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Foreword

It is a privilege to welcome you to this year’s ANU Student Research Conference (SRC). The Australian National University acknowledges, celebrates and pays our respects to the Ngunnawal and Ngambri people of the Canberra region and to all First Nations Australians on whose traditional lands we meet and work, and whose cultures are among the oldest continuing cultures in human history. We also pay our respects to all Conference participants who represent First Nations people from countries across the globe.

As one of the world’s leading research institutions, the Australian National University (ANU) is proud to host emerging researchers from across the globe. The Australian National University (ANU) is unlike any other university in Australia. Founded in 1946, in a spirit of postwar optimism, our role was to help realise Australia’s potential as the world recovered from a global crisis. It was envisioned at the time that Australia needed to build our national research capacity as we stepped on to a more complex world.

Our ability to come together to solve complex issues has never been more important. This year’s conference events program has been co-designed by students and staff within a 27 week personal and professional development program. This emphasis on staff-student partnership and co-design offers all ANU undergraduate, Honours and Masters by coursework student a program of conference events which have been designed for students, by students with the support of Engagement and Success staff and teams from across the University. The development of undergraduate research is extensively supported by the ANU, including through the ANU Undergraduate Research Journal and membership of the Australasian Council for Undergraduate Research (ACUR).

I would like to thank the ANU organising team for their incredible effort in standing up this year’s conference. Congratulations to the 2022 ANU Student Research Conference Co-Design Committee (Annabelle Tan Wan Zhi, Anneysha Sarkar, Lerr Wong Wei Lerr, Linda Harvey, Maxine Wu, Natasha Tareen, Rebecca Haller-Trost, Shambhav Gupta, Shashank CG, Srishti and Tina Gopalan).

This year, the ANU Student Research Conference welcomed the inaugural Ambassador team. SRC Ambassadors are previous student presenters who volunteer their time empower prospective and confirmed student presenters to make the most of their SRC experience. This year, SRC Ambassadors Yimeng (Amy) Cheng, Keira Mullan and Sophia Ridolfo have made significant contributions to ensuring that the student voice is at the very centre of SRC, including through the 2022 abstract submission campaign, pre-conference events and more.
I would also like to thank those that have supported the students to this point. Including Dr Andrew Mathieson, Terra Starbird, Bhavani Kannan, Alice Grundy, Anne McNaughton, Associate Professor Chris Ballard, Dr Dan Santos, Emma Rayner, Dr Jenny Davis, Jessica Urwin, Associate Professor Ntina Tzouvala, Dr Phil Norcott, Rebecca Frkic, Associate Professor Ron Levy, Aidan Delaney, Elizabeth Bailey, Emma Gerts, Kanishk Kumar and Sam Cheah.

Congratulations to all student presenters who will be sharing their research with the ANU community at this year’s conference. All student presenters have been successful in a double-blind abstract review process, with many student presenters additionally undertaking a process of feedback implementation for their abstract. Importantly, the majority of students presenting at this year’s conference are presenting their research outside of the classroom for the first time, and SRC is proud to provide a supportive and development abstract submission and presentation pathway for students.

I wish you all the best of luck and I look forward to seeing how your work will ultimately shape our collective future and ultimately solve our enduring, complex issues.

-Dr James Brann

Director, University Experience
Welcome

A warm welcome to the 2022 ANU Student Research Conference!

The 2022 SRC Co-Design Committee are a diverse team of student volunteers who have been working behind the scenes in partnership with staff to design student-oriented events, workshops, graphic design and social media content for this conference. The Co-Design Committee was created to help strengthen the connection between ANU students and how the SRC can best cater to those needs. The behind-the-scenes of this process has been an incredible learning curve, and we are grateful that you get to experience the results of the work we’ve put in. Your participation is an invaluable contribution to this year-long project.

Since April, we have devoted time and effort into achieving a common goal: ensuring that events, graphic design and social media content for the 2022 ANU Student Research Conference are designed by students and specifically catered towards students. Continuous two-way feedback between students and staff, weekly workshops, collaborative discussions and lots of sticky notes helped us to maintain focus on, and achieve, this goal. As a team, our diversity of experiences and backgrounds ensured continued refinement of ideas that eventually became the components of this year’s conference, including the workshops and events, and the graphic design for the events and merchandise.

The opportunity to be on the SRC committee has enriched our student experience and has polished our skills in human-centred design, leadership, teamwork, critical thinking and event designing — competencies which are crucial throughout our years at university. We learnt how to pitch to different audiences, how to channel our individual strengths, interests and experiences into the design process, and how to respond to feedback in a professional setting. These are skills which we may not necessarily develop through our courses, so these human-centred skills complement the knowledge we gain through our studies.

The student experience on the SRC Committee is unique as it is directed by students with guidance from ANU staff members. Accordingly we wish to acknowledge the support from Engagement and Success staff Sarah Walker (Manager), Ash Dowling (Deputy Manager, Student Development), Caitlin MacDonald (Student Leadership and Development Officer), Amelie Cahill (SRC Support Officer), Jason Yip (Student Engagement Officer), Kezia Kartika (International Student Advisor) and Kim-Ling Richardson (Marketing and Communications Officer).
We would also like to acknowledge the teams from across the University who have supported our design process. We wish to especially acknowledge the extensive support provided by the Brand & Marketing Services team (International Strategy and Future Students Division, ANU).

We invite all conference attendees to join us in reflecting on the importance of research right from its beginning at undergraduate level, and in recognising the scope for coursework students to contribute meaningfully to research endeavours. Ultimately, we hope all student conference presenters and attendees gain a sense of belonging in the world of research at ANU.


“From little things, big things grow. By being on the Committee, I have loved seeing everyone’s ‘small’ ideas finally grow into ‘big’ solutions - I have had the most wonderful experience working alongside other members who were just as excited and motivated as I was about making this event run successfully.”

— 2022 ANU STUDENT RESEARCH CONFERENCE COMMITTEE MEMBER
The ANU Student Research Conference acknowledges the generous support of academic staff from across the University who volunteer their time to evaluate and provide feedback on student presentations at the conference.

Ann Smith
Anyao Liu
Audrey Miranda Prasetya
Arunav Kumar
Azmira Janna
Davoud Pourmarzi
Dianna Smith
Maho Fukuno
Mark Wilson
Michael Anenburg
My Tran
Qingbo Sun
Sarah Boddington
Sarah Shafik
Shyam Menon
Subrata Banarjee
The Duong
Tuukka Kaikkonen
Vehia Wheeler
Vrinda Gupta
Yik Ki (Jackie) Ma
Yue Zhang
Keira Mullan

My name is Keira Mullan (they/she) and I’m a currently completing my Honours year in a Bachelor of Arts majoring in linguistics. Research is something I’m very passionate about, my interests involve language documentation and typology. Presenting my research on nominal gender and number in Kufo at ACUR@ANU 2021 was a fantastic opportunity for me to develop my skills in communicating research and hear about all the fantastic undergraduate research being done across Australia and abroad. I’m excited to be able to represent SRC as a student ambassador this year and help to guide and encourage other undergraduate and Masters by coursework students to share and get involved in research.

Sophia Ridolfo

My name is Sophia Ridolfo, a final-year Bachelor of Science (Adv) (Hons) student majoring in astronomy and astrophysics at ANU. I’m very passionate about research, and at an undergraduate level it is a particularly special opportunity to explore something you find interesting and contribute to your field. Currently I am a research assistant in astronomy and astrophysics, and gender diversity modelling at ANU. Presenting my research on star-forming regions in local galaxies at the ANU Student Research Conference in 2020 and ACUR@ANU 2021 was a fantastic opportunity for me to develop my skills further in communicating my research. I also had the privilege of sharing my experiences in undergraduate research with my supervisor in a keynote address at ACUR@ANU 2021. As a SRC Ambassador, I am excited to continue sharing my experiences in undergraduate research and encouraging students to get involved and share their research at the ANU Student Research Conference this year!
My name is Yimeng Cheng, a final-year Bachelor of Psychology (Honours) student at the ANU. As one of the Ambassadors for the Student Research Conference (SRC), my role is to share my experience with presenting at ACUR@ANU (an international undergraduate research conference hosted by ANU in 2021) and specifically to share general tips and advice based on my experience.

