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The Politics of STEMM Collaboration between Australia and China: National Security, Geopolitics, and Academic Freedom

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ABSTRACT

Since the 1990s, there has been a proliferation in science, technology, engineering, maths, and medical (STEMM) collaboration between Australian and Chinese universities and academics, which has produced divisions over the scientific, economic, human rights, and national security implications. Drawing on interviews with 22 academic researchers and the works of public commentators, I devise a typology of perceptions on STEMM collaboration: Pragmatic, Cosmopolitan, CCP-critic, and Leftist. Pragmatic and Cosmopolitan perceptions, which promote deep China engagement, are the most influential over the Australian government and university leadership strategy due to the economic and scientific opportunities that China presents, but CCP-critics, who highlight the national security and human rights risks involved, have growing influence over how the government and universities perceive and manage the relationship. The interviews also reveal that academic freedom means the freedom to pursue research without external influence. Shaped by individual experiences and assumptions regarding China, academics differ over what academic freedom should protect to maximise the benefits of STEMM collaboration while minimising risks. Overall, my findings suggest that geopolitical competition and perceptions of the risks and opportunities of China engagement shape STEMM collaboration and the freedom of academics.

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Introduction

In recent years, there has been growing concern that China has used increasing global scientific collaboration to its economic, technological, and military advantage. In response, the United States (US) has tried to counter China's military and scientific development and restrict its access to technology (White House, 2022). Geopolitical tensions have affected the output of US–China scientists (Jia et al., 2022; Wagner & Cai, 2022) and European governments are expanding legislation to counter security threats posed by China during scientific collaboration (d'Hooghe & Lammertink, 2022). However, during the COVID-19 pandemic, the number of US–China scientific publications increased in the race to understand the virus (Lee & Haupt, 2021).

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This article builds on this literature to consider how geopolitical competition is affecting scientific collaboration between Australia and China. It largely focuses on the period of 2017-2022. Since the 1990s, universities and academics in these two countries have expanded their collaborations in science, technology, engineering, maths, and medical (STEMM). From 2017, however, there has also been debate over the efforts by the Chinese Communist Party (CCP) to exert influence over and in other countries. This has brought into sharp relief the risks and opportunities involved in engagement with China. The increase in STEMM collaboration has produced divisions between those who see this relationship as presenting scientific and economic benefits (Laurenceson & Zhou, 2020) and those who see it as posing a threat to Australia's national security and economic competitiveness as a key US ally and to human rights in China (Hamilton, 2018; Joske, 2018). In seeking to synthesise perceptions on China in Australia (Bisley, 2018) and the CCP influence debate (Brophy, 2018), a 'threat and opportunity' binary is common. However, these works do not conceptualise the full range of perceptions within such debates about STEMM collaboration. To remedy this shortfall, I create an original typology that reflects a range of perceptions on this topic: *Pragmatic, Cosmopolitan, CCP-critic*, and *Leftist*. In doing so I draw on Amartya Sen's (1993) conception of 'positional objectivity' to demonstrate how perceptions of STEMM collaboration depend on an individual's experiences, interests, and assumptions regarding the economic and scientific opportunities that China presents, China's human rights situation, and the People's Liberation Army's (PLA) military threat to Australia.

Previous studies show how views that the CCP threatens Australia have led to the expansion of government policies to counter foreign interference in political institutions (Chubb, 2023) and universities (Shih et al., 2023). Through a focus on universities and STEMM collaboration, I build on this literature to examine the influence of the perceptions over how the government, university leaders, and peak bodies, as well as academics, perceive and engage with China. My findings show that Pragmatic and Cosmopolitan perceptions, which promote deep engagement with China, are the most influential due to the opportunities China presents. For example, China is now Australia's biggest STEMM collaboration partner in terms of scientific co-authored papers (SciVal, 2022). CCP-critics highlight the national security, economic, and human rights risks involved in STEMM collaboration, including its potential to modernise the PLA (Joske, 2018). They have become increasingly influential over how the government and university administrators and leaders perceive and manage the relationship. To show this, I focus on the expansion of Australian government control over universities, including the University Foreign Interference Taskforce (UFIT) Guidelines. Further, I demonstrate that there has been a substantial decline in Australian Research Council (ARC)-funded STEMM projects with Australian and Chinese collaborators since 2019, and increased support for defence-related research due to security concerns.

In this debate, there is contestation over academic freedom, which French (2019) contends is 'a defining characteristic of universities' to protect free intellectual inquiry. To date there has been little or no examination of discourses about academic freedom, the pressures on it, or why some people emphasise certain restrictions. According to the scholars I interviewed, academic freedom broadly means the freedom to pursue research without external influence, but understandings of this freedom are more complex in the case of STEMM collaboration. Pragmatists and Cosmopolitans argue that academics

should be free to pursue research with whomever they wish, which they see as producing economic and scientific benefits (Universities Australia, 2020). However, CCP-critics call for the Australian government and university administrators to intervene in STEMM collaboration to limit economic, national security, and human rights risks (Hamilton, 2019). These perceptions are shaped by experiences in STEMM collaboration and perceptions of the national security, medical, economic, and human rights risks and benefits to Australia and China. Further, Marginson (2022b) argues that scientists are largely autonomous in their research and build collaborations with like-minded scientists, free from government. In this study, I reveal how academic activities are shaped by the Australian government, which uses its control of public research funds and legislative power to intervene in STEMM collaboration to support its economic and security objectives and to align with public opinion.

Using Australia–China STEMM collaboration as a case study, this article shows that when this type of collaboration is perceived as an opportunity, it is subject to increased government support. But the more STEMM collaboration with China is perceived to be a risk to national security, economic competitiveness, and human rights, the greater the pressure the relationship comes under. This in turn leads to increased restrictions on the freedom of academics to pursue collaboration and less government support. Consequently, my findings demonstrate that global STEMM collaboration with China and academic freedom are sensitive to geopolitical competition and perceptions of the risks and opportunities of engaging with China. The article proceeds as follows. First, I define the CCP influence debate and university internationalisation and then present the methodology. Second, I present the typology, which I structure as pro- and anti-collaboration arguments. I also consider the influence of the associated perceptions over STEMM collaboration. Finally, I discuss the implications of the debate for the Australian university sector, and what the debate reveals about academic freedom, before concluding.

