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Artificial intelligence with American values and Chinese characteristics: a comparative analysis of American and Chinese governmental AI policies

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Abstract
As China and the United States strive to be the primary global leader in AI, their visions are coming into conflict. This is frequently painted as a fundamental clash of civilisations, with evidence based primarily around each country's current political system and present geopolitical tensions. However, such a narrow view claims to extrapolate into the future from an analysis of a momentary situation, ignoring a wealth of historical factors that influence each country's prevailing philosophy of technology and thus their overarching AI strategies. In this article, we build a philosophy-of-technology-grounded framework to analyse what differences in Chinese and American AI policies exist and, on a fundamental level, *why* they exist. We support this with Natural Language Processing methods to provide an evidentiary basis for our analysis of policy differences. By looking at documents from three different American presidential administrations—Barack Obama, Donald Trump, and Joe Biden—as well as both national and local policy documents (many available only in Chinese) from China, we provide a thorough comparative analysis of policy differences. This article fills a gap in US–China AI policy comparison and constructs a framework for understanding the origin and trajectory of policy differences. By investigating what factors are informing each country's philosophy of technology and thus their overall approach to AI policy, we argue that while significant obstacles to cooperation remain, there is room for dialogue and mutual growth.

Keywords China · United States · Artificial intelligence · Policy · Geopolitics

1 Introduction

Artificial intelligence (AI) has recently become a focus of governments worldwide. AI is a "growing resource of interactive, autonomous, and often self-learning agency" with many applications and the potential to reshape society (Floridi and Cowls 2019; Hagerty and Rubinov 2019). Globally, the United States of America (US) and China are two of the most prominent players in AI development (Ding 2018; Savage 2020). Their dynamic is often framed as a "race" for AI supremacy (Savage 2020), which is concerning because the US and China are geopolitical rivals and military superpowers.

Both countries only recently defined national AI strategies: China in 2017 and America in 2019. Some work has examined China's AI strategy, including (Allen 2019; Ding 2018; Roberts et al. 2019). Rasser et al. (2019) has looked at America's. There is a dearth of both comparative work focusing on the vision endorsed by the strategy and of work examining local plans in China (Roberts, et al. 2021a, b). In assessing the AI approaches of the US, UK, and EU (before new developments in American AI policy), Cath et al. (2018) used the term "Good AI Society" to analyse the visions of AI-enabled societies endorsed in policy documents, which informs this analysis. Recently, Roberts et al. (2021a) compared the strategies of China and the EU, and Roberts et al. (2021b) compared those of the EU and US. Nevertheless, a gap still exists for a comparison of the strategies of China and the US. This article seeks to fill it.

Given the competitive dynamic of the US and China, it is vital to understand not only their approaches but also how

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they might interact with each other. In this work, we use a philosophy of technology level of abstraction[1] to analyse the relevant AI policies. Geopolitical competition and economic levels of abstraction can inform us about international dynamics in the present moment. However, a philosophy of technology level of abstraction provides a historical grounding encompassing political and economic developments and offers a framework with which to analyse possible future dynamics.

Although private actors are significant players in AI development, this article focuses on government strategies, incorporating the private sector insomuch as the government delegates implementing AI strategy to it. In addition, while our positionality informs our ethical stances and normative judgements, we intentionally adopt a framing of ethical pluralism, which holds some values to be desirable while allowing latitude for others to be interpreted by different cultures in different places (Ess 2020). Finally, we adopt a mixed-methods approach that combines quantitative analysis of textual documents with a philosophy- and digital-ethics-informed evaluation. Our quantitative methods are based in natural language processing (NLP), a branch of computer science that uses computers to "understand and manipulate natural language text or speech" (Chowdhury 2003). NLP methods allow us to analyse term frequency and importance across languages, providing a more evidence-based foundation for our qualitative analysis. This unusual combination of methods provides a more objective grounding for textual analysis and points at directions for future work.

The article is structured into four more sections: Sect. 2 outlines the quantitative analysis and its conclusions, Sect. 3 focuses on the US, Sect. 4 on China, Sect. 5 discusses our findings, and Sect. 6 concludes the article. Tables of translated Chinese terms and words deemed significant for quantitative analysis can be found in the appendix.

2 Quantitative analysis

To provide a more objective grounding to our later documentary analysis, in this section, we will quantitatively analyse American and Chinese policy documents to identify differences between them. We will focus on the following questions: (a) how American and Chinese national documents compare in terms of sentiment and focus; (b) how local Chinese AI policy documents compare to national policy documents; (c) how American documents have changed over time.

2.1 Conclusions

Our quantitative analysis utilises *term frequency-inverse document frequency* (tf-idf), sentiment, and frequency analyses of AI policy documents from the US and China to help reveal their priorities. Tf-idf analysis uses the frequency of individual terms in a document relative to their frequency in a larger corpus to calculate a statistic indicating the relative importance of a word in a document. By identifying the top 20 words by tf-idf score in each document, we reveal that American documents have a broader focus than the Chinese documents. With garbled text[2] removed, there are 206 unique terms in the top 20 tf-idf lists of the 16 American documents, an average of 12.9 per document. This is a similar number to the national Chinese documents (53 unique terms, 13.25 per document). However, the Chinese documents are generally more consistent in focus, with 7 words appearing in at least 75% of the documents; no words are mentioned that consistently in the American documents.

Our diachronic analysis of significant words between administrations reveal significant differences in American documents over time and across government branches. When comparing an Obama-era AI R&D plan with two Trump-era documents based on that plan, there was a statistically significant increase in certain terms used in rhetorically bombastic ways, including "American", "leadership", and "partnerships" in both Trump documents. In one Trump document, we saw a significant increase of the rhetorical terms "federal", "partnership", and "economy"; in the other, we saw a significant increase in the terms "R&D" and "innovation". We generally saw decreases in technological terms, with "AI", "internet", and "system" decreasing in one and "development", "research", and "technology" decreasing in the other (though this could perhaps partially be explained by the increase in "R&D"). When comparing a Trump executive order (EO 13859, which established the American AI Initiative) with two Congressional documents from the Trump administration, we saw a statistically significant increase in focus on ethics-related terms and a decrease in rhetorical flourishes in the Congressional documents, indicating a disconnect between the rhetoric of the executive branch and the actions of the legislative branch.

Sentiment analysis identifies the "prevailing emotional opinion" of a text; the Google Cloud NLP API assigns a score value to a document indicating its sentiment and a magnitude value indicating how much emotional content a document contains (Natural Language API Basics 2021). By looking at these scores, we see that American documents

[1] A level of abstraction "qualifies the level at which a system is considered", clarifying which aspects of the system should be analysed (Floridi 2016).