As an international student myself, I am keen to help those from different cultural backgrounds find their passion in research. Currently, I am investigating topics in judgement and decision-making domain. However, during the last few years of my undergraduate studies I have been involved in various research projects in social and clinical psychology.
Annabelle Tan

I am Annabelle Tan, a member of the Program Design team and a current undergraduate student pursuing a Bachelor in Science, with aspirations to become a future litigator. I deeply enjoy being actively involved in opportunities to expand my worldview through integrating with peers of a similar future-oriented mindset with a collective interest in empowering ourselves, our communities and advancing the world we live in. When I am not involved in avid informal research into academic papers I can be found hiking, running, practising the cello or at weekend brunch with my nose buried in a good book.

Anneysha Sarkar

Anneysha is a Program Designer on the 2022 ANU Student Research Conference Co-Design Committee and a first year Bachelor of Advanced Computing (Honours) student.

Lerr Wei Wong

Hi, I am Lerr from Malaysia! I am currently in my first year second semester studying the Bachelor of Applied Data Analytics at the ANU. This year, I joined ANU SRC Co-Design Committee as part of the graphic designer team to develop a visual solution for the conference. As a graphic designer, inquisitive and creative are my adjectives. I enjoy the process of exploring, creating and innovating ideas. I identify problems that need solutions and develop new solutions to address the existing problems. What really drives me is design always starts with a blank in the beginning. Finally, I see myself furthering my design skills and improving my self-confidence in 27 weeks from SRC!
Linda Harvey

My name is Linda Harvey. I’m currently completing my Honours year in Psychology at the ANU, conducting research on young people’s experiences of climate anxiety. Besides working with the SRC on the graphic design team, I am currently on the executive team of the ANU Psychology Society as a Media Officer, creating graphics for our events as well as designing our merch. I am passionate about art and am looking forward to engaging in this creative endeavour. I am very excited to have the opportunity to build my design skills while working with this wonderful team.

Maxine Wu

Hello! My name is Maxine, and I am currently a first year undergraduate student who is studying a Bachelor of Philosophy (Science), majoring in chemistry and psychology. As an avid first-year student with many interests, I am currently invested in a variety of societies, from sports like rowing and Quidditch, to organisations such as Effective Altruism and the FOCUS group on campus. As an undergraduate student who plans to pursue research throughout my degree, I am very passionate about the value research has for the individual as a means that can broaden one’s educational experience, as well as its impact within greater society. Within the SRC Committee, I am working as a Social Media designer, which is role that strongly aligns with my previous experience as someone who has creative interests in graphics and film.

Natasha Tareen

Hello! My name is Natasha Tareen, and I’m a third year Business Administration student at ANU, with a minor in Middle Eastern and Central Asian Studies. I have been involved in designing graphics as Marketing Officer for the ANU Middle Eastern Studies Association, as well as editorial pieces for Woroni, and I am now fortunate enough to be a part of the Student Research Conference team as a graphic designer! Getting the opportunity to work with a team to produce the most optimal solution for the conference deeply aligns with the passion I have for continuing to create, alongside others with incredibly valuable insight. Outside of ANU, I love to paint, as well as building nanoblocks and aquariums.
Rebecca Haller-Trost

Hi everyone! My name is Rebecca, and I am currently completing my double degree in Commerce/Arts! Beyond studying, I am currently on the executive committees for two ANU societies and I am undertaking two internships. I am also in the process of securing an undergraduate research internship with the ANU and I am very excited to work under prestigious academics and professionals! I enjoy creative outlets such as graphic design, creating short films and writing music on my piano. As I am passionate about learning, it gives me great pleasure to have the opportunity to collaborate with this amazing team to develop and implement solutions that will engage and educate undergraduates about the importance of research!

Shambhav Gupta

Shambhav Gupta is a Program Designer on the 2022 ANU Student Research Conference Co-Design Committee and a first year Bachelor of Business Administration/ Bachelor of International Security Studies student.

Shashank CG

Hi! My name is Shashank (Shash). Currently in the first year of the Master of Business Information Systems program at the ANU. My deep appreciation for research and willingness to help other students in understanding the importance of research inspired me to be a part of SRC. I’m delighted to contribute as a graphic design team member and collaborate with such a creative and diverse team, which will help me hone my design skills as well. I aspire to venture into product management after my graduation. In my free time I read about psychology, I run and enjoy motorcycling a lot.
Srishti

Srishti is a Program Designer on the 2022 ANU Student Research Conference Co-Design Committee and a second year Bachelor of Law student.

Tina Gopalan

Hey there, I am Tina Gopalan from Malaysia currently completing an honours in biology. I’m working on greater gliders and hoping to make a positive impact in conserving them! I am a strong believer that no matter how small your work is towards a common goal, it is still as valuable as the goal itself. I enjoy playing futsal, board games & much more. I feel that research provides us with a plethora of knowledge and wisdom to learn from. I aspire to delve into it as well as collaborate with peers to make the world a better place one step at a time no matter how small my contribution may be. In terms of the SRC, I am part of the program designer team and I hope that the conference ignites meaningful conversations and inspires us all!

The SRC Co-Design Committee is a voluntary professional and personal development opportunity in which students are supported by staff to develop a conference experience designed by students, for students. Using a human-centered design process, the Co-Design Committee works in partnership with staff over 27 weeks, from April to October. The result is a research conference which reflects the perspectives, input and creativity of students in its fundamental design and delivery.
Tina has started her career journey working on the rights of LGBTIQ+ communities in Ukraine. The NGO where she worked supported LGBTIQ+ communities on the South of Ukraine and engaged in work with UN on the rights of lesbian and bisexual women. Then displacement from Ukraine interrupted Tina’s career trajectory. Tina and her partner Renee ended up in Australia where with no local experience even getting a lowest-paid job was a challenge. In her speech Tina will reflect on rebuilding a career as a displaced queer woman and share her learnings from working in academia and social policy where she made it a rule that lived experience and community accountability must be central to that work.

Speaker biography:

Tina Dixson is a final year PhD Candidate at the ANU researching the lived experiences of queer refugee women. Her most recent publication includes a co-authored chapter on the meaning of silencing of LGBTIQ+ displacement narratives published in the forthcoming book Queer Sharing in the Marketized University by Routledge.

In her career, Tina has worked in the areas of LGBTIQ+ rights, violence against women rights in Ukraine and Australia. Previously, Tina was a co-convener of the Queer Displacements, the first Asia-Pacific conference on LGBTIQ+ displacement and co-founder of the Forcibly Displaced People Network, the first Australian LGBTIQ+ refugee-led organisation. Currently, Tina works for the ACT Government Office of LGBTIQ+ Affairs.
Crossing the Divide: Research Communication Workshop

2pm-3pm Wednesday 14 September 2022

In-person | Level 6 Marie Reay Teaching Building

Have you ever wondered how you could use your undergraduate, Honours or Masters (coursework) research to create positive change, long after you have submitted your assignment or thesis? Perhaps your coursework is technical, jargon-heavy or very specific, and you’re not sure how to communicate it beyond your course or degree. This practical, interactive workshop facilitated by experienced research communicators welcomes undergraduate, Honours and Masters (coursework) students from all academic disciplines. Whether you want to better communicate your undergraduate study to friends and family, are keen to present at conferences, or are interested in undertaking further Honours, Masters or PhD research, this workshop will provide practical tips and tricks for articulating what you are studying and why it matters. Registrations are essential, and places are limited!
Charbel El-Khaissi is a doctoral student at the ANU. His research on the Aramaic language draws on sophisticated linguistic technology to understand how language evolves over time. He is presently a consultant for the Department of Education's University Research Commercialisation taskforce, which funds the translation of basic research into innovative applications for Australian industry.

Cynthia Parayiwa is a PhD candidate at the Australian National University and a senior research officer at the Australian Institute of Health and Welfare (AIHW). Her PhD research focuses on using administrative and survey data to explore the health impacts of experiencing a cyclone event during pregnancy. Cynthia's study focuses on cyclones and mothers residing in Queensland, Australia but her interests further include other stressful disaster events, occurring nationally and internationally, that can place a mother under unexpected environmental stress during pregnancy. Cynthia started as a graduate at the AIHW in 2015 and has experience analysing and reporting on government datasets.

Intifar Chowdhury is an Associate Lecturer at the ANU School of Politics and International Relations. Her doctoral research tackles the important question of whether young people are turning away from democracy. It constitutes a quantitative enquiry on advanced democracies using survey data from comparative databases. Prior to this, Intifar obtained a double degree in Science (Biochemistry/Genetics) and International Relations (Honours) at the ANU. Currently, she works as the Senior Survey Research Officer for the longitudinal Post School Destination (GENERATION) Survey, conducted by the ANU Centre for Social Research and Methods in collaboration with the Australian Department of Education, Skills and Employment.
Ivan Vinogradov got his bachelor’s degree in biology at University of Massachusetts, followed by a master’s degree at ANU. Ivan is now on a path to finish his PhD thesis on animal behavior and cognition at ANU. In his research, Ivan tries to understand how age, sex, and environmental factors may affect animal intelligence. Throughout his PhD Ivan worked as a tutor for undergraduate courses, presented at conferences, and participated in university life. Most recently, Ivan developed a biology-themed board game Time to Mate, which was featured on ABC News and Canberra Times.