The CCP Influence Debate and University Internationalisation

The CCP 'influence debate' was a series of arguments that arose in 2017 between academics, university leaders, and media commentators about whether Australian universities' engagement with China threatened or provided opportunities for national security, science, economic health, cultural diversity, and academic freedom. The people involved in the debate had numerous motives, including to influence public opinion and raise awareness, for example, of the CCP's threat to academic freedom, challenge or support claims made by others, highlight the debate's impacts, and shape Australian government policy and university responses.

I define 'CCP influence' as activities by China's CCP-led government, departments of the Chinese government including the Ministry of Education (MOE), and individuals and groups associated with the People's Republic of China (PRC), such as Chinese Students and Scholars Associations, that are perceived as interfering in Australian universities. 'Influence' here covers a range of different scenarios, including direct interference in the activities of universities, academics, and students. This interpretation is more restrictive than other instances of influence, which have less negative connotations, such as where the CCP and associated individuals influence academic activities in a transparent manner.

The internationalisation agenda

STEMM collaboration's rise has been driven by university internationalisation in Australia and China. Internationalisation refers to the expansion of university collaboration with overseas universities, the recruitment of international scholars and students, and the pursuit of funding grants. A core objective of internationalisation is to advance STEMM research for economic, scientific, medical, and technological benefits. In Australia, starting with John Dawkins, former Federal Labor Minister for Employment, Education, and Training (1987–1991), universities, like other public sector areas, have been subjected to government-led market-oriented reforms that have placed profit-seeking as the core objective, and in which universities are incentivised to pursue international engagement (Cannizzo, 2016). Since the 1990s, driven by internationalisation, the system of global science has undergone dramatic shifts. The field has seen increased scientific output and has become increasingly pluralised, with a rise in high-quality research and international collaborations (Royal Society, 2011).

China has been a key driver of increasing internationalisation, scientific output, and greater pluralisation of global science (Marginson, 2022a). Since the 1980s, due to its lack of STEMM expertise and technology, the Chinese government has promoted university internationalisation to support economic development based on STEMM advancement, innovation, and education improvements and through extensive funding (Marginson, 2022a). The MOE encourages international collaboration to access funding from overseas agencies, collaborate with international academics and with top global universities, and publish academic papers in English and with international co-authors, while also offering international scientists access to research funds (Ministry of Education, 2011). Talent programmes, such as the Thousand Talents Plan (TTP), are an important component of its international collaboration (Welch & Cai, 2011). The MOE's two core policies, Project 211 and Project 985, implemented in 1995 and 1999 respectively, pursue internationalisation by placing requirements on select universities, such as publication targets, to incentivise them to reach high global rankings, in exchange for financial investment (Perry, 2015). In 2017, replacing the 211 Project and 985 Project, Xi Jinping announced the Double First-Class University Project, which aims to construct 42 first-class and research-driven universities and 465 first-class disciplines through 140 universities by 2049 (Scholars at Risk, 2019). Based on the 2022 QS World University Rankings (2022) of the top Engineering and Technology Universities, a widely used global university ranking (Elsevier, 2021), there are six Chinese universities in the top 100, including Tsinghua (ranked 14).

Research collaboration is based on mutual research interests and collaboration between Australia and China is increasing in engineering, physics, maths, and material sciences, where Chinese universities are becoming global leaders (Laurenceson & Zhou, 2020). For example, between 2017 and 2021, China was Australia's most important collaborative partner in engineering and there was a 47.6 per cent increase in co-authored papers, which has formed part of an overall rise in scientific output in both countries (SciVal, 2022).

I address three types of STEMM collaboration.[1] The first is informal collaboration between academics based in Australian and Chinese universities, which has no external research funding. This occurs when two or more researchers conduct research, for

example, to publish an academic paper or share data. Second, I address formal collaboration between Australian and Chinese academics with external funding – for example, when Australian and Chinese scientists apply for ARC funds. Third, there are national or university level collaborations that may include universities, university departments, private companies, and government partnerships and funds. For example, Australia's Department of Industry, Science, Energy, and Resources and China's Ministry of Science and Technology fund the Australia–China Science and Research Fund (ACSRF), which supports Joint Research Centres between Australian and Chinese institutions to advance science and commercialisation (Department of Industry, Science, Energy, and Resources, 2021a). Developing these collaborations relies on existing relations between Australian and Chinese scholars and university leaders, such as Vice-Chancellors and administrators focused on international collaboration. Also, the Department of Foreign Affairs and Trade funds the National Foundation for Australia–China Relations (2021) to build bilateral engagement, including in STEMM.

Methodology

This article drew its data from multiple sources. First, I conducted semi-structured qualitative interviews in English with 22 academics at a range of Australian universities in humanities, economics/commerce, and STEMM disciplines. The project was approved by the Monash University Ethics Committee (ID 19635) in September 2019. The number of academic interviewees was capped at data saturation, when the interviewees began to express views that had already been mentioned in earlier interviews and where limited new data was created. The interviews ranged from 30 to 90 minutes and were conducted over Zoom and transcribed.

Interviews are helpful for investigating interviewees' experiences and perspectives and their statements' underlying meanings (Olson, 2016). For this project my interviews focused on perceptions of academic freedom and CCP influence, and their experiences in STEMM collaboration. The interview process was guided by the points that the interview participants elaborated on. Semi-structured interviews maintain relevance but give the flexibility to explore important ideas, and allow the interviewees a greater degree of agency and involvement in the interview process (Olson, 2016). This makes the semi-structured model more suitable than a structured one, in which responses are limited to specific questions, and unstructured interviews that allow wide-ranging discussion but limit responses' relevance.

I engaged with English reports and academic literature related to the CCP influence debate from 2017 onwards by numerous individuals, scientific organisations, and university peak bodies such as the Group of Eight (Go8) and Universities Australia. The analysis was supplemented by Chinese-language sources, including websites, media, academic papers, and Chinese government documents focusing on the Australia–China relationship, CCP ideology, higher education, and China's intellectual environment. I examined various STEMM collaboration case studies, bibliometric data trends in STEMM collaboration, and Australian government legislation and responses to perceived foreign influence including the UFIT Guidelines. This data provides multiple perspectives on a given situation and allows for specific claims to be validated.