[2] The pdf-to-text conversion process is not perfect and resulted in some incomprehensible text, especially in headings, but not enough to be concerning.

are more balanced in terms of emotional sentiment and also more densely emotional than the Chinese documents. This makes sense considering that many of the words of focus (determined by tf-idf analysis) in American documents, especially Trump-era executive documents, are rhetorical flourishes, while the Chinese documents focus on terms related to industry, technology, and innovative development.

Frequency analysis reveals that undergirding the American documents' emphasis on American technology and development is a competitive dynamic with China. While competition-related terms do not appear in the overall top focal words, China is mentioned in several of the documents, including in Obama's "AI, Automation, and the Economy" (3 times, 0.013% of all words), the National Security Commission on Artificial Intelligence (NSCAI) report executive summary (6; 0.190%), and its accompanying "Full Report" (205; 0.081%). To put those numbers in context, the Obama report discusses how students in China have math abilities exceeding their American peers (Executive Office of the President 2016b), while in the NSCAI report—which focuses on helping the government become "AI-ready" in security—the rhetoric is explicitly competitive, with sentences like "China possesses the might, talent, and ambition to surpass the United States as the world's leader in AI in the next decade if current trends do not change" (NSCAI 2021). China's documents, on the other hand, barely mention America. The only national document that mentions America is the White Paper on AI Standardization, which mentions America 8 times (0.025% of all words), and usually in concert with the EU or Japan, or else when discussing the National Institute of Standards and Technology (NIST) as one of several institutions working on developing AI standards (China Electronics Standardization Institute 2020). Only two local documents mention America, but in reference to the Cleveland Medical Center and Utah State University (General Office of the People's Government of Heilongjiang Province 2018; Guangdong Provincial Department of Science and Technology 2018).

China's national documents are largely positive in sentiment and development-focused, with a particular emphasis on "innovation" (创新, *chuangxin*) and words related to technology applications. Its local documents are distillations of its national documents. Our tf-idf analysis reveals that local documents prioritise application- and innovation-related words more intently than the national documents, focusing on applying technology in their local contexts. Both "artificial intelligence" and "innovation" have higher average magnitude in local documents that mention them than the national documents, indicating a heavier focus in the local documents. From a documentary analysis perspective, many of the documents read very similarly, with emphasis on building "innovation centres," achieving breakthroughs in "key core technologies", and identifying "application scenarios." To quantitatively compare these files to the seminal 2017 Three-Year Action Plan laying out important steps to achieve goals in the 2017 New Generation AI Development Plan, we programmatically identified similar phrases between the local documents and the Action Plan. Overall, there were over 400 substantial similarities identified. This revealed a significant amount of boilerplate language (ranging from section headers to ideological statements) but also some larger passages that were copied wholesale. Shenzhen and Nansha's documents copy a section about healthcare R&D wholesale, while Guangzhou and Hubei plagiarise a section about building new industrial ecosystems. These and other similarities raise the question of how truly committed these localities are to the centralised Party view of AI. The documents could to some extent be a box-ticking exercise to demonstrate local loyalty to the Party, with little genuine commitment. However, the success of these plans—and China's national plans—depends on the broader development atmosphere and, indeed, interactions with the United States. In the next two sections, we will qualitatively analyse American and Chinese policy documents before comparing the two country's approaches. In doing so, we aim to identify the vision of a "Good AI Society" endorsed by the various documents, its level of cohesion, and what it may mean for the competitive dynamic between the two countries.

2.2 Methodology

American and Chinese national documents were identified via a literature review. Provincial documents were identified with the Google search "＜province name＞新一代人工智能". Lower-level plans were identified largely incidentally as a result of those searches. When preparing documents for analysis, we obtained text directly from published documents when possible. When documents were only available in PDF format, we used the pdfplumber Python library to extract text. Some documents embedded informational boxes as images, so we used an online image-to-text service and the Tesseract Python library to extract the text.

For all the documents, we used the Google Natural Language API to analyse sentiment and entities of focus. To calculate tf-idf scores, we used the Jieba Python library (which specialises in splitting Chinese text into words) for the Chinese documents and the Natural Language Toolkit (NLTK) library for the American documents, identifying the top 20 terms in each document and their tf-idf scores. To compare texts, we used the difflib Python library to compare similar chunks of text using a 70% match threshold, meaning that chunks were flagged as a match if at least 70% of characters

matched text in the base document.[3] All codes can be found at https://github.com/emmiehine/us-china-ai-comp.

To perform a diachronic analysis of American documents, we tallied the frequency of all words in the tf-idf analysis of individual documents, then took the top 30 words by frequency for each category, excluding numbers and irrelevant words (such as names), and including extra words if tied. We did the same for the Chinese national and local documents. We used these lists to add supplementary words to the English analysis. The words used in this analysis can be found in Table 1 in the appendix. We compared proportions of occurrence using a z-test for statistical significance. As there have been no recent regime changes in the governing Chinese Communist Party (CCP), we did not perform a diachronic analysis of its documents, but focused on comparing national and local documents.

3 Policy evaluation: United States

American AI development policy began at the end of Barack Obama's presidency in 2016, marking the first of three distinct phases of AI policy that correspond to different administrations. Donald Trump (in office 2017–2021) and Joe Biden (sworn in January 2021) defined new approaches to AI policy. These approaches feature several consistent themes, including the minimisation of government intervention while favouring an emphasis on the role of free-market capitalism and a high regard for American innovation. Themes that vary across the phases are the degree to which diversity in AI development is emphasised and who is defined as the beneficiary of AI. These fluctuating priorities reflect different visions of a Good AI Society, but they seem to be stabilising under Biden. Table 2 in the appendix shows the documents analysed from each of the three administrations.

3.1 Obama: a diversity-focused foundation

The Obama administration began America's AI development policy in 2016 and established a relatively hands-off foundation prioritising diversity, American innovation, and faith in the free market. In October 2016, the National Science and Technology Council (NSTC) issued a report "Preparing for the Future of Artificial Intelligence" alongside "The National Artificial Intelligence Research and Development Strategic Plan" (R&D Plan). The former was a survey of the state of AI, its applications, and questions that AI development raises for society and public policy, with recommendations for government action. The latter was an outline of seven R&D strategies, intended to be a "high-level framework" to identify AI R&D needs and provide overall guidance for Federal agencies, but not to provide granular research agendas. These were supplemented in December 2016 with "Artificial Intelligence, Automation, and the Economy", which outlined the potential impact of AI-driven automation on the American job market and economy, as well as policy recommendations.