Jessica Sharmin Rahman is currently working as a postdoctoral fellow in Health Intelligence at CSIRO Health & Biosecurity unit. She completed her doctoral studies in the Human Centred Computing (HCC) group of the Research School of Computer Science at the Australian National University (ANU). She also worked as an academic tutor at ANU. She received her B.Sc. (Hons) degree from the University of Dhaka, Bangladesh. Her research interests include physiological signal analysis, medical computing and human computer interaction. Her talk on her PhD thesis won the people’s choice award in the ANU 3 Minute Thesis (3MT) competition 2020. When Jessica is not running experiments or doing analysis for her research, she can be found performing and competing all around Australia with her dance crews.
Research Careers: Qualities and Inequalities

Keynote Address | 10am-11am Thursday 15 September 2022

In-person | Level 6 Marie Reay Teaching Building

This is a brief talk, followed by a Q and A so we have plenty of time to think together. I give some context to my work and my interests, how (and why) I have approached my career and the lens of quality, relational productivity, and being the difference I want to see (which is the hard bit). This latter seems to me the only authentic way to work in unequal contexts.

Speaker Biography:

Professor Lyndall Strazdins is a leader in work, family and health, authored or co-authored > 150 peer reviewed journal papers, commissioned reports or discussion papers. She has been a lead or co-lead on competitive grants, consultancies and partnerships > $8M, an ARC Future Fellow and awarded the EU Marie Skłodowska-Curie International Fellowship Seal of Excellence in 2017. Her papers have been repeatedly ranked among the top 5 in their year in her field.

Professor Strazdins leads research on time as a determinant of health. Lack of time is the most common reason for not eating healthy food or being physically active and her work shows why time is a problem, and for whom. Most recently she has been using new methods to reveal the health harms of long work hours, which are emerging as one of the most important drivers of social and gender inequality.
ANU Student Research Conference Hack-a-thon

1pm-4pm Thursday 15 September 2022

In-person | Level 6 Marie Reay Teaching Building

Want to do research in a career outside of academia? Interested in collaboratively solving multidisciplinary problems, while networking with employers? The 2022 ANU Student Research Conference hack-a-thon invites you to connect with employers as you collaboratively research and design a solution to a provided problem, and pitch it to a panel of employers. Prior to the conference, you will research and develop your solution as part of a small multidisciplinary team of fellow students. Your research and development will culminate on the day of the hack-a-thon where you will meet employers 1:1 as you put the finishing touches on your solution and network over afternoon tea. The afternoon will conclude with each team pitching their solution to a panel of judges.

Places in this hack-a-thon are strictly limited, and registrations are essential.
Developing Technologies to Protect Australia From Catastrophic Bushfires

Keynote Address | 10am-11am Friday 16 September

In-person | Level 6 Marie Reay Teaching Building

Associate Professor Yebra will talk about her research on technology to prevent catastrophic bushfires, how she got where she is, how she developed personally and professionally throughout her research journey, and how her research is contributing to society. Learn about her and get inspired whether you are or not thinking about pursuing research pathways.

Associate Professor Yebra is a leading expert in remote sensing and bushfire management and the director of the ANU-Optus Bushfire Research Centre of Excellence which aims to develop technological solutions to protect Australia from catastrophic bushfires. She has published more than 141 scientific papers and her research has been recognised through numerous awards, including the Max Day Environmental Science Award by the Australian Academy of Science, the CSIRO OCE Pyne-Scott career award and the Bushfire & Natural Hazards CRC’s Outstanding Achievement in Research Utilization award. She was a finalist for the Australian Space Awards’ Academic of the Year and the National Resilient Australia Award. Marta Yebra has served on several advisory government bodies including the Australian Space Agency’s Bushfire Earth Observation Taskforce and Earth Observation Technical Advisory Group, the Victorian Department of Environment, Land, Water and Planning’s Scientific Reference Panel and the ACT Multi Hazards Advisory Council.
Networking 101 for Coursework Students Workshop

1pm-2pm Friday 16 September 2022

In-person | Marie Reay Teaching Building

Calling all undergraduate, Honours and Masters by coursework students! Do you need to find a research supervisor or mentor, but are not sure how to get started? Perhaps you want to create and maintain connections with academic staff and fellow students, find the opportunities that align with your goals, or brush up on your professional communication skills? This workshop will support you to build your confidence with academic networking. You will hear tips and tricks from experienced academic networkers from a wide range of disciplines, and you will get started on a practical networking strategy that you can implement in your own academic journey. Registrations are essential, and places are limited!
Workshop Presenters

Julie Hotchin is an Honorary Lecturer in the School of History at the Australian National University. She is an historian of the religious and cultural life of medieval Germany, specialising in women's religious communities, manuscript cultures and the history of emotions. Julie returned to research after a career in the Australian Public Service. Her public outreach activities include an oral history of a local landcare group and related conservation activities.

Jennifer Hung is a third year PhD student at The John Curtin School of Medical Research. She studies mRNA translation - the process by which our bodies make proteins from mRNA. She is also a tutor for the Masters course ‘Research Presentation Skills’. Jennifer is passionate about science communication, leading to her winning the 2022 College of Health and Medicine 3 minute thesis competition and earning a place in the University-wide final. Before her PhD, Jennifer studied the PhB (Bachelor of Philosophy) here at ANU, with a focus on biology and medical science, followed by an honours year also at JCSMR.

Sai Campbell is an Honours student at the National Centre for Epidemiology and Public Health looking at public health interventions in infectious disease outbreaks. She conducts research in various roles at the ANU, government, and with the World Health Organization on topics ranging from student equity to health emergencies. She was recently involved in the ANU report on e-cigarette health outcomes which received extensive international media attention. Sai is president and co-founder of the ANU Undergraduate Research Society, the peak body for students engaging in undergraduate research across all disciplines with the aim of broadening accessibility and support. In her spare time, she enjoys trail running with her friends.
Get a taste for academic networking over three mini-courses of afternoon tea, where each course is served alongside a menu of questions to replace those awkward silences with meaningful conversation! You'll connect with students and academic staff including PhD students from a range of disciplines to increase your confidence with academic networking, build useful connections and identify practical steps towards achieving your research aspirations. All undergraduate, Honours and Masters by coursework students are invited—whether this is your first academic networking event or you are an experienced networker. Places are strictly limited, and registrations are essential.
Closing Address and Presentation of Awards

4pm-5pm Friday 16 September 2022

In-person | Level 6 Marie Reay Teaching Building

Join us for the closing address of the 2022 ANU Student Research Conference (SRC) delivered by Vice-Chancellor Professor Brian P. Schmidt. Following the closing address, the Vice-Chancellor will announce the winners of the 2022 ANU Student Research Conference, acknowledge the achievements of the SRC Co-Design Committee and Ambassadors and thank the key supporters of the 2022 Conference. All student presenters, their supervisors, friends, family and supporters are invited to attend. This event is open to the wider ANU community.
Professor Brian P. Schmidt AC FAA FRS

Vice-Chancellor and President, The Australian National University

2011 Nobel Laureate Physics

Professor Brian P. Schmidt was appointed Vice-Chancellor and President of The Australian National University (ANU) in January 2016.

Professor Schmidt is the 12th Vice-Chancellor of The Australian National University (ANU). Winner of the 2011 Nobel Prize in Physics, Professor Schmidt was an astrophysicist at the ANU Mount Stromlo Observatory and Research School of Astronomy and Astrophysics before becoming Vice-Chancellor.

Professor Schmidt received undergraduate degrees in Astronomy and Physics from the University of Arizona in 1989, and completed his Astronomy Master’s degree (1992) and PhD (1993) from Harvard University. Under his leadership, in 1998, the High-Z Supernova Search team made the startling discovery that the expansion rate of the Universe is accelerating. Fellow of the Australian Academy of Science, The United States Academy of Science, and the Royal Society, he was made a Companion of the Order of Australia in 2013.