This approach provides in-depth findings, but I do not claim to analyse a representative sample of academic researchers and their perceptions. As always, the findings that flow from the research need to be interpreted carefully and with appropriate caveats in mind. Interviewees in the humanities who focus on China in their research make up the largest group interviewed (16/22). This group are the most involved within the CCP influence debate and China debates in Australia and were most willing to express their perspectives. The responses of STEMM scientists and those in economics and business varied less, requiring fewer interviews. The additional publicly available documents from scientists and scientific and academic peak bodies outlined above complemented the interviews. I spoke to academic researchers from a variety of backgrounds, including five with Chinese heritage who grew up in China (4) or Australia (1). I interviewed fewer Chinese heritage interviewees because the tense political environment at the time of the fieldwork made participant-recruitment difficult, especially in STEMM disciplines. As Chen (2021) writes, due to geopolitical tensions, discussions of China are increasingly polarised, which can limit academics' willingness to express their views. Further, Jiang (2020) argues that in Australia there is a growing climate of suspicion of the political views of Chinese people. By way of illustration, two Chinese heritage academics I approached declined to be interviewed out of concern about how their views would be interpreted.

The data collected was analysed using grounded theory, which induces theories from data rather than testing hypotheses or existing data. I used grounded theory to code the interviews and additional sources. As research in this area is limited, this process produced categories of conceptual definitions and assessed relationships between them (Thornberg & Charmaz, 2014), in this case by grouping perceptions to create the China perceptions typology (see Figure 1), and which NVivo software helped to achieve.

The Appendix lists the academic researchers interviewed for this article, their disciplines, and the typological group in which I have placed them. It also provides information about the public commentators whose statements and works I draw on. I anonymise all interviewees and use pseudonyms to discuss them; no information is provided about where they work to protect their identities. Some interviewees have publicly expressed their views regarding CCP influence, which may increase the risk that they could be identified based on the findings. This is mitigated as the interviewees were made aware of this risk when they consented to the interview, and if they have publicly expressed this view, there is no greater risk here.

I use Sen's (1993) conception of 'positional objectivity' to examine the perceptions. According to Sen, individuals make conscious and unconscious choices as to what data to gather when they look at the world, and their choices are dependent on their experiences, beliefs, and objectives. These choices are evident in each of the four perceptual types identified in Figure 1.

Individuals have been placed into the four categories based on their perceptions about the efficacy of scientific collaboration between Australia and China. The worldviews and assumptions that underpin those perceptions are identified and summarised in Table 1. The typology does not attempt to confine human complexity to five reductive categories, as the perceptions overlap (see Figure 1). Nonetheless, the typology provides a means of tracing distinctive views on STEMM collaboration, as the remainder of this article illustrates.

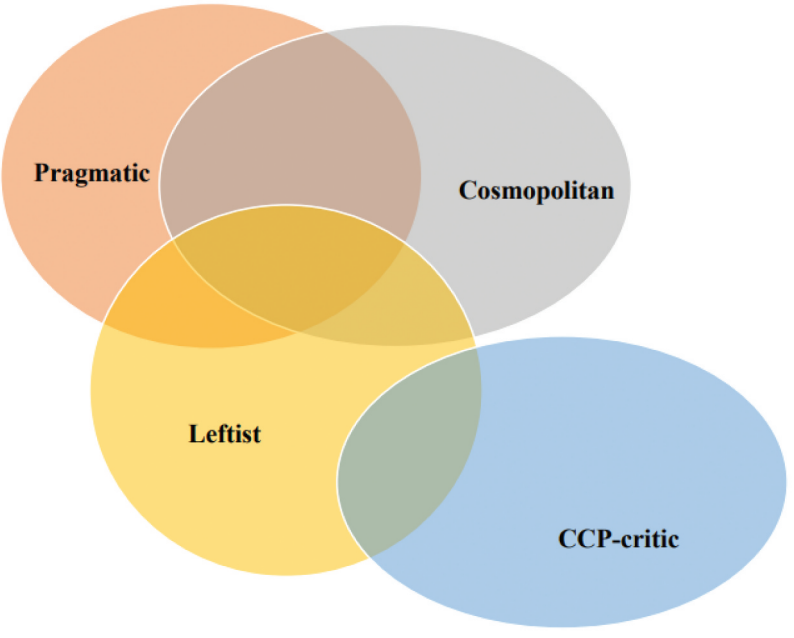

Figure 1. Four typological categories and their overlap
Source: Author's creation

Support for STEMM Collaboration

Pragmatists and Cosmopolitans promote the benefits of STEMM collaboration. Pragmatists emphasise its economic, scientific, and technological advantages whereas Cosmopolitans focus on the strengths of diverse and international research teams and university campuses to support these objectives. These views are the dominant perspectives adopted by university Vice-Chancellors, scientists, economists, and university and scientific peak bodies such as Science & Technology Australia. Pragmatists and Cosmopolitans promote and pursue wide-ranging collaborations with China (Group of Eight, 2020). They have positive experiences during engagement with Chinese universities. For example, when Vice-Chancellors visit China, they tend to be welcomed by their Chinese counterparts and the local media for supporting STEMM research in China (China Online News, 2019). Thus, they assume that reductions in STEMM collaboration would adversely impact their universities and research in this field more broadly. They tend to downplay or ignore national security risks to Australia and to human rights in China.

Pragmatic and Cosmopolitan views are grouped because they intertwine and increase the strength of their advocacy. Their views reflect broad public and Australian government support for the economic, medical, technological, and economic benefits of STEMM (Collinson & Burke, 2022). Since the 1990s, Pragmatic and Cosmopolitan views have influenced successive governments, which have regarded STEMM collaboration as an opportunity to advance research, technology, and economic growth. The government still invests in STEMM collaboration, of which Vice-Chancellors, scientific peak bodies, and academics take advantage, such as the ACSRF.

Table 1. Four Sets of Perceptions of STEMM Collaboration between Australia and China

	Pragmatic	Cosmopolitan	Leftist	CCP-critic
Background	University leaders and Vice-Chancellors, STEMM and economics academics, scientific peak bodies		Chinese Studies and humanities academics	Chinese Studies and humanities academics, and academics and policy analysts with national security and defence focus
Stance on STEMM collaboration	Supportive		Somewhat supportive	Critical
Influence on how collaboration is perceived in Australia	Relatively strong		Limited	Increasingly strong
Positive experiences with Chinese academics and students	✓	✓	✓	
Positive exposure to growth of China's economy and higher education sector	✓	✓		
Positive view on China assists their employment opportunities and university objectives	✓	✓		
Concerned about human rights situation in China			✓	✓
Concerned about China–West military tensions			✓	
Concerned about anti-Chinese racism	✓	✓	✓	
Concerned about growing Australian government control over universities	✓	✓	✓	

Source: Author's analysis

As China has become a core part of the global STEMM research ecosystem, Pragmatists and Cosmopolitans have argued that Australia needs such collaboration to advance research. For instance, according to Universities Australia (2020):

> The ability of a country to deliver on its social and economic aspirations is strongly related to its ability to effectively connect with the world around it and utilise the knowledge and resources to its advantage … There are few industries or endeavours that match the interconnected nature of the global research system. Globally, US$2 trillion is invested in research every year. Australia represents about 1 per cent of this expenditure. In knowledge generation terms, we generate 4.2 per cent of the world's scientific publications but comprise only 0.3 per cent of its population.

