goldstone*

Mining in the Australian context is a politically overdetermined practice: it involves not only the whole complex of issues around land rights and Native Title, but also threatens large scale environmental degradation and contributes to global processes such as climate change. Contradictory forms of knowledge and practice are assembled and disassembled at mining sites, too, including geological science, local knowledge of country and competing forms of land management. This unstable political terrain means that the cultural representation of mining histories is especially fraught.

This paper considers two examples of these representations on screen—Werner Herzog’s *Where The Green Ants Dream* (1984) and Ivan Sen’s *Goldstone* (2016). It uses these exemplars of what Jane Mills refers to as “sojourner cinema” as sources for a contemporary history of mining environments and of Indigenous knowledge of mining practices on country in Arnhem Land and Western Queensland. By looking at the diegetic elements and the contexts (social, political and environmental) for each film’s production, it will contribute to a history of mining that incorporates Indigenous knowledge and media representation.

### Biography

**Adam Gall** is a Sydney-based researcher who works in the areas of Australian studies and cultural studies. Adam teaches environmental history and ecocriticism at NYU, Sydney. His research looks at attachment and political commitment in southern settler-colonial environments.

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## Reproducibility and open science

### Fiona Fidler

Coordinator  
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University of Melbourne

Concern over the reproducibility of scientific results is not new. However, large scale meta-science projects to empirically evaluate how often published results can be successfully replicated are relatively new. An early example is The Reproducibility Project in Psychology which ran from 2010–2015 (OSC 2015). In that project a group of 270 psychological scientists directly replicated 100 published experiments and found that less than half produced the same results as the original. Following a similar model meta-science studies have been conducted in other fields too – cancer biology, biomedicine, economics – with equally disappointing results. These low reproducibility rates have raised questions about publication biases and other perverse incentive structures in science that may be encouraging a proliferation of false positives in the published literature. In this session Steve Kambouris’ talk presents the case (made across a number of disciplines) that two factors publication bias towards novel and large effects as well as low statistical power in many study designs are direct



contributors to the current failures to reproduce accepted results and the resulting replication crisis in science. Outright scientific fraud accounts for a very small (though alarmingly increasing) proportion of irreproducible results. However as Hannah Fraser's talk will explain milder socially acceptable but questionable research practices contribute to inflated effect sizes and produce false positives. Fraser will present results from a recent survey to assess how widespread such research practices are amongst ecologists and compare these to previous similar surveys in other disciplines.

Others studies have revealed that outside such large scale meta-science projects direct replication of research is very rare. In psychology approximately 1 in every 1000 papers published is an attempted direct replication of previous research (Makel et al 2012). In ecology it's closer to 1 in every 2000 (Kelly 2017). The vast majority of published findings never face the direct replication challenge. The extent to which they may be conceptually replicated or otherwise corroborated remains largely unevaluated. Ashley Barnett's talk explores how scientists (again ecologists) think about different types of replication and the epistemic roles they play in sciences. He will also present results from recent surveys and interviews on this question. The recently formed Open Science movement advocates radically increasing the transparency and sharing of scientific methods materials data and code. Associated initiatives like public pre-registration of experimental design and planned analysis before data collection represent radical changes to the way much of science operates.

## References

- Open Science Collaboration (2015). Estimating the reproducibility of psychological science. *Science*, **349**(6251), aac4716.
- Makel, M., Plucker, J.A., & Hegarty, B. (2012). Replications in psychology research. *Perspectives on Psychological Science*, **7**(6), 537-542.
- Kelly, C. (2017). Do Behavioral Ecologists replicate their studies? Ignite presentation at Ecological Society of America: July 2017, Portland, Oregon, US.

## Presenter names and paper titles

Ashley Barnett

### Is replication necessary in ecology?

So little replication takes place in science that it makes you wonder if it is really necessary, especially in sciences like ecology where close replication studies are very difficult? This paper presents the results of interviews and surveys of ecologists on this issue.