Emcee | Keira Mullan

Keira Mullan (they/she) is currently completing their Honours year in a Bachelor of Arts majoring in linguistics. Research is something Keira is very passionate about, and their interests involve language documentation and typology. Presenting their research on nominal gender and number in Kufo at ACUR@ANU 2021 was a great opportunity for them to develop skills in communicating research and to hear about all the fantastic undergraduate research being done across Australia and abroad. They are excited to be able to represent SRC as ambassador this year, helping to guide and encourage other undergraduate and Masters by coursework students to share and get involved in research.
Program of Student Presentations
Plasma is a body of ionised gas consisting of free electrons, positive ions and neutral atoms. The presence of electromagnetic waves (e.g. radio wave, microwave) inside a plasma under different conditions (temperature, density, etc) exhibit different behaviours. A particular type of electromagnetic wave of interest is the helicon wave, whose behaviour is not well known. To study helicon waves in the laboratory, a high quality diagnostic device is needed. A Bdot probe is a device that can detect the magnitude of time-varying magnetic fields. It operates based on the principle that a time varying magnetic field can induce electrical currents in a wire. The Bdot probe can be used to study helicon waves in laboratories. The research project consisted of two goals: (1) to create a working Bdot probe that minimises noise pickup and (2) to test the performance of the Bdot probe inside the ECHIDNA linear plasma device of the Space Plasma, Power and Propulsion group at the Australian National University in attempt to measure the presence of helicon waves. With the help of supervisors, I successfully created a working Bdot probe. Testing the probe under a well known system showed great results in the ability to measure time-varying magnetic fields. However, we could not clearly identify the presence of helicon waves when making measurements inside of plasma due to unknown experimental factors and time constraints in identifying those factors. This research has provided experimental advancement of the study of helicon waves at the ANU. The use of helicon waves have been proposed in the design of space thrusters and further study of them could see them being implemented in further applications.

This work was supervised and supported by Prof Christine Charles and Mr Dimitrios Tsifakis of the SP3 group.
Carbon farming is a known catalyst for improving sustainability of rural livelihoods. In Papua New Guinea (PNG), 87% of the population depends on semi-subsistence agriculture for basic income. In light of such staggering statistics, this research investigates carbon calculators for use in PNG coffee, helping local growers to engage with emerging carbon markets. These calculators, also known as carbon budgeting tools, rapidly assess and quantify greenhouse gas (GHG) emissions from agricultural production. They can be linked to verified offset schemes and used as high integrity evidence in offset activities. This has the potential to benefit PNG communities and tackle diverging insecurities of gender equity, tropical biodiversity conservation and climate change. Through a mixed method approach, 41 models were identified using a systematic literature review. Each model was subjected to eight unique exclusion criteria, assessing their appropriateness for PNG smallholder and plantation coffee production. These criteria considered social, cultural, economic, and environmental perspectives, validated by independent experts in Pacific agriculture and carbon accounting. Six models successfully satisfied criteria and were tested on-ground with PNG coffee growers in a validation exercise. Fieldwork concluded no existing model is a perfect fit for the case study, but there is compelling evidence that by engaging with growers, exporters and government agencies, existing tools can be modified to fit the system. As this project is the first of its kind, it is uniquely positioned to help other Pacific island nations accurately quantify emissions from agroforestry sectors, offering them a competitive seat in the carbon-responsible agriculture market.

I would like to acknowledge the incredible support and guidance of my supervisors Dr. Steven Crimp and Dr. Kanika Singh.
Weifeng Tao | The invisible sexual minorities: Queer men's sexuality and identity construction

Queer men, sexuality, asexuality, pansexuality, non-binary, gender fluid, BDSM

Men's sexuality has been a popular topic in academic discourse. Most of these studies examining men's sexuality, masculinity and sexual behaviour are centred around heterosexual and gay men. However, other non-normative male identities and sexual practices remain understudied. This study aims to address the gap by sharing findings on eight semi-structured interviews with Australian and Chinese AMAB (assigned male at birth) interviewees, aged 18-32, who identified as either asexual, pansexual, gender-fluid or non-binary. This research relevels queer men's unique ways of understanding and practising sex and constructing their non-normative male identity. The findings suggest that (1) asexual men tend to question, challenge and resist existing mainstream sexual norms and assumptions around men, trying to unbind themselves from traditional masculinity ideology and construct their unique male identity; (2) Some non-binary and genderfluid participants tend to view sex as a meaningful practice in exploring their genderqueer identity and pursuing their ideal sexual self; (3) In some queer men's understandings and practices of BDSM (bondage, discipline, dominance and submission, sadomasochism), certain BDSM sexual relevant activities are significant in self-exploration or actualisation of their ideal gender or sexual identity. Beyond physical sexual pleasure, they can be linked with personal meaning-making and resistance to traditional gender stereotypes or male ideology.

I appreciate Dr Baptiste Brossard, Prof Mary Rasmussen, Prof Melinda Cooper and support from my parents and my friend Watson.
Matthew MacInnes | Should We Be Overwhelmingly Concerned About the Far Future?

Philosophy; Ethics; Longtermism; Existential Risk; Future Technology; Rights

If humanity becomes extinct, trillions of people who could have had fulfilling lives in the future may never exist. Yet the risk of us causing our own extinction is increasing as our technology becomes more advanced. In addition to existing technologies such as nuclear weapons, advances in areas such as artificial intelligence and synthetic biology could pose an even greater threat to our species. With these things in mind, longtermist philosophers argue that we ought to be overwhelmingly concerned about the far future. They claim that actions which are intended to improve the far future are massively valuable, that these actions will not require us to violate people’s rights, and so we ought to do what is best for the far future. In my research I examine these claims using the methods of analytic moral philosophy. I begin by arguing that longtermists are right about the value of the far future, and explain why common objections to this long-term value thesis fail. However, I claim that they are incorrect about longtermism and rights: in a range of likely scenarios, doing what is best for the far future will require us to violate people’s rights. I then consider two ways in which longtermists might respond to this challenge. First, they might claim that our common understanding of rights is incorrect, and that an alternative theory of rights can solve this problem. Second, longtermists might argue that when the stakes are high, we ought to violate people’s rights if doing so will prevent a catastrophe. I conclude that the second strategy is more promising than the first, but that many questions surrounding longtermism and rights remain unresolved.

I would like to thank my supervisor Garrett Cullity for his support during this project.
Decision makers often need to make judgments based on incomplete information. When new information emerges that cannot be considered a subcategory of prior information, it is referred to as an expansion of existing information. The current study used scenarios regarding COVID-19 treatments to explore whether adding a new treatment option to the existing options alters people’s preference judgement to the existing treatments, or whether it obeys Reverse Bayesianism instead (i.e., the ratio of probabilities assigned to the old categories remains the same after expansion). A sample of 478 UK adults were recruited via an online survey platform, mean age = 45.3 years, SD = 15.6 years. Participants were randomly allocated to conditions where they were either asked to assign probabilities to how much they prefer antibiotics and self-healing (control condition), or assign probabilities to how much they prefer antibiotics, self-healing and a novel antiviral pill (expansion condition); total probability needed to add to 100%. Results failed to support the effect of expansion as no significant difference was found between the ratios of probabilities assigned to the old categories with and without expansion. On the one hand, this could suggest that Reverse Bayesianism holds true; however, a closer look at the data revealed that there were a substantial amount of 0% assigned to the new category, thus leaving the ratio unchanged. Future research could consider using a within-subject design and scenarios where people do not take the options as categorical to further investigate when Reverse Bayesianism holds.

I sincerely thank the help that my supervisor Professor Michael Smithson provided throughout the project.
Reconstructing past oceanic conditions such as seawater temperature is vital to understanding previous climatic changes. Bivalve molluscs are faithful recorders of seawater temperature, encoded as an oxygen isotope ratio (δ18O) value in shell material. The emerging field of aquaculture paleo-thermometer calibration using live specimens provides a critical framework for decoding the oxygen isotope-temperature relationship. This study produced an accurate δ18O versus seawater temperature regression within an ambitious temperature range of 13 to 28 °C, capturing the full habitable range of the bivalve mollusc Anadara trapezia. A new method was developed for obtaining quantitative stable oxygen isotopes in-situ from polished shell aragonite, using the Sensitive High Resolution Ion Micro-Probe (SHRIMP), translating to higher resolution measurements. New shell growth was marked in the shells by a strontium pulse-chase labelling event. This study achieved highly controlled and measured growth conditions, with temperatures held within 0.2 °C between 13-23 °C and 0.6 °C at 28°C. All other parameters were held within similar tight constraints, which has been difficult to achieve previously. This study’s results produced the following regression between the incorporated δ18O in A. trapezia shell aragonite (103lnα) and measured temperature (T °K): 103lnα = 18.45 (±1.44) * 103/T [K] - 32.64 (±4.91) This study produced a new, faithful, and precise aragonite paleo-temperature proxy for Australasian coastal regions. Potential future studies utilising this calibration will further our understanding of previous estuarine conditions. It expands knowledge on δ18O fractionation in aragonite-producing organisms globally and has the potential to improve current local and global climate modelling.