The Obama administration's documents have been criticised for offloading responsibility for ethical behaviour and relying too much on private-sector self-regulation (Cath et al. 2018). However, they do provide a laudable foundation for grounding the administration's vision of a Good AI Society in efforts to create a diverse AI pipeline. All three documents emphasised the need to increase diversity in all aspects of AI development, and in the technology industry as a whole. AI is meant to be developed "*by* and *for* diverse populations" that includes not just Americans but a variety of international partners, with the US in a leading position (Executive Office of the President 2016a). The economy document focused on the American worker, discussing the risks and benefits of automation (Executive Office of the President 2016b). However, the documents' arrival at the end of the Obama administration meant that there was limited opportunity for policy implementation.

The Obama-era documents introduced two themes that continue into the Trump era: a reliance on free-market capitalism, and faith in American innovation. The R&D Plan noted that the private sector should take the lead in development, but that the government must take action in areas that will not be prioritised by industry due to insufficient profit drivers. Cath et al. (2018) note that "Preparing for the Future of Artificial Intelligence" envisioned the government defining the "outer parameters" of AI use and collecting data to inform policymaking, while the private sector innovates within a broad regulatory framework. Overall, the picture is one of a relatively hands-off administration that wants to lead internationally, diversify the AI talent pipeline, and encourage specific research priorities, but otherwise gives the private sector wide latitude to innovate.

3.2 Trump: nebulous American values

The first half of the Trump administration was characterised by a completely hands-off approach to AI policy. When policymaking began, it emphasised minimal government regulation and oversight and included borderline-jingoistic praise of "American values" and innovation. Executive branch documents are much less diversity- and ethics-focused than the Obama-era documents and the international principles that the US has endorsed, but some of these themes persist in background documents.

[3] 544 matches of at least 4 characters were identified, but 126 were "到2020年" ("by 2020"), leaving 418 substantial matches.

For the first two years of the Trump administration, there was little action on AI policy, with members of the administration taking the view that "there is no need for an AI moon-shot, and that minimizing government interference is the best way to make sure the technology flourishes" (Knight 2018). However, the Department of Defense (DoD) took initiative to issue its own "Artificial Intelligence Strategy" (the DoD Strategy) in 2018. There was a summit on "AI for American Industry" in May 2018; the summary document emphasised the need to maintain US leadership and "realise the full potential of AI for the American people" by removing "overly burdensome" regulations to limit "barriers to innovation", and also increase public–private partnerships (The White House Office of Science and Technology Policy 2018). The Trump administration initially did not have a vision for a Good AI Society, just a society where businesses worked to develop AI with minimal oversight and regulation from the government.

However, this changed rapidly after the summit. About three weeks after the summit, then-Defense Secretary Jim Mattis, who oversaw the issuing of the DoD Strategy, wrote a memo to Trump urging him to create a national AI strategy. The New York Times reported that Mattis "argued that the United States was not keeping pace with the ambitious plans of China and other countries" (Metz 2018). Indeed, the DoD Strategy stated that "our adversaries and competitors are aggressively working to define the future of these powerful technologies according to their interests, values, and societal models" (DoD 2018). While it is difficult to establish direct causation, in February 2019, Trump signed EO 13859, entitled "Maintaining American Leadership in Artificial Intelligence", which reflected some of the DoD strategy themes. The order established the "American AI Initiative", focusing on American driving of technological standards and development, training workers, promoting trust in AI, and fostering an international environment advantageous to American interests (Executive Order No. 13859 2019). One of its objectives was to "[implement] an action plan to protect US economic and national security interests" (Future of Life Institute 2021). In the context of Mattis's memo, this implied a coordinated effort to preserve American leadership in an economic and geopolitical competition against China. It also introduced the idea of AI with "American values", a pillar of Trump's "Artificial Intelligence for the American People" initiative (Artificial Intelligence for the American People 2021; Executive Order No. 13859 2019). While the website seemed to define "freedom, guarantees of human rights, the rule of law, stability in our institutions, rights to privacy, respect for intellectual property, and opportunities to all to pursue their dreams" as these "American values", the executive order seemed to consider privacy as separate from American values. The 2020 "American Artificial Intelligence Initiative: Year One Annual Report" (AAII Report) included "privacy, civil rights, and civil liberties" under the umbrella of "our Nation's values" (Artificial Intelligence for the American People 2021; Executive Order No. 13859 2019; White House Office of Science and Technology 2020). These unclear and unstable values seem to be more a matter of rhetoric than a genuine foundation for a Good AI Society.

One clear aspect of Trump's AI plan is the prioritisation of the free market and innovation. Minimal regulation continued to be emphasised across departments, with the memo "Guidance for Regulation of Artificial Intelligence Applications" and the standardisation report "U.S. Leadership in AI: A Plan for Federal Engagement in Developing Technical Standards and Related Tools" framing excessive government regulation as hampering innovation and thus American competitiveness (National Institute of Standards and Technology 2019; Vought 2020). Although they contained little emphasis on ethical and unbiased AI, Trump's documents brought in "trustworthiness" as a guiding value.

After this, the chronology becomes convoluted. EO 13859, signed in February 2019, references "trustworthy AI", which echoes both the April 2019 EU High-Level Expert Group (HLEG) on AI's "Ethics guidelines for trustworthy AI" and the US-approved May 2019 OECD "Recommendation of the Council on Artificial Intelligence" (Alexander 2019). Trump's first executive order predates them both, but "Executive Order 13960: Promoting the Use of Trustworthy Artificial Intelligence in the Federal Government" (EO 13960) was issued in December of 2020, raising the question of who is influencing whom. The Trump administration's definition of "trustworthy" does not seem to have evolved between executive orders, as the language in the second order references the first, and reads remarkably similar to it. Ironically, the word "trustworthy" appears nowhere in the second executive order except in the title; every reference to "trust" regards fostering public trust so that AI can be used more extensively (Executive Order No. 13960 2020), not necessarily more effectively.

The "Purpose" section of the second executive order stated that "The ongoing adoption and acceptance of AI will depend significantly on public trust" (Executive Order No. 13960 2020), showing that its motivation was to foster continued deployment and use of AI, while the OECD and HLEG guidelines focus on ensuring AI is trustworthy because it respects human rights and serves the "common good" (HLEG 2019; Recommendation of the Council on Artificial Intelligence 2019).