Collaborating with Chinese universities provides academics with opportunities to apply for funding. For example, the Research Fund for International Scientists, which is funded by the National Natural Science Foundation of China, provides scientists who are not citizens of the PRC with funding to conduct basic scientific research in China, up to an annual value of 800,000 RMB (equivalent to A$168,000) per project (National Natural Science Foundation of China, 2022). As Brianna, a Pragmatist who has won funding through this scheme, explains, '[as] an academic, there's a lot of pressure to produce publications and get grant funding [from her university]. The links with China are more opportunities to do that research because we can link with these other universities'. Furthermore, 'we [her Australian and Chinese collaborators] go and ask for one million yuan (equivalent to A $224,000) [from the Chinese university] and it just magically appears'.

China has the largest number of STEMM university graduates globally with whom Australian scientists can collaborate. The Center for Security and Emerging Technology found that, in 2019, there were 49,498 STEMM PhDs awarded at Chinese universities (Zwetsloot et al., 2021). In 2019, 8,891 STEMM PhD students graduated from Australian universities (Department of Industry, Science, Energy, and Resources, 2021b). As Ryan (another Pragmatist) argues, 'if we didn't collaborate extensively in China as a fifth of the world's population, you're going to cut out a whole pool of potential talent'.

Due to the MOE's investments in STEMM research, China's universities are attractive for Australian academics who want to access advanced technology. Mason (a Pragmatist) emphasises that collaboration has mutual benefits:

> It's a bit of a mistake to see [research collaboration] in zero-sum terms, particularly from an Australian perspective. We haven't got a hope in hell of staying at the international technology frontier unless we collaborate internationally, we've always done that. It's just a fact. I think these people [who oppose collaboration] don't like the reality of the world. But the reality of the world today is that there are an increasing number of areas where China is at the technology forefront.

These voices tend to selectively emphasise examples that accord with their objective to promote STEMM collaboration, such as COVID-19 research, a field in which Australian and Chinese scholars have a track record of working together. On 11 January 2020, University of Sydney Professor Edward Holmes tweeted the genome of SARS-CoV-2, thus making it available to the world and allowing for the rapid development of COVID-19 testing and vaccines (Foley, 2021). The genome's mapping was a global endeavour, made possible by collaboration between Holmes and Fudan University Professor Zhang Yongzhen, who held the genomic information (Zhang & Holmes, 2020). Pragmatists such as representatives of the Go8 promote this example to emphasise STEMM collaboration's importance (see Visentin, 2020). For example, the Australian government awarded Holmes the 2021 Prime Minister's Prize for Science for his research (Department of Prime Minister and Cabinet, 2021).

While they may be concerned about human rights or national security risks, Pragmatists tend to prioritise STEMM collaboration. For example, in response to concerns that this form of collaboration risks making the human rights situation in China even worse because it could help develop surveillance technologies, Jane Golley (a Pragmatist) states 'How can Australia best stop abuses against Uyghurs? Stopping collaboration won't stop that. If we stop research collaboration China will still develop new technologies and we will be left outside the game' (cited in Gan, 2019).

PRC-oriented scholars assisting to expand Australia–China university engagement

A sub-group of Pragmatists are classified as PRC-oriented insofar as they have close personal and occupational connections to China. These Pragmatists emphasise the mutual bilateral benefits of university engagement to Chinese audiences, such as universities and the government. These scholars are originally from the PRC or from a Chinese-language community in Southeast Asia and have migrated to Australia. PRC-oriented Pragmatists differ from other Pragmatists, such as Western-born scientists, who typically spend only short periods of time in China teaching and researching and are thus less likely to engage closely with Chinese

culture, language, or politics. The PRC-oriented scholars, meanwhile, use their expertise and academic positions to engage with and provide advice to Chinese universities, think tanks, the Chinese government, and PRC-linked Overseas Chinese organisations such as the Federation of Chinese Scholars in Australia (Federation of Chinese Scholars in Australia, 2021). These professional organisations facilitate networking for their members and event attendees. Such activities align with the Double First-Class University Strategy to expand global research collaboration, advance science and economic modernisation, and boost China's university rankings (State Council, 2015).

Those from STEMM disciplines use their positions to advance science in China and expand linkages with Australian universities. For example, Professor Yu Aibing has played an important role in deepening Monash University's China engagement. Yu is the Monash University Vice-Chancellor's Professorial Fellow of Engineering and the Pro Vice-Chancellor and President of Monash Suzhou, a joint venture with Southeast University in China. Yu has extensive links with Chinese universities, think tanks, overseas Chinese organisations, and the central Chinese and local governments (Monash University, 2021a). For example, he was an Honorary President of the Jiangsu Overseas Exchange Association (Monash University, 2016), a sub-body of the Overseas Chinese Exchange Association, which aims to represent overseas Chinese and assists them to build collaborations abroad and share technology with China (Jiangsu Overseas Exchange Association, 2021). Yu has played a role in developing the Monash–Jiangsu Industrial Technology Research Institute (JITRI) collaboration, which the Chinese government operates with the goal of commercialising science and technology (Monash University, 2015; 2021b). In 2015, Monash University and JITRI signed an initial A$4 million agreement, which was expanded in 2016 as JITRI provided an additional A$12 million (Monash University, 2016).

Anti-STEMM Collaboration Arguments

CCP-critics believe the regime is a threat to academic freedom in Australian universities and that STEMM collaboration risks Australia's economic prosperity and national security, as well as human rights in China. Clive Hamilton (2019) rejects the idea put forward by Pragmatists and Cosmopolitans that 'international scientific collaboration is a pure good because it contributes to the betterment of humankind'. He sees claims by university leaders in favour of research collaboration as promoting universities' budgetary 'bottom line'.

CCP-critics assume that their personal experiences, as well as their knowledge of and exposure to the negative outcomes of STEMM collaboration, such as through their research on national security, ensure they are detached observers of this form of collaboration. These critics include Chinese Studies academics who work in the humanities and who are concerned about China's human rights situation, and others who have a focus on national security and who see the PLA as posing security risks to Australia. CCP-critics believe Pragmatists and Cosmopolitans ignore the negative implications of STEMM collaboration because of their positive experiences and personal interests in the process (Hamilton, 2019). Whereas Pragmatists and Cosmopolitans tend to ignore the risks of STEMM collaboration due to their own experiences and objectives, CCP-critics avoid acknowledging or downplay the benefits for Australia that this relationship has produced.