Acknowledgements go to my Lead Supervisor Laura M. Otter, and to my Secondary Supervisor Stephen M. Egging for their tremendous aid throughout the project.
Gender is a fascinating grammatical category that has long interested both linguists and non-linguists alike, and has been the focus of much theoretical and applied study. While in some languages genders are clearly defined and can be easily determined, this is not the case in all languages. This study aims to determine the number of genders in Kufo, a Kadu language from the Nuba Mountains in Sudan. This is the first substantial grammatical analysis of Kufo, and so will provide important evidence needed to understand the broader affiliations and history of the Kadu group, which is largely undocumented, as well as expand our understanding of gender through the complex system Kufo exhibits. This study uses data gathered through linguistic elicitation with a diasporic Kufo speaker to analyse the subject agreement prefixes nouns trigger. Kufo nouns trigger a complex combination of these subject agreement prefixes in their singular and plural forms. This study argues that these combinations represent four genders and nouns are able to change gender between their singular and plural forms, which is in opposition to long standing beliefs that gender is an inherent quality of a noun that does not change when it is inflected.

I would like to thank Haroun Kafi for sharing his language, and my supervisor, Nicholas Evans, for supporting my research.
Sophie Constable | Historical factors affecting post-war social re-integration of Nikkei (Japanese migrant) communities in New Caledonia (NC), Australia and the USA

Pacific history; World War II; Nikkei; New Caledonia; social and cultural identity

Through comparison of the factors supporting post-war social re-integration of ostracized Nikkei (Japanese migrant) communities in New Caledonia (NC), Australia and the USA, this paper seeks to better understand how conflict-related social tensions in transnational settler societies are managed. These three localities are comparable contemporarily and historically: for example, USA, Australia and French NC historically valued Japanese migrant labour, but struggled with racism. All three had territory attacked by Japan in WWII, and experienced war-time atrocities, but sought important relationships with Japan post-war. In all three countries, Nikkei who resisted deportation experienced post-war prejudice. However, post-war American Nikkei communities had a noticeably stronger and earlier public presence than those in NC or Australia. My research identifies three factors contributing to the post-war social re-integration of Nikkei communities in these three locations. Firstly, newspaper reporting of Japanese war crimes in France compared with Australia show a greater impact on society in the Asia-Pacific than in Europe, and in Australia compared with NC. Secondly, the timing of the rallying of NC Nikkei community is congruent with the NC independent movement, and NC Nikkei being largely métis were thus reframed as belonging to a local grouping stigmatised by white colonisers. Lastly, while Japanese-Americans were seen as pro-American because their war service was sanctioned, recognized and promoted, neither New Caledonian nor Australian Nikkei war service has been officially or popularly recognized. Understanding how the post-conflict identity of community groups connected to enemy combatants are reframed to enable re-acceptance by wider society may be pertinent to how ongoing social tensions in transnational settler societies affected by the Asia-Pacific War are managed, and inform understanding of similar transnational society conflict.

I would like to thank Dr Nicholas Hoare for his encouragement and assistance with this paper.
This paper uses Jean Langford’s ethnography, Fluent Bodies, to analyse how Cannabis Sativa is used as a means of oppression, rebellion, division, and unison of the Indian population from the colonial times to the contemporary times where targeted individuals belonging to the minority sections of the society are still arrested on the suspicion of the consumption of Cannabis. I have drawn from this ethnography and other secondary sources from the internet and various journals to trace the history of Cannabis consumption in India. Cannabis sativa is a popular herb in central Asia and is consumed for its medicinal properties as well as its ties to religion and culture in different regions. India has a history of the consumption of Cannabis even though it is banned by the State. The consumption and banning of Cannabis follow a history of oppression by the State as well as the British imperialists as well as a history of rebellion by the Indian population during the colonial times and the minorities in the contemporary times, with both sides taking advantage of the various loopholes in the law. There is a pattern of suppression and rebellion through the banning and consumption of Cannabis from the colonial to the contemporary times, suggesting that though the governments have changed, certain sections of the society, are still being controlled by the people in power. I chose Langford’s fluent bodies as my primary ethnography as I draw parallels between how Ayurveda delineates colonial and imperial powers and how Cannabis is used to do the same in India. This paper illustrates that Cannabis has successfully been used to rebel against the British empire and the State but throughout history the State and imperial rulers have also tried to control the consumption of Cannabis for this very reason. In the current times when the debates around the consumption of Cannabis in India have again emerged, it is useful to place the consumption of Cannabis in a social, religious, and historical context as I have attempted to do in this paper. The limitation of this paper is that I could not conduct any primary fieldwork in India due to time and geographical restrictions.

I acknowledge my professor Dr. Fouzieyha Towghi for helping me with the essay.
Natural Language Processing (NLP) approaches have revolutionized the business environment by providing effective methodologies to analyse textual contents and their semantics. However, their success is yet to be applicable to the literature given the unavailability of an effective framework and computation power. Many approaches also require annotated or labelled data, which is yet to be available in the academic realm. With an aim to improve the understanding of literature data and explore the effectiveness of NLP topic modelling approaches, this study has utilized a high-quality and sizeable dataset collected via the resources provided by the Open Research Graph platform [1]. We have obtained 508,878 publications from CrossRef [2] and compared the performance of three key topic modelling algorithms, namely, Latent Dirichlet Allocation (LDA) [3] [4] [5], K-means [6] [7], and Non-negative Matrix Factorization (NMF) [8] [9] using Python programming on the supercomputer, Gadi [10]. Both quantitative and semantic evaluation showed a high level of effectiveness in the algorithms. The algorithms were capable of generating 20 topics, each comprising words and phrases related to a coherent theme, such as medicine, robotics, genetics, networking, etc. In particular, LDA and NMF reached a confidence level of over 51% and 56% respectively for the most relevant topic, surpassing the baseline of 20%. On the other hand, significant differences between the algorithms have been noticed in terms of runtime, variances in the importance of terms, and distribution of documents across topics. We highlighted the efficiency and effectiveness of NMF for literature topic modelling from this study. Future research could examine the effectiveness of other NLP methodologies on sizeable literature data and develop specialized datasets and algorithms for this area.

I would like to thank my supervisor, Dr. Jingbo Wang of the NCI for her guidance; and Dr. Amir Aryani of Social Data Analytics (SoDA) Lab at Swinburne whose data graph research has enabled this study.
Reference List


Claire Huang | Re-evaluating barrier performance on modern hardware and software.

*programming languages; garbage collection; performance analysis; write barriers*

Garbage collection (GC) automatically manages memory used by a program, identifying objects in-use and reclaiming unreachable objects. Without GC, programmers have to manually manage these objects. This can be tedious, error-prone, and a source of major security problems. An efficient GC algorithm is crucial for improved user experiences including responsive websites and energy efficient apps. In high-performance GC, write barriers are a widely used technique to achieve efficiency. Write barriers are small pieces of code which monitor changes to the relationship among objects in memory. They give GC designers algorithmic freedom to exploit the spatial and temporal memory behaviours of a program, but incur a performance cost. With constant changes in computer hardware and software, an up-to-date and accurate evaluation of barrier costs is critical for GC designers to make informed choices. I investigated the cost of a particular write barrier, called the object barrier, by carefully designing a GC algorithm which did not require the object barrier for correctness. This allowed me to explore the barrier’s behaviour by evaluating the algorithm with and without the barrier. Using a diverse set of modern benchmarks and latest Intel and AMD machines, I was able to provide a fresh perspective on barrier costs, which was 0.8% on AMD and 1.8% on Intel. The results reaffirmed that write barriers remain a flexible and cheap building block for high-performance GC algorithms. Unexpectedly, four benchmarks even sped up on the AMD with the barrier enabled. This contradicts the commonly held belief that the object barrier imposes a noticeable cost, opening the door for future investigations. The project framework can also be easily adapted to measure a variety of other barriers.