Comparing the three principle-sets shows that the HLEG and OECD recommendations present a far more "human-centred" perspective on trust, while the executive order is much more competition- and economics-focused.[4] The

[4] The HLEG document does not ignore economic competition, stating that "We also want producers of AI systems to get a competitive advantage by embedding Trustworthy AI in their products and ser-

HLEG and OECD principles' explicitly ethics-centric approach to trustworthy AI is much more idealistic than the American principles, which repeat that the principles (which include "purposeful and performance-driven") are to be applied "to the extent practicable" (Executive Order No. 13960 2020). Thus, we see that the ethics-first approach from the HLEG report, echoed in the OECD principles that the US endorsed, was not replicated in the later Trump executive order (Floridi 2019). The Trump administration's documents change the focus from a human- and ethics-centred understanding of "trustworthy" to one that is meant to foster innovation and competition.

As indicated in our diachronic quantitative analysis that showed a significant decrease in use of ethics-focused terms from the Obama to Trump administrations, innovation has undoubtedly replaced the Obama administration and American allies' focus on ethics and diversity as the primary focus in the Trump administration's initial documents, at the potential cost of America's position on the international stage. This is ironic considering the explicit goal of maintaining American leadership. In the AAII Report, it is stated that:

> "Global leadership in AI matters. With the United States in the lead—together with like-minded allies—we will shape the trajectory of AI development for the good of the American people—enriching our lives, promoting innovation, fostering trust and understanding, and ensuring our national defence and security" (White House Office of Science and Technology 2020).

In this vision, American allies are expected to subsume their own goals to those of America, which seems unlikely to occur and raises the question of whom AI is to benefit. The administration's website about its AI initiatives was entitled "AI for the American People". However, the decreased emphasis on diversity in the flagship documents implies that this may not mean all American people (Artificial Intelligence for the American People 2021). EO 13859 and the AAII Report make scarce mention of developing inclusive and unbiased AI, which could harm innovation by limiting the scope of problems addressed and diminishing the problem-solving capacity of teams.

However, further examination shows that the Trump administration's supporting documents have not entirely discarded the foundation laid by the Obama administration. A 2019 update to the 2016 R&D Plan expounded upon the Obama-era discussion of diversity (Select Committee on Artificial Intelligence of the National Science and Technology Council 2019), while a 2019 R&D "Progress Report" mentioned how National Science Foundation (NSF) support for the Advanced Placement Computer Science Principles exam resulted in considerable increases in the number of female, Black, and Latinx students taking the exam (Artificial Intelligence Research & Development Interagency Working Group et al. 2019). The 2021 National Artificial Intelligence Initiative Act codified points made in these supporting documents, including supporting "equitable access" to K-12 AI education, technology ethics fellowships, and research into AI's ethical and social issues (Smith 2021).

Though some similarities remain deep down, when compared to the Obama-era documents, there is more jingoistic rhetoric (supported by our quantitative analysis) centring around nebulous "American values" and geopolitical competition, especially with China. In fact, in some interpretations, American values seem to include world leadership. An Office of Science and Technology Policy release explicitly linked AI "developed in a manner consistent with our Nation's values and interests" to protecting American interests "against strategic competitors and foreign adversaries" (Office of Science and Technology Policy 2019). It is not difficult to see that these "competitors" and "adversaries" are primarily China; the Trump administration issued sanctions on some of China's leading AI companies (Doffman 2020; Freifeld and Alper 2021). The actual values endorsed in these documents are respect for the free market and American innovation. Missing is an administrative awareness of the need to ensure AI is developed by and for the full diversity of America's population (necessary for AI to be genuinely trustworthy), although some of the supporting documents sought to carry this forward. Ultimately, "American values" seem to be a nebulous, nationalistic rallying cry to increase support for American AI, defined in opposition to China. This geopolitical competition aspect is further honed in the Biden administration's approach to AI.

3.3 Biden: value clash

Joe Biden took office in January 2021, but his administration is already explicitly defining its AI policy primarily as a value contest with China, which is being followed by Congress. To support this, the administration is taking proactive and reactive measures to strengthen America's position. As of July 2021, the two major developments in the Biden administration's AI agenda have been the release of the National Security Commission on Artificial Intelligence (NSCAI) "Final Report" and the relaunch of AI.gov. While the administration still emphasises the value of American

Footnote 4 (continued)

vices" but also emphasises minimisation of risk (HLEG 2019). The OECD document also recognises that AI could "contribute to positive sustainable global economic activity" but in the context of responding to "key global challenges", again presenting a more humanity-oriented approach (Recommendation of the Council on Artificial Intelligence 2019).

innovation, it seems to be more willing to regulate the free market than the Trump administration and appears to be building a more coherent and inclusive vision of a Good AI Society.

The NSCAI was established in 2018 to consider how to advance AI and related technologies "to comprehensively address the national security and defence needs of the United States" (About 2021). Its work spans the Trump and Biden administrations. The Final Report, published in March of 2021, defines "AI competition" as a "values competition" that should be "embraced", and explicitly specifies that the competitor in the AI-values competition is China (NSCAI 2021), which the Trump documents declined to do.

Congress appears to be following this line. In May 2021, two bipartisan bills were introduced in the Senate to implement the NSCAI's recommendations, which are explicitly designed to counter China. Senators Heinrich and Portman, co-founders of the Senate Artificial Intelligence Caucus, also sent a letter to the director of the NSF, urging the Foundation to prioritise safety and ethics research. The letter parrots the Trump administration rhetoric but also, in its focus on ethics, contains echoes of the Obama administration: "AI leadership by the United States is only possible if AI research, innovation, and use is rooted in American values. Central to these values are notions of ethics and safety" (Martin Heinrich Newsroom 2021).[5]

In non-military efforts, the bipartisan "United States Innovation and Competition Act of 2021" continues to emphasize competition and diversity. If enacted, it would require government guidance on AI to consider the NSCAI principles and the principles laid out in Trump's executive order and increase funding for AI research and scholarships (Martina and Shepardson 2021; Senate Democrats Newsroom 2021a). There is an entire section called the "Meeting the China Challenge Act of 2021", which directs the President to increase sanctions on China; the Secretary of State is called to submit annual reports on Chinese AI activity in the "Advancing American AI Act" section (United States Innovation and Competition Act of 2021 2021). Thus, we again see explicit competition with China, but this time concerning economics and technology, not just defence. The bill summary notes that "Herein lies the promise of a United States approach to AI that leverages U.S. strengths of entrepreneurialism and innovation" (Senate Democrats Newsroom 2021b), showing that Congress believes that these particularly American characteristics are its strengths over China.