Risks to human rights and national security

CCP-critics criticise the country-agnostic approach to STEMM collaboration pursued by Vice-Chancellors, university and science peak bodies, and scientists, because it ignores national security and human rights risks (Hoffman, 2019). As part of this approach, universities and researchers pursue global research partnerships regardless of a country's political system or record on human rights. CCP-critics worry about China's worsening human rights situation, in particular the development of 're-education camps' and use of surveillance in Xinjiang (Leibold, 2020). They are concerned that Australian universities and leaders are complicit in the Chinese government's and security agencies' infringements on human rights by expanding STEMM collaboration.

These concerns were expressed in a joint 2019 *Four Corners* documentary titled 'Red Flags', which uncovered extensive collaboration between Australian universities and Chinese entities involved in Beijing's global surveillance (ABC, 2019). This includes research collaboration with Chinese companies blacklisted by the US government due to being implicated in human rights abuses against Uyghurs. Global Tone Communication Technology (GTCOM), a data-mining company, is a subsidiary of a state-owned corporation overseen by the CCP's Central Propaganda Department. GTCOM is majority owned by the Chinese government and undertakes research collaboration to test its technology with the University of New South Wales (UNSW) (Rubinsztein-Dunlop et al., 2019). Reflecting this concern, Logan (a CCP-critic) states:

> What you tend to have on the science side is a poor understanding of the Chinese political situation, and the way in which the party is intertwined with anything to do with money or technological innovation. So you see collaborative partnerships that have emerged that are quite problematic on a range of uses, like dual-use technology or projects related to artificial intelligence, which may look innocuous but then is used to racially profile and target Uyghurs.

These examples have influenced how Australian university Vice-Chancellors and research administrators approach STEMM collaboration. In 2018, a former Curtin University Professor, Liu Wanquan, who is now a Professor at Sun Yat-Sen University in China, co-authored a research paper with China-based collaborators. It was revealed that the study involved taking photos of students aged 18 to 22 at Dalian Minzu University and used AI-powered analysis to improve facial recognition of the Uyghur, Tibetan, and Korean minorities in China (Wang et al., 2018). In response to 'Red Flags', in 2019 Curtin University announced a review of its research approval procedures (McNeil et al., 2019). In 2021, Curtin determined that Liu's research breached ethical standards because the authors did not gain informed consent from the students whose photos were taken for the study. Curtin saw this study as a reputational risk due to its potentially adverse effects on human rights (Belot, 2021). Facial recognition technologies are used by police and state security agencies in China for surveillance and social control (Hoffman, 2019). In 2021, Curtin Deputy Vice-Chancellor Professor Chris Moran called for the paper to be retracted by Wiley Publishing, but Wiley has refused (Belot, 2021). Curtin's response contrasts with its earlier strategy of expanding collaborative partnerships with its Chinese counterparts and technology companies such as GTCOM (Hastie, 2019).

Risks that STEMM collaboration aids the PLA's military development

CCP-critics are concerned that collaboration on STEMM assists the development of dual-use technologies that have military–civilian purposes and are used by the PLA. Hamilton (2019) argues that there is no longer a clear distinction between civilian and military technologies 'because major civilian technologies, like big data, satellite navigation, and facial recognition technology, are used in modern weapons systems and citizen surveillance'.

Perceptions of research collaboration are contingent on assumptions about national security and human rights. Ethan (a CCP-critic) criticises the limited scrutiny that university administrators place on STEMM collaboration and supports greater university regulation:

> It would be nice if collaboration was all warm and fuzzy and shared values as [university] administrators like to imagine. Unfortunately, it isn't. I don't think it is reasonable for universities to be collaborating scientifically with the PRC on technologies that could have potential military or surveillance uses that would implicate researchers in the unfolding crimes against humanity in Xinjiang. Should my university be collaborating in AI technology with a Chinese university involved in defence research? The obvious answer for me is no.

Similarly, Alex Joske (2018), a former Australian Strategic Policy Institute (ASPI) analyst, argues that to modernise its technology, the PLA has expanded collaboration with foreign universities and that these projects are often supported through Australian taxpayer funds. For example, he raises the issue of Curtin University researchers collaborating with PLA-affiliated scientists on explosions and projectiles (Joske, 2018).

The Leftist critique

Leftists share CCP-critics' concern about the potential for universities to assist in the development of technologies that infringe on human rights in China, but support STEMM collaboration and broader China engagement. Leftists are primarily academics in the humanities and Chinese Studies who have left-wing economic and political beliefs. They tend to reject and downplay the CCP-critics' 'China threat' narratives, which they see as stigmatising Chinese people and exacerbating political tensions between Australia and China. Leftists believe that the CCP-critics have legitimised growing control by the government and security agencies over research in Australia, with detrimental effects on academic freedom (see e.g., Keane, 2021). As David Brophy (2021) argues, responses to concerns about human rights in STEMM should not increase the power of the government and security agencies to intervene in the university sector. To respond to these challenges, he emphasises the need 'to democratise the university and enable staff and students to collectively engage with the ethical and political questions that arise from international collaborations'. Nevertheless, Leftists have little influence because their perspectives at are odds with public opinion and the political mainstream in respect to the security threat that China poses (Lowy Institute, 2022). Neither do they emphasise the economic benefits of STEMM collaboration. Rather, as the next section shows, works by CCP-critics and especially researchers at ASPI, a national security focused think tank, have influenced the expansion of government scrutiny and restrictions on STEMM collaboration to mitigate security risks.

The China Debate's Implications for Australian Universities: The Focus on National Security

Participants in the CCP influence debate have shaped public opinion and policy regarding STEMM collaboration. Through their emphasis on the opportunities that flow from this process, since the 1990s Pragmatic and Cosmopolitan considerations have had the most influence on how scientists, Vice-Chancellors, administrators, university peak bodies, and the Australian government perceive STEMM collaboration. Since 2017, however, the influence of CCP-critics has been more apparent in the government's assessment that China collaboration is a threat to Australia's economic and national security and to human rights within China. This is reflected in the expansion of policies, guidelines, and regulations over Australian universities, declines in public funding for STEMM collaboration projects, and increases in funding for defence-related research. Before the 2022 Federal election, the Australian Labor Party (ALP) generally supported the Liberal National Party (LNP) government's (2013–2022) policies on China (Dobell, 2022), but in government (2022–) the ALP has tried to reduce tensions with Beijing with the goal of removing trade measures against key industries such as coal. In December 2022, Foreign Minister Penny Wong met her counterpart Yi Wang in the first Ministerial visit in three years to commemorate the 50th anniversary of diplomatic ties (ABC, 2022). In 2023, a series of measures were gradually removed, such as trade restrictions on barley.