I acknowledge the assistance of the Memory Management Toolkit (MMTk) research team, especially Steve Blackburn, Zixian Cai and Wenyu Zhao.
Catie Travers | Ms Diagnosed: Visualising and Analysing Causal Factors of Gender-Data Bias in Machine Learning for Healthcare

gender-data bias, healthcare bias, gender bias, gender issues, gender diversity, machine learning, bias in machine learning

Data collected in clinical trials is not representative of the gender diversity of the wider population, a phenomenon named gender-data bias. This bias preferences people assigned male at birth (AMAB). This results in increased healthcare knowledge about people AMAB, hence they currently receive a higher quality of healthcare. Current research identifies this gap but does not thoroughly discuss how the gender-data gap will impact the accuracy of machine learning algorithms in healthcare. These algorithms will be highly trained on data from people AMAB, which may lead to an exclusion of healthcare outcomes experienced by other genders. This research addresses this gap. Through a literature review coupled with system modelling, this research revealed what forces are contributing to the gender-data gap in machine learning for healthcare and how they can be reduced. The most influential factors that increase gender-data bias are pre-existing bias, the costs of data collection, disparities in the provision of healthcare by gender, and the categorisation of gender as a binary. This paper makes six recommendations to reduce the gender-data gap. These recommendations include increased research to define the psychological effects of gender bias, increased research to determine the effect that gender perspective has in medical evaluation, stricter regulation regarding reducing biases in machine learning training datasets, reforming medical textbooks, making it easier for gender-diverse people to participate in clinical trials, and to foster the acceptance of gender as a spectrum in society. Gender-data bias negatively affects the healthcare treatment of over 51% of the population. We need to ensure that healthcare outcomes are independent of gender identity.

I would like to acknowledge Kathy Reid for her advice and wisdom throughout this project.
The development of information and communication technologies has transformed the way people do business. One of these transformations is the emergence of platform-based companies like Uber and Airbnb. These companies do not produce goods or services in a traditional sense; instead, they create value by establishing a platform where producers and consumers can interact directly. Some argue that platform companies’ business model can reduce transaction costs, increase labour participation and create autonomy for workers. However, in exchange for economic efficiency, the independent contractors (or ‘gig workers’) have to bear the operating costs for their work and let go of social benefits attached to the traditional form of employment. This regulatory challenge also occurs in Indonesia, where ride-hailing companies like Gojek or Grab are popular. The drivers of the apps face the same problem as most gig workers: long working hours, low income, absence of job security, and minimum social and employment benefits. In this paper, I borrow the concept of ‘smart regulation’ under regulation and governance scholarship to propose a solution for gig workers’ unfair working conditions in Indonesia. The key component of smart regulation is using non-governmental organisations and commercial interests as regulatory surrogates in tandem with direct government regulation. As such, this paper maps non-state actors that may be involved in regulating ride-hailing platform companies, which include drivers association, consumer preferences, regulatory standards organisations (Fairwork project), and socially-responsible investors. In this instance, the government acts as an enabler and a meta regulator to ensure these non-state actors can do their regulatory role.

I thank Christian Downie as the class convener for his guidance in writing this paper and Indonesia Ministry of Finance for sponsoring my education at the ANU.
The problem of efficient computation arises in many contexts. In abstract algebra, in order to understand a group, it is useful to have the ability to perform efficient computations in that group. In geometric group theory, the problem of determining whether a group is biautomatic and if so, determining a biautomatic structure on a group, assumes relevance in this context. A group is a set together with a binary operation called multiplication that satisfies certain axioms. When a group is studied via presentations (by specifying a set of generators for the group and a set of relations that those generators satisfy), there are infinitely many words to represent any group element; it is thus impractical to study a group by considering all representatives for a group element. Biautomatic groups are a class of groups in which we obtain a set of representatives that can be described by a simple machine called a finite state automaton. These groups also have the property that paths in the Cayley graph (a geometric depiction of a group) corresponding to chosen representatives remain synchronously close to each other. Biautomaticity is thus one way to ensure the ability for efficient computation in a group. We explore some theory of automatic groups, following [WPIG] and then consider ways to determine a biautomatic structure on a group via a group action on a geometric object, following the results ofNiblo and Reeves [NR98] and Januszkiewicz and Świątkowski [JS06].
References


I would like to thank my supervisor, Adam Piggott, for his indispensable guidance and support during the project.
Angus Dunne | Digital Twinning of the Mulloon Rehydration Initiative - a collaboration between ANU’s Institute for Water Futures and the Mulloon Institute

Digital twin, leaky weir, catchment landscape rehydration

This research project explored the world- and story-building requirements for communicating a digital twin narrative focussing on fish passage to a government organisation. The project asked two strategic questions: 1) What information is required to make a convincing case for approval of a leaky weir in a catchment rehydration initiative? and 2) What design features are required for storytelling built on a digital twin to facilitate conversation with regulators about information requirements? The research project used rapid prototyping and a transdisciplinary approach to develop visualisations and a script to build a world and communicate a story about landscape rehydration and fish passage drawing on digital twin concepts. With regard to information for a convincing approval, the research elicited both unambiguous statutory as well as more case-specific discretionary information requirements. Otherwise overlooked statutory requirements were able to be identified. Case-specific information requirements benefited from digital-twin driven engagement to help refine understanding, including regarding threatened species and fish life cycles, e.g., in the context of an eel that gives birth in Tahiti but spends the remainder of its life in Australian waterways. Digital twin-based story telling appeared to create an environment that highlighted shared interests and placed approvals in a whole of catchment approach when evaluating landscape rehydration benefits and impacts for fish passage. The project informs further development of a digital twin’s value in catchment scale rehydration, as a capacity building tool, data storage framework and boundary object.

I would like to acknowledge Joseph Guillaume & Craig Strong (ANU) Laura Fisher, Peter Hazell and Tam Connor (TMI)
Covid-19 affects many countries in the world, including Australia. As one of the important macroeconomic indicators, GDP per capita is critical for displaying the level of a country’s economic activity during this specific period. The objective of this study is to assess the impact of Covid-19 on GDP per capita in Australia using the Seasonal Autoregressive Integrated Moving Average (SARIMA) model. The data was quarter GDP from 1960 to 2021 collected from the Australian Bureau of Statistics (ABS) and divided into three parts (data training, data validation, and data simulation). Data has seasonal movement and is possibly associated with other periods. Therefore, the study fitted the data series using the SARIMA(0,1,1)(0,1,1)4 model, where the model is the best based on the Mean Square Prediction Error (MSPE) and performed very well in predicting the GDP per capita from 2015 to 2019. The chosen model was then used to forecast the scenario for 2020-2021, with the difference between expected and actual values measured as the Covid-19 effect on GDP per capita. The gap represented the potential GDP per capita loss impacted by Covid-19. As a result, Covid-19 reduced the mean actual GDP per capita in 2020 by -4.1 percent. However, it appeared that the economy gradually began to recover in Q4-2021, bouncing back to the track of pre-Covid-19 conditions.

Thanks to my support systems (Erika and Fahri Abqari) and Dr. Xuan Liang for her excellent job teaching this course.
Remittances, which are money and goods sent by international migrants to their home country, have been recognized as a crucial source of foreign exchange or income in developing countries including the kingdom of Tonga. However, the effects of remittances on economic growth in Tonga have been little examined so far. In addition, although previous research has assumed that remittances have direct effects on economic growth, this assumption seems unrealistic. To fill these gaps in the existing literature, this paper attempts to identify the indirect effects of remittances in Tonga, using time-series data between 1990 and 2020. Based on previous research, human capital accumulation, physical capital accumulation, the competitiveness of exported goods, and financial development are used as potential channels through which remittances indirectly affect economic growth. This research uses Structure VAR for data analysis because this methodology allows us to control the order of the effects from one variable to the others by imposing structure on the model. The results show that remittances can indirectly and positively affect economic growth through financial development, but this result is not robust. In addition, the results suggest that remittances do not promote economic growth through promoting investment and do not cause real appreciation which can dampen the competitiveness of tradable goods in Tonga. The policy implication is that increase in deposits of commercial banks by promoting the use of formal financial institutions for sending remittances could ease the liquidity of the banks and hence remittances could promote economic growth in Tonga.

I would like to thank Dr. Yixiao Zhou for her insightful advice and kind support throughout the course.
Angus Padley | Moral Foundations Theory in Australian Politics  
*Moral Foundations theory, Australian Politics, 2019 Federal Election, Qualitative Methods, Political Campaigns*

This paper investigates the ways in which the Australian Labor Party (ALP) and the Liberal-National Coalition (Coalition for short) employ ‘moral foundations’ in their political campaigning, and bases its analyses on Moral Foundations Theory (MFT). MFT was first proposed by Haidt and Joseph (2004), and argues that human moral reasoning is based on at least six innate ethical intuitions: care/harm, fairness/cheating, loyalty/betrayal, authority/subversion, sanctity/degradation, and liberty/oppression (Haidt, 2021).