Hannah Fraser

### Questionable research practices in Ecology and Evolutionary Biology

Questionable research practices (QRPs) present a barrier to transparency in science in general and to efforts to reproduce results in particular. This paper introduces QRPs and presents survey results showing their prevalence in ecology and evolutionary biology.

Steven Kambouris

### The replication crisis in science: How do publication bias and low statistical power contribute?

This paper presents the case (made across a number of disciplines) that two factors, publication bias towards novel and large effects, as well as low statistical power in many study designs, are direct contributors to the current failures to reproduce accepted results and the resulting replication crisis in science.

## Paper abstracts

Ashley Barnett, "Are replication studies necessary in ecology?"

The ability to replicate another scientist's study is often said to be what separates science from other types of research, but as so little replication takes place, is it really necessary, especially in sciences like ecology where close replication studies are very difficult? If replication studies are not needed, what fulfils the same the epistemic role that replication studies were thought to play? We asked ecologists what they thought about the role of replication studies in interviews and surveys and in this paper I discuss the adequacy of the arguments presented in favour or against replication and the insights gained into how ecologists decide which research can be trusted.

Hannah Fraser, “Questionable research practices in Ecology and Evolutionary Biology”

Researchers use a range of tricks to make results seem more significant or novel than they are. These tricks mean that these studies are less likely to present a true representation of their study system and are very unlikely to be reproducible. An extreme but thankfully rare example of this is presenting fraudulent data or analyses. However, a number of other practices that are less obviously unethical are prevalent and have similar effects. A previous study (Johns et al, 2012, *Psychological Science* 23, 524–532) showed that some of these ‘questionable research practices’ were highly prevalent in psychology. We recently used a similar methodology to investigate how prevalent questionable research practices are in ecology and evolutionary biology and how acceptable researchers find them. We found that questionable research practices are prevalent in ecology and that these practices persist even though most researchers using them find them unacceptable. Participants indicated that this apparent conflict may be due to pressure (either real or perceived) to publish a short, novel papers filled with statistically significant results.

Steven Kambouris, “The replication crisis in science: How do publication bias and low statistical power contribute?”

The replication crisis in the sciences has highlighted concerns about the quality and reliability of research through repeated failures to replicate published results. A number of reproducibility projects across different disciplines have found that at best, just under 50% of the studies chosen for replication could have their original results reproduced. Publication bias in academic journals has been nominated as a main underlying reason for replication failures; journals have been shown to tend to publish studies with statistically significant results rather than studies with non-significant results. Another contributing factor is the publication of studies with significant results, but low statistical power. Surveys of the literature in psychology and in ecology have shown that on average statistical power is low, well below the threshold of 0.8, which is widely considered to be the minimum required. I show some preliminary work exploring how different levels of statistical power result in the over-estimation of effect sizes in the published literature (which will then be less likely to be replicated), for some simple models of publication bias.

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## HPS Postgraduate Workshop

### Steven Kambouris

Coordinator

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The University of Melbourne

### Session 1 (14:00–15:30)

#### Panel: Research Communities within the HPS/STS Umbrella

**Description:** This is a panel intended to address the diversity of the HPS/STS community, and help postgraduate students place their work in the wider context of the research community, and provide advice on developing an identity as a researcher in such an interdisciplinary environment. The panel includes scholars from different research programs, who have volunteered to share how their own disciplinary and methodological approaches can be located within the AAHPSSS community of researchers (broadly taken to include, without being limited to, historical, philosophical, and/or sociological approaches to studying science and/or technology).