The University Foreign Interference Taskforce (UFIT) Guidelines

In 2019, the Australian government and university sector created the UFIT Guidelines to counter foreign interference in the tertiary education sector. The guidelines were updated in 2021 and had the stated objective 'to provide additional guidance on which universities can draw to assess risk in their global engagements, and to safeguard their people and data', including through their governance frameworks, and to increase government, national security agency, and university cooperation (Department of Education, 2021). This initiative reflects the growing influence of CCP-critics and especially the notion that universities have not gone far enough to mitigate the threat of foreign interference and thus require greater government and internal oversight to mitigate risks to national security, human rights, and economic competitiveness. For example, Alex Joske (2018) argued for additional scrutiny on Chinese scientists' affiliations with the PLA due to security risks. He proposed to '[e]stablish a committee bringing together members of the national security community and university leaders' (Joske, 2018), which would focus on cooperation to manage and communicate on security risks.

Vice-Chancellors and university peak bodies have expressed support for the guidelines. According to the Group of Eight (2021), the UFIT Guidelines provide a sufficient balance between foreign influence threats and managing international engagement opportunities and respecting institutional autonomy rather than relying on direct government regulation. In a reflection of the growing influence of the CCP-critics, universities have responded to the guidelines and government pressure by increasing their due diligence on international research partnerships. For example, Monash University, the

University of Sydney, the University of Queensland, and UNSW have engaged John Garnaut to audit their China engagement and management of the risks associated with foreign influence (Bonyhady, 2021). The Garnaut audit aims to ensure that international engagement, such as with Chinese universities, is in Australia's national interest, and to identify if researchers have disclosed their academic affiliations and funding sources. In response, the University of Queensland (2022) and the University of Sydney (2022) have implemented requirements on higher research degree students and academic staff to disclose foreign university affiliations or where they are conducting research that may have military use.

The UFIT Guidelines state that universities must have due diligence processes to mitigate the risks of foreign influence, especially in international collaboration in areas with potential military use (Department of Education, 2021). In response, universities have placed additional scrutiny on STEMM collaboration. In 2020, the University of Adelaide reported that seven collaborative research projects with overseas institutions had been cancelled or not pursued. These proposed projects included a cryptography collaboration with funding from a Chinese multinational because it had potential military uses. However, the University of Adelaide still undertakes international collaboration with China due to the opportunities the relationship presents (Department of Industry, Science, Energy, and Resources, 2021a).

Leftists see attempts by university leaders and administrators to increase due diligence as reflecting greater managerial power over academic activities. University of Sydney Professor John Keane (2021) argues that his institution's responses to foreign influence have increased the burden on scholars by requiring them to disclose their foreign affiliations. Further, Keane (2021) contends that such decisions have been based on transparent engagement with academic staff. He believes academic staff are better placed to mitigate the risks of foreign influence than external consultants or research administrators whose primary role is not research. Further, Leftists perceive that this increasing focus on national security and foreign influence discriminates against Chinese people (Brophy, 2021). This is because a purpose of the audits is to identify whether academics are affiliated with a Chinese military university or are illicitly transferring research and technology overseas.

National security and public funding

A growing trend in recent years is that the impact of national security considerations has increased in ARC-funded collaborative projects in the field of STEMM between Australian and Chinese academics. Examining ARC grants is useful because winning external research funding is important to finding and maintaining an academic career (Monash University, 2021c). ARC grants are reviewed by other academics and recommended to the Federal Minister for Education through a peer-review process (ARC, 2021). Further, examining ARC grant trends tells us which areas of research, and which research collaborations, the government is willing to support. The government uses its funding and influence over the ARC to promote projects that it believes are in the national interest, such as economic development, medical research, and national security. Since 2018, to win ARC funding applicants must meet the national interest test (NIT) and the Minister for Education can veto projects that are deemed to not meet the NIT (ARC, 2021).[2]

From 2002 to 2022, STEMM collaboration, as measured by the total number of co-authored publications, expanded (SciVal, 2022). Public funding for collaborative projects has been a key driver for such publications, but ARC funding for STEMM projects between Australian and Chinese collaborators has declined since 2019 in the context of worsening public opinion and government attitudes about the security threats that China poses to Australia.

From 2002 to 2017–2018, governments led by the LNP Coalition (2002–2007 and 2013–2022) and the ALP (2007–2013 and 2022–) viewed STEMM collaboration as an opportunity and provided expansive funding, but this support declined from 2019 due to increasing security concerns. As Figure 2 shows, funded Linkage and Discovery projects rose for Australia–China projects from 32 in 2002 to 142 in 2019, but by 2022 this had dropped to 65.[3] The proportion of ARC projects that involved collaboration with Chinese partners rose from 3.5 per cent in 2002 to 14.2 per cent in 2019 but dropped to 8 per cent in 2022.[4]

The funding trends for ARC projects between Australian and Chinese collaborators reflect changing public opinion about the economic, scientific, and security risks and opportunities of engaging with China. Public opinion about STEMM collaboration with China remains positive. For example, an ACRI and UTS Centre for Business Intelligence and Data Analytics poll (Collinson & Burke, 2022) found that 61 per cent of respondents agreed that 'Academics from Australia should continue to partner with academics from China to undertake research projects', while 15 per cent disagreed. Similarly, 69 per cent agreed that 'Australian scientists working with Chinese scientists is beneficial for Australia', while just 11 per cent disagreed (Collinson & Burke, 2022).

This indicates that the public has supported the provision of government funding for STEMM collaboration with China, such as through the ACSRF, in less risky disciplines including medical and economic focused research, but there is also growing public concern about the security threat that China poses, especially in STEMM fields with potential military use. The government has responded to these concerns by ruling that public funds cannot be used to support research that may endanger national security.