Psychologists have long observed that people make decisions using unconscious heuristics (see for example: Nisbett and Wilson, 1977; Kahneman and Egan, 2011). MFT simply extends this idea to ethical decision making. MFT has major political implications, with Haidt (2012) and Hanel (2017) finding that political parties which appeal to all six moral foundations in their election campaigns generally receive more votes. However, liberal (or left-wing) political parties and individuals (as opposed to conservative/right-wing ones) often only focus on the care/harm, fairness/cheating and liberty/oppression foundations whilst ignoring the rest (Graham et al., 2009; and Haidt, 2021). This paper finds evidence to suggest that this finding holds in an Australian context. This paper coded the 2019 federal election campaign launch speeches of both the ALP and the Coalition into the six moral foundations identified by the MFT literature. The results indicate that the ALP strongly references the care/harm, fairness/cheating and liberty/oppression foundations whilst largely neglecting the rest. The Coalition also made heavy use of these foundations but utilised loyalty/betrayal, authority/subversion and sanctity/degradation to a greater extent than the ALP. This suggests that the ALP (and to some extent the Coalition) would benefit from utilising a wider range of moral foundations during elections.

I would like to thank the course convenor, Marija Taflaga, for her guidance and support.
Georgia Conechado | Modelling and Optimising Distributed Energy Resources in Electricity Networks

Photovoltaic systems, Energy storage, Distribution networks, Smart grids, Optimisation, Cost benefit, Optimal Power Flow, Electrification

During the transition to renewable energy and electrification of homes, it is important to ensure the stability of the electricity network, while providing financial benefit to communities. With increasing uptake of Distributed Energy Resources (DERs), such as rooftop solar and battery systems, there is additional complexity within the electricity network due to bi-directional power flows. An Optimal Power Flow (OPF) framework provides the theoretical basis for planning power exchange between DERs and the grid, by minimising a cost function subject to the network’s physical limits. In this paper, an OPF framework is developed to coordinate residential batteries with rooftop solar generation while minimising customer energy costs and maintaining network voltages within limits. A power flow model called the LinDistFlow model is used to represent the power flow physics. The OPF framework was implemented in Python through an optimisation library called Pyomo. An example optimisation of a simplified network with two customers was conducted using CPLEX, a solver for linear programming problems. The results included the battery charging-discharging power profiles, in addition to the network voltage profiles. In a comparison with a baseline case, it was also shown that the inclusion of grid voltage limits in the optimisation problem is key to mitigating detrimental voltage breaches. Additional constraints and network model configurations required for realistic application were also outlined. This OPF framework has been shown to be a viable foundation for a control algorithm for DERs that could help manage the rapidly changing electricity network.

I would like to sincerely thank my supervisor Dr Chathurika Mediwaththe for her guidance and Masoume Mahmoodi for her support.
Claire Watson | Deciphering Hermes: Tangled Japanese Femininity Within the Story of ‘Train Man’

Japanese Studies; Film; Gender; Popular Culture; Internet Forums; Textual Analysis; Screen Analysis

Observing the feminine counterpart of one of Japan’s most influential twenty-first century heroes as an icon in her own right provides key insights into how gender functions in Japanese society. In 2003, a fairy tale for the internet age surfaced, complete with a defeated villain (a public transport groper), an unlikely champion (a reclusive geek), a rescued damsel (an elegant office worker), and a happily-ever-after romance (their subsequent courtship). The true story of Densha Otoko, or ‘Train Man’, was a wildly popular and impactful one in Japan in the early two thousands. It debuted on an online forum thread, garnered a cult following, and was eventually adapted into novel, television, manga and film modes. Multiple scholars have traced how Densha Otoko redefined notions of ideal masculinity in Japanese popular culture. Less understood as a source of gendered cultural understandings is the object of Train Man’s affection, dubbed ‘Hermes’. My research unravels Hermes as an icon of Japanese pop cultural femininity via a close textual analysis of the 2005 film adaptation in tandem with the original archived forum posts. My findings reveal four interconnected yet distinct aspects. Hermes is an assertive romantic tactician, an embodiment of the Japanese OL (Office Lady) archetype, defined by her lavish, ‘proper’ consumption habits, and acknowledged as incomplete without the companionship that a male partner would bring. The portrayal and consumption of Hermes’ identity reveals hybridised understandings of gender in early twenty-first century Japanese society; demonstrating how traditional and modern ideals of femininity were finding ways to coexist in new media forms.

Thank you to my course convener Prof. Carol Hayes - Japanese pop culture was one of the best worlds I got to explore at ANU.
Thomas Powell-Davies | A description of diphthongs in Tasmanian English

linguistics; phonetics; sociolinguistics; sociophonetics; vowels; diphthongs; Australian English; Tasmania

In recent decades, there has been an increasing focus on regional variation in how English is spoken within Australia. After a long period, of research focusing primarily on sociological factors starting with Mitchell & Delbridge (1965), the focus has broadened to include regional differences, but predominantly based studies within major cities. Tasmania, an island with a distinct sense of identity, can offer valuable insights into the nature of geographically-conditioned linguistic variation in regional Australia. The production of the AusTalk corpus (Estival et al., 2006), a trove of recordings from locations all around Australia, opens the door to this kind of comparison to include places that have previously been neglected. Diphthongs, which are vowels that move between two different target mouth positions in the same syllable (Ladefoged & Maddieson, 1996), serve as an interesting point of comparison, as they are often regarded in the public eye as a defining feature of Australian English. This study aims to profile the diphthongs of English as spoken in Tasmania through acoustic phonetic analysis of formant frequencies of diphthongs produced in monosyllabic words based on wordlist data, using the EMU Speech Database Management System (Winkelmann et al., 2007) and R (R Core Team, 2021). Results are compared to what is already known about diphthongs in Australian English more generally and also with reference to a description of Tasmanian monophthongs, or vowels with only one target. The findings form the first quantitative description of Tasmanian diphthongs and will enable Tasmania to be included in future studies on regional variation in Australian English diphthongs.

I would like to thank my supervisor Dr Rosey Billington and also the many people behind the AusTalk corpus.


Women are underrepresented in STEM (science, technology, engineering, mathematics) subjects at ANU and other universities. We present a quantitative study of the gender gap across various STEM disciplines at undergraduate level at the Australian National University (ANU). Previous studies have quantitatively examined student enrolments by gender in STEM disciplines to illustrate the gender gap, however, this study is the first to use a combination of commencing, continuing, graduating and discontinuing student enrolments data to illustrate the gender gap in further detail across specific STEM disciplines over time. Using data over the 2015-2020 period we investigated the proportion of female students in comparison to the proportion of male students at different stages of undergraduate at ANU for various STEM disciplines. We find the proportion of female students from commencing, continuing and graduating students data was the lowest (between 10%-30%) for engineering, computer science and information technology. In addition, the number of female discontinuing students in mathematics and statistics has significantly increased over time, indicating more female students are discontinuing (either unenrolling or transferring out of) mathematics and statistics every year. Our results illustrate that there is room for improvement in the diversity of students in numerous disciplines in STEM at ANU. Future studies should expand on this investigation using data from non-STEM disciplines and postgraduate student data in conjunction with qualitative data to provide a more comprehensive picture of the gender culture at ANU. Addressing this issue is crucial and will align with ANU’s goal of being a standard-bearer for equity and inclusion in the 2021-2025 Strategic Plan.

I would like to acknowledge and thank my supervisor Professor Lisa Kewley and course convenor Dr. Chris Browne for their support, guidance and advice in accomplishing this project.
Recommendation of carbon crediting purchasing for the ANU

Abatement, Carbon Credits, CER, ERF, ERAC, Climate Change

CER – Clean Energy Regulator
ERAC – Emissions Reduction Assurance Committee
ERF – Emissions Reduction Fund

The ERF or Emissions Reduction Fund is a scheme implemented by the Australian Government that provides the voluntary ability for private entities to purchase or create carbon offsets. The methods of creating these carbon offsets have been muddied and clouded in the past decade, coming under scrutiny from many academics and historic ER, ERAC and CER affiliated persons. The research project aimed to evaluate the ERF methods in order to make a purchasing recommendation of carbon credits for the ANU. It did this by creating a template scoring system for the 14 grouped methods of creating offsets under the ERF. Then using Grounded Theory as the basis, sources where collected which analysed the data surrounding the methods and examined them against the basic understanding of each method. The research project also used the Clean Energy Regulators data sheet of projects to make judgments about methods when there was limited sources.