The executive branch of the Biden administration is also following this line by taking measures to curtail China's progress in AI and boost the American AI industry, while also fostering diversity. Biden has kept many of the Trump administration's reactive export bans targeting Chinese technology companies and added sanctions on seven Chinese supercomputing companies (Au 2021). These reactive initiatives accord with the NSCAI Report's recommendations to create "choke points" to curtail Chinese progress (Kharpal 2021; Nellis 2021). However, the Biden administration is also taking proactive measures to invest in domestic chips and foster cooperation with allies (Kharpal 2021). Biden has held talks with Japanese Prime Minister Yoshihide Suga and South Korean President Moon Jae-in about countering China's chip industry, indicating increased efforts to unite allies against Chinese AI and other technology (Fitzsimmons 2021).

In concert with these outward-facing foreign policy measures, the Biden administration is also taking internal action to promote the diversity and strength of the American AI industry. AI.gov was initially launched in March of 2019 to showcase Trump's "Artificial Intelligence for the American People" efforts (Johnson 2019). After Biden's inauguration, it redirected to a working group page until May 5, 2021 (*Wayback* Machine, 2021), when it was relaunched as a website targeting the general public with information about its AI initiatives and scholarship programs for students to help promote diversity in AI (Mucha, 2021).

The website outlines a promising vision of ethical and trustworthy AI. It links to many of the Trump documents, but clarifies and expands on many of the concepts in six pillars:

1. Innovation.
2. Advancing trustworthy AI.
3. Education and training.
4. Infrastructure.
5. Applications.
6. International Cooperation (The National Artificial Intelligence Initiative (NAII) 2021).

Under the "Advancing Trustworthy AI" pillar, trustworthiness is defined to be more human-centric, in a way that is significantly closer to the HLEG and OECD than the Trump administration, emphasising ethics, freedom from bias, fairness, and privacy preservation (Advancing Trustworthy AI 2021). Notably, the site seems to finally define "American values", which include most of the various concepts mentioned in various Trump documents:

> "The United States has long been a champion and defender of the core values of freedom; guarantees of human rights; the rule of law; stability in our institutions; rights to privacy, civil rights, and civil liberties; respect for intellectual property; and opportunities to all to pursue their dreams. The AI technologies the Nation develops and uses must respect human rights

[5] Note another definition of "American values".

and fundamental freedoms, reflect these core values, and be devoted to helping people" (International Cooperation 2021).

It also emphasises that the US will work with allies to foster these goals (International Cooperation 2021). This long-overdue definition seems to be providing a solid grounding for executive and legislative action on AI. It could provide a foundation for a Good AI Society that uses innovative development to benefit all Americans, as well as America's allies. In October of 2021, the White House Office of Science and Technology Policy called for an AI "bill of rights" to protect some (but as yet undefined) rights of American citizens from the negative impact of AI. The announcement includes a public request for information, stating that "Technology can only work for everyone if everyone is included" (Lander and Nelson 2021), reflecting the deliberate inclusivity revived from the Obama administration. This may also be building on a September 2021 statement by the newly formed US-EU Trade and Technology Council (TTC). The subsection "Statement on AI" states that "The United States and European Union acknowledge that AI-enabled technologies have risks associated with them if they are not developed and deployed responsibly or if they are misused" and affirms a "human-centered" approach that explicitly references the OECD Recommendation. When referencing "our common democratic values and human rights", it explicitly states that the US and EU are "opposed to uses of AI that do not respect this requirement, such as rights-violating systems of social scoring". The next point states that the US and EU "have significant concerns that authoritarian governments are piloting social scoring systems with an aim to implement social control at scale" (U.S.-EU Trade and Technology Council Inaugural Joint Statement 2021). Given that "social scoring" is almost synonymous with "China", this appears to be further encouraging a values clash. This closing of ranks, establishing a strong stance on American—and shared "democratic"—values, also increases the competitive dynamic with China.

Together, the Biden administration's legislative and public-facing initiatives represent a merger of the Obama administration's diversity-focused efforts and the Trump administration's focus on American leadership. Our quantitative analysis indicates that Democrats in Congress and the White House are more likely to emphasise ethics and diversity. Under Biden, these are no longer snuck in the background. China is explicitly presented as America's competitor as measures to hinder China's progress are escalated in concert with efforts to promote American innovation. In its vision of a Good AI Society, the Biden administration continues to emphasise free-market principles in R&D but is taking measures to reshape the industry. In emphasising diversity and an ethics-focused definition of trustworthiness while pushing multilateral initiatives, it re-defines the beneficiaries of AI to be all Americans and America's allies—but not China, the policy documents of which we will evaluate in the next section.

4 Policy evaluation: China

China has been signalling its intention to develop AI since 2013, but its efforts began in earnest after the "Sputnik moment" in 2016, when AlphaGo (a Google DeepMind AI program) defeated Go champion Lee Sedol (Roberts et al. 2019). In 2017, the State Council released the "A New Generation AI Development Plan" (AIDP). Shortly after, the Ministry of Information and Technology, one of the bodies tasked with implementing the plan, issued the "Three-Year Action Plan for Promoting Development of a New Generation Artificial Intelligence Industry" (Action Plan). The AIDP functions as a "wish list" of hundreds of applications but does not provide detailed implementation, while the Action Plan outlines specific progress needed in certain sectors and sets out measures to strengthen development and implementation efforts. As Sheehan (2018) writes, "The hope is that if local officials cough up a sufficient number of these gifts… they will eventually add up to the plan's headline goal: global leadership in AI", although this goal may not be sole leadership as the US seems to desire for itself. If enough of these are in basic research, it may address the concerns Tse and Wang (2017) raise about incentives for rapid results encouraging "new applications of pre-existing technology" instead of fundamental research. However, our quantitative analysis shows that both national and local plans still prioritise applications over basic research, despite the concerns Tse and Wang (2017) raise about this decreasing the likelihood of AI breakthroughs emerging in China. Table 3 in the appendix shows the four national documents and Table 4 the 28 province, autonomous region, and city-level local documents we analysed. In addition, Table 5 provides a list of important Chinese terms and their English translations.