#### Panelists:

- Dr Rachael Brown, Australian National University
- Assoc Prof Richard Hindmarsh, Griffith University
- Dr Nicola Marks, University of Wollongong
- Dr Rey Tiquia, University of Melbourne

### Session 2 (15:45–17:15)

#### Panel: After completion: Careers, Funding and Publication

**Description:** An overview of the options and opportunities after a PhD/Masters in HPS/STS, focusing on advice and answering questions about:

- Funding opportunities available for HPS/STS researchers, and what’s involved in applying
- Career paths in academia post-completion
- Publishing in the diverse and interdisciplinary areas of HPS/STS

#### Panelists:

- Dr Mike Arnold, The University of Melbourne
- Dr Rachael Brown, Australian National University

- Dr Rod Buchanan, The University of Melbourne
- Dr Gerhard Wiesenfeldt, The University of Melbourne

### Networking for postgraduates

An open forum for students to share ideas about how postgraduate students in HPS/STS can build networks with other students across institutions and different conferences, and if there is interest in setting up a such a network (e.g. on Facebook, Twitter), and what functions it might serve for the postgrad community.

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## Bringing dialogue to public engagement in science and technology: A workshop on communicative practices

### Wendy Russell

Coordinator

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Australian National University and University of Canberra

Scholarship on public engagement in science and technology has tended to focus on the institutional conditions for this engagement, including the purposes and politics of initiating public engagement and the questions and framings involved. The roles and dispositions of participants and the connection between engagement processes and scientific citizenship have also been explored. Similarly, deliberative democracy as a field has had a focus on the conditions for deliberation, and the purposes of deliberative forums in influencing political decision-making and wider political discourse. Both fields have tended to neglect or to deride the role of facilitators and to essentialise the communicative skills of facilitators and participants.

Dialogue, as a field, has a focus on communicative skills and practices. It has in common with public engagement in science an emphasis on the uncertainty and subjectivity of knowledge. It shares with deliberative democracy the ideals of reciprocal understanding and truth-seeking. In emphasising the practice and skills of dialogue, it connects with the recent appeals to adopt 'care' as a practice in public engagement in science, and with recent work on the development of a deliberative stance.

This workshop will draw on insights and practices from the Science & Technology Engagement Pathways (STEP) program within the Commonwealth Department of Innovation, Industry and Science (2011 – 2013), and a Science Dialogue course run for the last two years at the ANU. The aim is to bring together HPS and STS scholars, including postgrads, and scientists from various disciplines. In fact, the more diverse the participants, the more interesting the workshop will be. There is potential for the workshop to be opened up to interested members of the wider community. Dialogue methods will be used to explore the role of communicative practice in understanding and practicing public engagement in science and technology and in communicating across academic divides.

Marks, N. J. and A. W. Russell (2015). "Public engagement in biosciences and biotechnologies: Reflections on the role of sociology and STS." *Journal of Sociology* **51**(1): 97-115.

Niemeyer, S.J. and Jennstål, J. (2016) *The Deliberative Democratic Inclusion of Future Generations* In: González-Ricoy, I. and Gosseries, A. (Eds), *Institutions for Future Generations*, Oxford University Press: Oxford.

### Biography

**Dr Wendy Russell** is visiting fellow at the Centre for the Public Awareness of Science at the Australian National University and an associate of the Centre for Deliberative Democracy and Global Governance at the University of Canberra. She is also director of Double Arrow Consulting, a Canberra business specialising in two-way engagement. Previously, she was senior lecturer in the School of Biological Sciences at the University of Wollongong.

As a researcher, Wendy has worked on public engagement in biotechnology and nanotechnology, on technology assessment and transdisciplinarity, and more recently on the impacts of deliberative democracy processes. As a teacher, she has won national tertiary teaching awards and currently teaches a course in Science Dialogue – Theory and Practice at the ANU. As a federal public servant, she managed development and implementation of the award-winning Science and Technology Engagement Pathways (STEP) framework. As a consultant, she has worked with universities, CRCs, governments and government agencies to develop and evaluate communication and engagement strategies and activities. As a practitioner, she designs and facilitates workshops

and events to connect practitioners, researchers,  
policy makers and publics