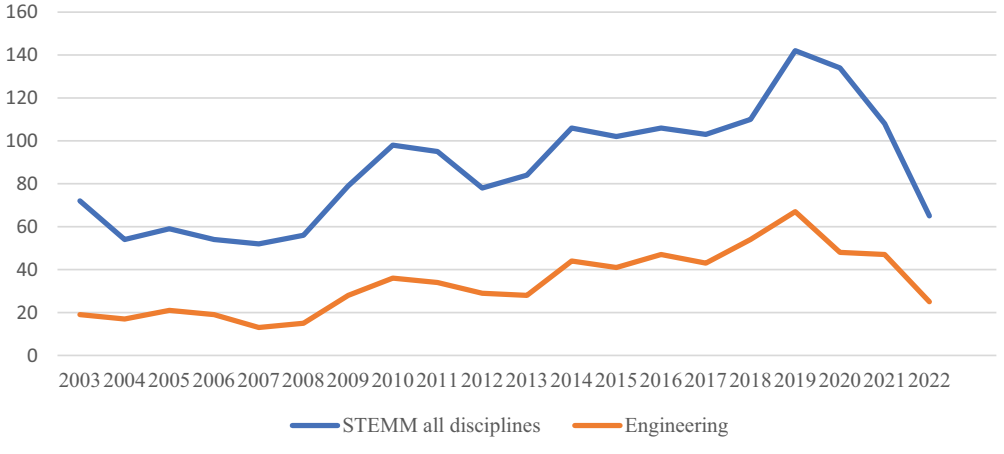

Figure 2. ARC-funded projects in Australia–China STEMM collaboration (2002–2022)
Source: Generated from data provided by the Australian Research Council (2022)

From 2002 to 2019, increases in ARC grants aligned with positive public opinion towards China. According to the Lowy Institute (2022), 77 per cent of Australians thought China was more of an economic partner and 15 per cent saw China as more of a security threat in 2015, but by 2018 public attitudes had become more negative. In 2022, 63 per cent of Australians believed China was more of a security threat than an economic partner, and 33 per cent believed China was more of an economic partner than a security threat.

The government has been increasingly willing to restrict STEMM collaboration. In 2020, the then-Minister for Education, Dan Tehan, blocked five STEMM applications for funding up to A$500,000 worth of ARC grants with international collaborators. This came after ASIO subjected them to additional vetting to assess their national security risks. A total of 18 projects were subjected to such vetting, with the remaining 13 retaining their funding because they did not pose a risk to national security (Packham, 2021). These projects involved engineering, physics, materials science, and nanotechnology research, which have potential military applications (Ross, 2020), while the cancelled projects included collaborators involved in the TTP and with PLA-linked Chinese universities (Packham, 2021). Such cancellations align with ARC funding trends for engineering projects. As Figure 2 shows, the number of ARC-funded engineering projects with Chinese collaborators, which was the top discipline for collaborations from 2002 to 2022, rose from 13 in 2002 to 67 in 2019, before dropping to 25 in 2022.[5] This increased scrutiny reflects the CCP-critics' view that public funds for projects involving Chinese collaborators with PLA linkages should be restricted (e.g., Joske, 2018).[6]

There has also been increased funding for research focused on defence. In November 2021, former Prime Minister, Scott Morrison (2018–2022), announced the Blueprint for Critical Technologies, which aims to position Australia as a leader in technologies deemed vital for economic health and defence. These technologies include AI, which has dual-use military purposes, and economic and medical applications, such as vaccines. The Blueprint promises A$100 million over 10 years for Quantum funding (Critical Technologies Policy Coordination Office, 2021).

This funding is part of Australia's response to security concerns and the Chinese government's investment and advancements in critical technologies (Morrison, 2021). In 2021, the National Bureau of Statistics of China (2021) reported that in 2020 Chinese government funding for research and development reached US$378 billion. Further, defence-focused funding aligns with CCP-critics' calls for the government to shape STEMM research to align with Australia's security interests. For example, in September 2021, an ASPI report argued for a critical technologies strategy in the context of strategic competition with China (Hanson & Cave, 2021). Additionally, this funding seeks to align with the US, which has placed pressure on Australia to support its strategic goals to maintain its technological and strategic competitiveness vis-à-vis China, including as part of the AUKUS and Quad alliances (e.g., Jackett, 2022). The Australian government continues to support STEMM collaboration in disciplines such as medicine, but it has been influenced by CCP-critics to mitigate security risks and to demonstrate that it is acting in the public interest.

STEMM collaboration and academic freedom

The debate about the risks and rewards of collaborating in STEMM research with China has had direct implications for academic freedom. According to the interviewees,

academic freedom generally means the freedom to pursue research without external influence, but this definition does not fully reflect the complexity of the issue. In Sen's view (1993), individuals selectively describe ideas in ways that suit their objectives, which means for instance attitudes towards academic freedom will be shaped by individual experiences of and interests in the risks and opportunities that STEMM collaboration presents. On the one hand, for instance, CCP-critics support the Australian government's recent interventions to monitor and even limit STEMM collaboration, such as by restricting public funding for projects that involve Chinese partners in fields that have military applications. They justify these restrictions in the name of mitigating the risks to Australia's national security and human rights in China, while maximising the economic, scientific, and medical benefits. On the other hand, Pragmatists and Cosmopolitans argue that the government should grant autonomy to researchers so that opportunities for fruitful collaboration and innovation are maximised, and they favour public funding to advance STEMM collaboration from which they have benefitted. Leftists, meanwhile, contend that academics should be free to pursue research without considering the national interest, or the government's designated priorities, as such requirements restrict the breadth of topics that academics can pursue. These different conceptualisations of academic freedom reflect the challenge to produce a universal understanding among Australian scholars of what this form of freedom should in fact protect.

According to Evans and Stone (2021), the protection of academic freedom in the university system should be strong enough to withstand pressure from the public, government, and university managers. However, academic freedom can come under pressure as university administrators seek to align academic activities with their brand during internationalisation, and the government can use its legislative and funding power over universities to shape activities to meet its objectives. As Marginson (2022b) argues, scientists pursue research with like-minded scientists, largely free from government, but such freedom may be sensitive due to intensifying geopolitical competition. This argument has been partially validated in this article, given that STEMM output has risen in the 21st century as Australian and Chinese scientists have collaborated (SciVal, 2022) despite the tense state of bilateral relations. However, influenced by the views of CCP-critics, the government has increasingly tried to shape STEMM research through special funding initiatives and priorities, restrictions on projects that are seen as a risk to Australian interests and security, and the promotion of those that deliver economic and scientific benefits (e.g., the ACSRF). Further, as CCP-critic arguments become more influential, and to demonstrate they are acting in the national interest, university leaders and administrators increasingly support these objectives through the UFIT Guidelines. Universities have accepted funding and supported projects that align with government priorities, such as Monash's collaboration with JITRI to deepen engagement for economic benefits (Monash University, 2021b). They have also cancelled projects that are deemed to not support or risk national security, as in the case of the University of Adelaide (2020). This article thus confirms that the ability of scholars to pursue collaboration can be restricted as academic freedom becomes secondary to security concerns (Evans & Stone, 2021; Marginson, 2022b): that is, the more China is seen as a threat, the less public, government, and university support and funding there is for STEMM collaboration.