According to the AIDP, global leadership in AI development China's primary goal. The AIDP lays out milestones for 2020 (enter the "first echelon" of international AI competitors),[6] 2025 (achieve major breakthroughs and establish regulations), and 2030 (achieve "world-leading" AI and become "the world's primary AI innovation centre") (State Council, 2017a). What this means for the future of global AI competition is unclear, as becoming *a* world leader would

[6] According to Allen (2019), China assesses itself to have achieved this goal in mid-2018 and considers itself to be in a "race of two giants" with the US.

require it to meet or exceed the US in AI prowess, while achieving the latter goal of becoming the "primary" innovation centre would require it to take the lead in AI innovation from the US. To accomplish these goals, China is using a combination of central government, local government, and private-sector initiatives. These often-intertwined initiatives attempt to preserve social stability while encouraging innovation and technical progress, but raise questions about who the beneficiaries of AI are.

4.1 National development initiatives

China's national policy documents reflect a drive for global leadership to be achieved by a harmonious balance of social control and innovation. However, national funding initiatives may not be keeping pace with requirements and are concentrated in prosperous areas, calling its goals into question.

While different administrations have distinct definitions for AI plans in the US, China has not had any regime transitions as it has worked to develop AI. The primary divisions are between national and local efforts. China's AI development plans operate through a structure called "fragmented authoritarianism", where the central government outlines overarching goals and delegates implementation to local governments while sharing power among central agencies (Lieberthal 1992; Zeng 2020). Economic-performance-based incentives motivate local politicians to compete for the best implementation in their area (Roberts et al. 2019). This is often thought of as an exclusively top-down approach, but it is, in fact, a combination of top-down guidance and bottom-up initiatives (Ding 2018; Zeng 2021). This creates regional competition that allows for successful initiatives to be promoted to national levels, but can also create coordination problems (Zeng 2021).

After the expiration of the seminal 2017 Action Plan in 2020, no subsequent plan was issued. Instead, AI seems to have been wrapped into China's more extensive science and technology (S&T) goals in the 2021 "Fourteenth Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Outline of the Long-Term Goals for 2035" (Five-Year Plan). The government's decision to wrap AI back into its larger technology plans implies a return to its pre-2016 view of AI as "one technology among many" (Roberts et al. 2019), albeit with more emphasis on its importance and still guided by the AIDP.

These documents outline significant goals to be achieved through a harmonious balance of social control and innovation. The "Basic Principles" undergirding the AIDP are "technology-led", "systems layout", "market-dominant", and "open-source and open" (State Council 2017a). The "market-dominant" principle is quite different from the US version of the same, emphasising the need to "better take advantage of government planning and guidance,… market regulation,… etc." rather than adopt a free-market approach (State Council 2017a). The "technology-led" principle includes the goal of "disruptive breakthroughs"[7] (State Council 2017a), which is a sentiment worth interrogating. One of China's goals in its technology development is to promote social stability, which is mentioned in both the AIDP and the Five-Year Plan (State Council 2017b; Xinhua News Agency, 2021a). Although the term "disruptive" refers to the technological implications rather than the political implications, disruptive "breakthrough" technologies often go hand-in-hand with social and political disruptions. This is demonstrated by the first three industrial revolutions, when technological innovations in steam power, electricity, and digitisation, respectively, caused massive social and political change (Schwab 2018). When AI is hailed as a key part of the "Fourth Industrial Revolution" (Schwab 2018), it seems that ensuring stability is seemingly incompatible with the disruption inherent to AI development. The "Artificial Intelligence Standardisation White Paper" notes that China must continue to innovate and drive AI development, but that since "the application boundary of innovative technology is difficult to control, it may trigger risk of abuse" (China Electronics Standardization Institute 2020). The Five-Year Plan cautions that the state needs to "preserve social stability and security" during development, which does not seem to correspond with the Silicon Valley innovation ethos of "move fast and break things" (Business Insider 2009). Against this backdrop, the plans emphasise the need for an "innovation-driven" strategy (Xinhua News Agency 2021b), backed by our quantitative analysis that illuminates the intense focus on "innovation". The AIDP describes AI also as a tool for social control in pursuit of the "great rejuvenation of the Chinese nation" (State Council 2017a), indicating that the CCP sees AI as both a threat and an opportunity for social stability.

This particular balance is clarified in the drive for harmony endorsed in Chinese AI ethical principles. Different government institutions have approved three sets of AI ethics principles (Roberts et al. 2021a). Two of them feature the modern word for "harmony" (和谐, *hexie)*. These principle-sets seem to take a global view of human flourishing, but are inherently contradictory. 和 is the character for "harmony" found in Confucian texts and is formed of the radicals for "grain" and "mouth", displaying its origins in an agricultural society. The character 谐 includes the radicals for "words/speech" and "all/every/everyone", implying the need for accord in expressed opinions to achieve harmony. In the "Beijing AI Principles", 和谐 is included in the principle of "harmony and cooperation" (和谐与合作, *hexie yu hezuo*), with 合作 implying a sense of collaboration (literally "together work") (Beijing Academy of Artificial Intelligence

[7] "颠覆性突破".

2019b). The principle states that governance cooperation should occur at levels from academic to international (Beijing Academy of Artificial Intelligence 2019a). In the "Governance Principles for a New Generation of Artificial Intelligence", 和谐 is paired with 友好 (Ministry of Science and Technology 2019), translated as "harmony and friendliness" (和谐友好, *hexie youhao*) (MIIT 2018). It states that AI should be "based on the premise of safeguarding societal security and respecting human rights, avoid misuse, and prohibit abuse and malicious [applications]" (MIIT 2018). Thus, a harmonious balance must be struck between social stability and innovative development. "Harmony and friendliness" is repeated in the September 2021 "New Generation Artificial Intelligence Specifications", which adds more specificity to principles in the previous documents, though the management, R&D, supply, and use specifications are still quite broad (Ministry of Science and Technology 2021). Still, this shows an active commitment to developing a national code of ethics that allows the CCP to define what counts as "promoting human well-being" (Ministry of Science and Technology 2021), among other values.

When it comes to maintaining social stability, the central government is taking an active paternalistic role in regulating AI. The draft "Internet Information Service Algorithmic Recommendation Management Provisions", released on August 17 2021, contain sweeping regulations for recommendation algorithms, including that they may not "[upset]… social order" (Article 6) or "go against public order and good customs" by encouraging addiction or "high-value consumption" (Article 8). The government will categorise recommendation services and regulate accordingly (Article 19) (Translation 2021).