The results of the research project on the ERF and its methods were critical, suggesting that there needs to be more collusion between the CER, the Australian Government, and academic institutions like the ANU. Only one eligible method for the ANU to purchase carbon offsets from was found.

The importance of this research project was found in the fact that it collated the research and found new potential problems with the methods of creating carbon offsets under the ERF. This has not been done in the fashion of this research project before. It provided an accurate snapshot for the Below Zero ANU group, which will be used to guide ANU in purchasing carbon offsets.

Special thanks go to Sarah Milne who supervised me through this project, and to Caitlyn Baljak and Juliet Meyer who helped edit and guide me. Another thank you to Paul Burke and Andrew Macintosh who gave there time to give me advice in field they are very knowledgeable in.
Chinese-Australians have lived in Australia for over two hundred years, but only in the last fifty have Chinese-Australian artists gained visibility in Australia’s mainstream art world. Cultural heritage only became a dominant theme in Chinese-Australian art in the late 1980s and early 1990s, coinciding with Australia’s foreign policy shift to Asia. In this thesis, I argue that the creative expression of Chinese-Australian artists has evolved to merge Chinese influences with contemporary Australian art practices. My analysis centres four Chinese-Australian artists: William Yang, Lindy Lee, Kate Beynon, and Jason Phu, each from a different generation and with unique familial migratory histories. This thesis is the first in-depth study of this combination of artists. I begin by explaining how changes in Australia’s immigration policies and diplomatic engagement with China catalysed a flurry of exhibitions about Chinese and Chinese-Australian art to reshape understandings of art history. I then compare how the artists incorporate calligraphic practices to address their positionality as Chinese-Australians and broaden ideas of national belonging. Next, I examine how the four artists go beyond identity concerns to contemplate the natural world through a spiritual lens, drawing from Buddhist and Daoist philosophies. I review critical receptions of Chinese-Australian artists as a measure of social and cultural impact. Finally, I evaluate how the Australian arts landscape has changed from the 1990s to the 2020s and ponder the role of Chinese-Australian artists in Australia’s future arts engagement with China.

I would like to acknowledge my Honours supervisor Professor Ari Heinrich and Honours Convenor Dr Chris Ballard.
The ANU has implemented a ‘Below Zero’ plan which includes transitioning to net-zero carbon emission status by 2025, going further to net-negative by 2030. To assist the implementation of decarbonisation efforts, ANU Below Zero has tasked the Battery Storage and Grid Integration Program with developing plans and technology to decarbonise ANU’s energy usage and provide stable, clean energy. This project assesses the financial viability of installing solar panels as part of broader decarbonisation and conducted energy cost estimation out to 2050 to give approximations of ANU’s future energy costs without positive climate action.

The preeminent findings are that under several different scenarios with respect to input costs such as installation, current and future electricity prices, and the project’s cost of capital, installing 4 Mega-Watts of panels is justified. Employing Irving Fisher’s Net-Present-Value analysis, all future savings from installing solar were converted to value-in-today’s-dollars and summed to find that value can be created for ANU under most scenarios (with returns varying for different combinations of variables), as well as positive returns on investment. Under the likeliest range of variables (according to the ACT average and ANU’s cost of capital) of $1.57/Watt of solar installation cost and 3% p.a. financing costs, ANU stands to create $3.7 million of value in today’s dollars with a return-on-investment of 3.6% p.a. These financial benefits, along with reputational enhancements associated with positive climate action, lead to concluding that ANU should proceed with solar installation on all viable roofs as soon as possible to maximise said benefits.

I would like to acknowledge my supervisors Alix Ziebell and Michael Thomas from BSGIP, as well as Juliet Meyer from ANU Below Zero.
This study assessed the conservation value of four remnants of Grassy Box Woodland located on the ANU campus. The study updates results from an initial survey conducted in 2010, which recognised the remnants as Natural Temperate Grassland (NTG), a threatened ecosystem locally and nationally. The 2022 study focused on the largest remnant patch and conducted a detailed field survey of the spatial extent, species composition and richness, and ground cover metrics. Fieldwork was conducted in late summer 2022, and results were compared with those of the 2010 survey. Key results are: (1) four remnants have grown in total by 63% in spatial extent from 2010. Two of the remnants, coded R1 and R2, have connected with each other (coded RL); (2) within RL, native species ground cover is high at 89%, and exotic species cover is low at 11%; (3) while there appears to have been a significant loss of species richness within this remnant compared to 2010, the proportion of native species remains high. Of 25 species found within RL, 17 are native, and 9 are exotic; (4) Microlaena stipoides is dominant in RL and Themeda triandra ranks second, indicating the remnant has experienced relatively low disturbance; (5) no threatened species were observed in the field except for one flowering planted Leucocrysum albicans. Therefore, strictly speaking, the site cannot be recognised as NTG, the high Floristic Value Score of 5 indicates that this community should be considered part of the nationally protected ecological communities, as valuable as those formally classified as NTG. Results are encouraging in relation to the value and approach to management of the remnants and suggest future management priorities.

I would like to express my deepest appreciation to Professor Peter Kanowski, Jackie O’Sullivan, John Fitz Gerald, Michael Kelly, Warrick Doherty and Isabela Burgher.
Ting Wang | a creative user-centred design methodology for ANU Sculptures

#digital humanities #heritage #user-centred design #multimedia

The research topic is “how to use digital technologies to increase public engagement with heritage and culture”. This research involved a practical project of applying a user-centred design approach to ANU sculptures as a showcase for this topic. A user-centred design includes the processes of empathising, defining, ideating, prototyping, and testing. The author collaboratively worked with stakeholders, ANU Collections, Drill Hall Gallery, and ANU Heritage to produce a multimedia digital storytelling map with interview videos, 3D models and podcasts. The author argues that applying easy-to-use and free open software to the project with collaborating with relevant stakeholders significantly improves public engagement in consideration of the limited funding situation in the heritage field. The stakeholders expected an effective way to improve public engagement and the approach could also easily be adopted by them for future digital improvement on whole ANU sculptures. The solution developed by the author was to use easy-to-learn free software to create the multimedia elements as visual aids to “speak” interesting stories related to the sculptures from diverse perspectives from artists, academics, and curators to current students. This project followed with a user testing of the digital map on targeted users (including ANU students and ANU staff). Participants were very excited about this project and found the storytelling map engaging and interesting to read and use. The approach is a good showcase for the heritage field to learn this creative and engaging approach to help significantly improve audience engagement with limited funding and digital knowledge.

I would like to appreciate the support from Dr Katrina Grant, ANU Collections, Drill Hall Gallery and ANU Heritage.
Yalan Chen | Healing human nature alienation: A practice led-research to produce paintings by integrating Australian Native floral energy with automatism technique following analysis of Hilma af Klint’s ‘The Ten Largest’ paintings.

Human nature relationship, Healing, Hilma af Klint, automatism, Australian native floral

I propose to present my practice-led research that explored the process of integrating Australian native floral energy with automatism painting technique. My painting technique was informed after the analysis of Hilma af Klint’s ‘The Ten Largest (1907)’ paintings. Swedish artist Hilma af Klint produced these paintings in responds to increased materialism at her time. She claimed her paintings were commissions from sprits from higher astral world with intention to guide humanity in the future. She used automatism technique and produced ten large-scaled abstract paintings with symbols and letters. Automatism technique refers to involuntary movements such as sleep walking and breathing. It is a technique commonly used by surrealist painters. By researching Hilma af Klint’s notes, methodology, religion as well as current literatures, I was able to decode two key messages within ‘The Ten Largest’ paintings. First primary message is about how to conduct a spiritual life with a belief in invisible power of the universe and put forward a quality of goodness through noble endeavour and pure intentions while imagining a positive future. Second key message is about providing an understanding of human society where all things are interconnected physically and spiritually towards the origin of the universe. Her paintings are valuable in facing current issues such as environmental crisis and contemporary wellbeing by decreasing materialism and developing a closer relationship with nature. Following researching Hilma af Klint’s work, I developed my own methodology to produce paintings in responds to contemporary issues such as plant conservation and human-nature alienation. I firstly experimented large amount paintings and drawings with automatism technique in the studio and categorised them by using Sigmund Freud’s psychoanalysis theory. My process of experimenting with automatism technique was also supported by philosophy of creativity and Darwinian theory of natural selection. I secondly observed and studied Australian native botanical plants from Australian National Botanical Garden.
I studied their form, colour and energy field. In final stage, I merged practiced automatism technique and botanical studies to produce paintings. My intentions of making paintings were about bringing positive botanical energy to daily life, reminding us to reconnect with nature in a more technologically driven world and promoting global sustainability practice.