Conclusion

This article has focused on how geopolitical competition has impacted Australia–China STEMM collaboration, with wide-ranging implications for science, economic development, medicine, national security, and human rights. By drawing on Sen's (1993) conception of 'positional objectivity', I have demonstrated that individual interest, personal experience, and beliefs shape how Australian academic researchers see the efficacy of collaboration with their Chinese counterparts. These perceptions, in turn, have influenced how Australian researchers have argued about the optimal path forward (see Table 2). Since the internationalisation of Australian tertiary education in the 1990s, the Pragmatic and Cosmopolitan perspectives have influenced the development of STEMM collaboration due to the opportunities China has presented, but this relationship has come under pressure as CCP-critics have highlighted the national security and human rights risks involved.

The article now concludes by identifying the implications of the China debate for the Australian university system, especially for those scholars with aspirations to international collaboration. By focusing on the UFIT Guidelines, my findings confirm that Australia is part of a growing response in the West to counter security threats from China in universities (d'Hooghe & Lammertink, 2022), while making a new contribution to the literature on global STEMM collaboration amidst geopolitical competition. This form of collaboration continued to increase until 2020 despite tensions in Australia–China relations (Laurenceson & Zhou, 2020), but I have shown how public funding for these projects has been severely impacted by security concerns. This finding about how these concerns are adversely affecting public funding is somewhat consistent with other studies, which have found that concerns over national security and foreign influence have reduced STEMM outputs between American and Chinese scholars too (see Jia et al., 2022; Wagner & Cai, 2022). As ARC funding becomes more restricted, it is thus likely that Australia–China outputs will also decline due to the importance of public funds for research. My findings illustrate that where there are greater security concerns about China, pressure grows on STEMM collaboration, and especially on disciplines with potential military use.

Nevertheless, the bibliometric data that I have analysed shows how the number of co-authored publications involving Australian and Chinese scholars in STEMM grew between 2017 and 2021 (SciVal, 2022). This is consistent with the experience of the US: in the context of increasing geopolitical tensions, American scientists

Table 2. Summary of Arguments about Key Issues in China Collaboration Debate

Issue/ Typology	Collaboration poses threat to Australian democracy, national interest, and economic prosperity	Collaboration presents economic opportunities	Collaboration offers opportunities to enhance cultural diversity	CCP influence debate reflects anti-Chinese sentiment	CCP rule and its human rights record warrants public criticism	Australia's alliance with the US should be openly supported
Pragmatic	No	Yes	Yes	Yes	No	Ambivalent
Cosmopolitan	No	Yes	Yes	Yes	No	Ambivalent
Leftist	No	Ambivalent	Yes	Yes	Yes	No
CCP-critic	Yes	No	No	No	Yes	Yes

Source: Author's analysis

still worked with their Chinese partners on COVID-related research (see Lee & Haupt, 2021). This demonstrates that Western governments continue to support and promote research in STEMM disciplines that are perceived to produce positive outcomes (e.g., in medicine). In Australia, this was evident in the ACSRF and Professor Holmes' work on COVID-19. Despite the prominence of its critics, this persistence in collaboration demonstrates that advocates of STEMM collaboration in Australia remain influential due to the scientific and economic opportunities that China presents. Based on these findings, a fruitful direction for further research would be to examine the impact of geopolitical competition in comparative perspective and how this shapes national responses, in both Western and non-Western contexts.

Notes

1. For discussion of the origins and motives of Sweden–China research collaborations, see Shih and Forsberg (2022).
2. In November 2023, the government introduced a bill to remove the requirement for Ministerial approval of ARC grants to limit political interference (see Clare, 2023).
3. The ARC states that there are 15 unspecified projects. Even if all 15 are STEMM, this is a substantial drop.
4. Overall international collaboration in ARC projects has remained stable. For example, in 2019, 81.4 per cent of projects indicated an international collaborator, and in 2021 it was 80.9 per cent.
5. The number of ARC-funded projects in biological and medical sciences between Australia and China is too small to analyse trends.
6. Another reason for the decline in international collaborations is that in 2020 the Chinese government began to discourage international collaboration to build domestic technological self-sufficiency (Ministry of Education & Ministry of Science and Technology, 2020).

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Appendix. Interviewees and Commentators Referred to in this Article

Name/ Pseudonym	Discipline	Typological group
Mason	Economics	Pragmatic
Sarah	Economics	Pragmatic
Amelia	STEMM	Pragmatic
Ryan	STEMM	Pragmatic
Brianna	STEMM	Pragmatic
Owen	Commerce	Cosmopolitan
Ethan	Humanities	CCP-critic
Mia	Humanities	CCP-critic
Lena	Humanities	CCP-critic
Oliver	Humanities	CCP-critic
Logan	Humanities	CCP-critic
Jackson	Humanities	CCP-critic
Jerome	Humanities	CCP-critic
Daniel	Humanities	CCP-critic
Allison	Humanities	CCP-critic
Aiden	Humanities	CCP-critic
Percy	Humanities	Leftist
Ashley	Humanities	Leftist
Gabriella	Humanities	Leftist
Christian	Humanities	Leftist
Dylan	Humanities	Leftist
William	Humanities	Leftist

Commentators

Name	Discipline /research focus	Typological group
Jane Golley	Economics	Pragmatic
James Laurenceson	Economics	Pragmatic
Michael Biercuk	STEMM	Pragmatic
Edward Holmes	STEMM	Pragmatic
Toby Walsh	STEMM	Pragmatic
Group of Eight	n/a	Pragmatic
Universities Australia	n/a	Pragmatic/Cosmopolitan
Science & Technology Australia	STEMM	Pragmatic/Cosmopolitan
Yu Aibing	STEMM	PRC-oriented Pragmatist
Danielle Cave	National security	CCP-critic
Clive Hamilton	Humanities	CCP-critic
Fergus Hanson	National security	CCP-critic
Samantha Hoffman	Humanities	CCP-critic
John Garnaut	n/a	CCP-critic
Alex Joske	National security	CCP-critic
James Leibold	Humanities	CCP-critic
David Brophy	Humanities	Leftist
John Keane	Humanities	Leftist