Broader policy documents address the need for balance. The Five-Year Plan references the need to "within stability, seek progress" or "seek progress in stability" (稳中求进, *wen zhong qiu jin*) (Xinhua News Agency 2021a).[8] This phrase originated in the 2011 Central Economic Work Conference and referred to maintaining macroeconomic policy and social stability in concert with rapid economic development (Liu 2011). Ten years on, it is being applied to technology development as well. It goes hand-in-hand with the Action Plan's call for "double initiating" (双创, *shuang chuang*) platforms of innovation and entrepreneurship (创新创业, *chuangxin chuangye*) (MIIT 2017).[9] The central government is attempting to allow an acceptable level of chaos, with the explicit goal of seeking advantages in domestic social control and global geopolitical clout.

However, funding slowdowns call these goals into question. While China's approach to AI development has been summarised as "throwing money at the problem" (Webster et al. 2017), there are indications that the tap may not be as free-flowing as assumed. As with development plans, funding of AI projects and companies can also be separated into multiple categories. Nationally, funding is provided for projects of various scales by the government through the National Natural Science Foundation of China (NSFC), comparable to America's NSF. The NSFC focuses on basic research and "pre-commercial, scientist-led projects" (Acharya and Arnold, 2019). NSFC funding for Information Science projects (which AI falls under) decreased from 2015 to 2016, but has been increasing ever since. However, in both the General Project and Key Program Project (for larger projects) categories, while funding has increased, the project approval rate has decreased, implying that applications are becoming more competitive, and funding is not keeping pace.

Funding is heavily concentrated in "first-tier" cities, with Beijing receiving nearly as much as the third- and fourth-ranked provinces of Jiangsu and Guangdong received, combined. Second-ranked Shanghai received about 60% of what Beijing did. After those four cities and provinces, funding drops steeply, with Hubei province receiving about 34.5% of Beijing's total (National Natural Science Foundation of China 2019). Thus, the beneficiaries of AI development seem to be already-established research hubs which may be problematic given that provincial authorities are largely responsible for advancing the central government's goals. Although these "first-tier" cities and provinces contribute heavily to central government revenue through taxes (Textor 2022), this allocation of funds merely entrenches the development gap between regions.

4.2 Local development initiatives

China's local documents outline lofty goals. Provinces rich and poor aim to use AI development to benefit their local economies, with some success. However, funding concentration in wealthy provinces and headwinds in talent attraction may impede these—and thus national—goals.

In the "federated authoritarianism" model, provincial- and city-level governments are responsible for interpreting and implementing central government plans. Common themes in many local plans include establishing target values for the AI industry, establishing "open innovation platforms", founding technology parks, cultivating AI companies and talent, encouraging collaborative development, and strengthening research and applications in specific sectors. This is supported by our word frequency and tf-idf analysis,

[8] CSET translates this phrase as "[seek] progress while maintaining stability" (Xinhua News Agency 2021b). However, 中 implies that 求进 (seeking progress) is taking place "within" 稳 (stability).

[9] New America translates 双创 as "double innovation" (MIIT 2018), but to avoid an overlap in the use of "innovation" and to preserve the sense of initiating something new, we present an alternative translation.

which shows that application scenarios are prioritised above basic research, despite the dangers to this approach outlined by Tse and Wang (2017).

It is unclear to what extent local plans are genuine development efforts versus paying lip service to the CCP's goals. As outlined in our analysis of similar text chunks, many contain boilerplate language, especially regarding guiding ideology. Furthermore, the outlined goals are often lofty. Zeng (2021) describes the regional targets as "grossly inflated" as they sum to more than double the national industry value target of 150 billion RMB by 2020, itself a high target considering that in 2019, the core industry was estimated at 57 billion RMB. It is also difficult to ascertain how many goals are being met, as there are limited follow-up reports. Hunan, which set a target value of 10 billion RMB by 2021 (Hunan Province Department of Industry and Information Technology 2019), appears to have achieved that in 2020 (Cao and Pang 2021). Guangdong, which set a goal of working with Tencent to develop medical imaging products (Guangdong Provincial Department of Science and Technology 2018), reported the release of an oesophageal cancer diagnosis tool (Yicai Global 2017), and SenseTime and Accenture agreed to construct innovation hubs in Shenzhen (Dou 2018; Han and Zha 2019).

However, economically disadvantaged province Heilongjiang may have been less successful in its 2020 goals. Heilongjiang set a goal of a 5 billion RMB AI industry by 2020 (General Office of the People's Government of Heilongjiang Province 2018), but in 2019, the Jiusan Society (a minor political party that follows the CCP) released a proposal outlining issues faced by the province, including lack of R&D capacity, coordination difficulties, lack of infrastructure, and investment shortfalls (Heilongjiang Provincial Committee of Jiusan Society 2020), indicating that it was likely not on track to meet its goals. This accords with CSET's reporting that funding is more difficult to access for lower-tier cities and provinces, and also with data from the Artificial Intelligence Industry Alliance (AIIA).

The AIIA was founded in October 2017 to "promote collaborative innovation in AI" (Luong and Arnold 2021). Government actors at state, provincial, and local levels form alliances with industry, providing funding, policy incentives, and supervision to promote development and local projects. While it has been suggested that these alliances may allow for less-wealthy provinces like Heilongjiang to access more investment (Luong and Arnold 2021), project data mimics NSFC allocations, with 71% in the "first-tier" cities of Beijing, Shanghai, Shenzhen, and Guangzhou (Liu 2020; Luong and Arnold 2021). This system allows the government to "pick winners" (Luong and Arnold 2021), which appear to be in economically advantaged areas. Complicating goals to attract talent and companies to settle in specific provinces is the fact that talent and companies are finite and scarce resources: there is a shortage of over 5 million AI workers in China (Zeng 2021), who may be inclined to go to provinces with more resources.

Thus, funding allocation indicates that the beneficiaries of the AI development process—independent of the results of that development—may be already-economically advantaged provinces. While it may not be inherently problematic to concentrate development in specific places (*à la* Silicon Valley), pressuring less-wealthy provinces into issuing lofty goals, which then require investing in development efforts in pursuit of an unlikely payoff, means that they may not have the resources to invest in projects that may be more likely to benefit the province, at a cost to the province and the nation as a whole.

4.3 Private-sector development initiatives

Private-sector work is the other key component of China's AI development efforts, playing a significant part in AI development through state-sponsored initiatives and partnerships. While there are notable success stories, funding data questions how much these initiatives can achieve their goals.

China has appointed several "national champions" to lead the charge as "National New Generation Artificial Intelligence Open Innovation Platforms" (AIOIPs). Members of the "National AI Team" are granted increased government support, as well as preferential access to regional projects and public data. These companies are, in turn, expected to lead development, coordinate standards, and act as "open innovation platforms" to "[support] the entrepreneurship" of smaller enterprises (Ding 2018; Larsen 2019).

The emphasis on private companies leading innovation accords with the fragmented authoritarianism model but may negatively impact local areas. Concerns have been raised that a singular focus, such as Hefei's 5 billion RMB "China Speech Valley" focused on intelligent speech, may not suit a city; diversity of capabilities could be necessary to sustain an AI ecosystem (Ding 2020). This may be a consequence of the fragmented authoritarianism model. Since cities and provinces cannot do everything outlined in the plan, they are incentivised to pick a speciality (similar to "national champion" companies), but staking an entire region's economic development on one concept is considerably riskier.

The AIIA allows the state to play a significant role in public–private partnerships. Government officials and state-owned enterprises are overrepresented in AIIA leadership, indicating the state's power in shaping alliance agendas. However, industry still plays a bottom-up role in determining project directions. AIIA application areas are broadly consistent with the priorities laid out in the Action Plan, but also focus heavily on AI-enabled business solutions, showing the influence of industry interests (Luong and Arnold 2021).

As with local and national funding, there are signs that AI investment in the private sector may be cooling off. Equity investment in China's privately held AI companies has faded dramatically over the past several years. CSET estimates that the number of equity investments in private AI companies in China increased between 2015 and 2019. Total investment value nearly quintupled between 2015 and 2017, but then plummeted back to near-2015 levels over the next two years. Furthermore, they find that Chinese investors are "minor players" in international markets (Arnold et al. 2020). 2019 has been called the "capital winter" and is showing significant effects on the industry; 336 start-ups shut down in 2019 (Zeng 2021), which may complicate provincial efforts to attract and cultivate the companies on which the government relies to drive innovation and development.

China sees AI as a tool to enable it to compete with the West, but seems content to work quietly towards its goal of becoming the leading global AI power with little rhetoric of explicit competition in its policy documents. Its goal-oriented model of "fragmented authoritarianism" and enlisting of public and private actors—and willingness to rely more heavily on central guidance than free-market America—allows the central government to maintain social stability while guiding technological innovation, preserving a nebulous sense of harmony. AI seems to be moving from an elevated position to a critical tool in a more extensive technology toolbox, but funding data brings into question the feasibility of China's ambitions.

National and private-sector data show that investment into AI may be slowing, and these effects are also being felt at local levels. While China's fragmented authoritarianism development model seems to give opportunities to all provinces, AI funding is concentrated in highly developed areas. While some projects are successful (such as the China Speech Valley), not all provinces—especially less-wealthy ones—will be able to achieve their likely overly lofty goals considering the aforementioned funding headwinds and talent shortages.

It appears likely that the Chinese and US governments are spending on a similar scale when it comes to non-defence AI R&D spending and other investments (Hao 2019), and also coming to see AI as one technology among many, which may portend future competition on other emerging technologies. Particular to AI, though, is the potential for a values clash. The CCP's emphasis on social stability means that AI is explicitly not being developed for those the CCP considers a threat, including the Uighurs of Xinjiang, who are subject to AI-supported profiling and detention (Mozur 2019). The same principle-sets that emphasise the need for "harmony" also endorse the need for AI with "human values", but these are even less well-defined than Trump's "American values" (Beijing Academy of Artificial Intelligence 2019a; National New Generation Artificial Intelligence Governance Expert Committee 2019). The Beijing AI Principles state that AI should serve the "overall interests of mankind", and the AIDP principles say that AI should "serve the progress of human civilization" (Beijing Academy of Artificial Intelligence 2019a; National New Generation Artificial Intelligence Governance Expert Committee 2019), but ethnicity-based oppression does not serve humanity and must be condemned.[10] In the next section, we will undertake a philosophical analysis to establish a framework that attempts to account for these contradictions.

5 Discussion

To contextualise the differences in AI policy approaches outlined above, we will briefly discuss how the Protestant Ethic and Confucianism impact technology policy in the US and China, respectively. Those two philosophies have had an enormous influence on life and governing style. Thus, they can illuminate how governments may behave regarding AI policy and how incongruities in the domestic approaches laid out in the previous section could be overcome.

5.1 US

Max Weber's theory of the Protestant Ethic intersects with the idea of the technological sublime to encourage a domestically focused AI policy. The individualistic, capitalistic drive of the Protestant Ethic encourages market-driven innovation and little regulation, while the technological sublime has historically encouraged the touting of American technological superiority (Nye 1994; Weber 2001). Both encouraged hard work by individuals: the Protestant Ethic for the sake of demonstrating one's character and gaining salvation, and the technological sublime for individual participation in nation-building. And while both have evolved from their religious roots, the influence of ascetic Protestantism is still seen in Americans' "dedication to work and success", and the technological sublime manifests in a unique sense of American exceptionalism and drive to demonstrate the nation's superiority through technological success (Nye 1994; Weber 2001).

When it comes to AI, this feeds directly into the drive for American leadership in AI and its underlying neoliberal ideology. The individual capitalistic drive of the Protestant Ethic promotes a hands-off regulatory environment driven by market innovation. By this philosophy, the US has always been the world leader in innovative technological

[10] For additional investigations into the abuses targeting Uighurs, see Human Rights Watch (2021); Nice et al. (2021); Rajagopalan et al. (2020); and Ramzy (2021).

development, and AI should be no different. All three administrations celebrate the American worker as a crucial asset that must create AI but be protected from its impacts, reflecting the Protestant Ethic's emphasis on individual work and the technological sublime's celebration of individual innovators. This informs a reliance on free-market policies to guide development which allows for the leveraging of the private sector, but potentially beneficial technologies with limited commercial applications must still be given a chance to flourish. However, this approach is largely incompatible with globalism and the US's obligations to its allies, as demonstrated by the aforementioned passage in the Trump administration's AAII Report, which assumes that US allies will prioritise the "good of the American people" over their own when it comes to AI development. However, since the pursuit of the technological sublime is so uniquely American, it is logical that the sublime provides a foundation for an approach that prioritises domestic interests. It also follows that this approach would lend itself to a nebulous value-set used more as a rallying cry emphasising American exceptionalism than a genuine set of guiding principles.

However, the Biden administration, echoing examples like the railroad and the telephone—which were a success in the US but adopted worldwide—seems to be attempting to broaden the scope of the technological sublime through efforts to work with allies more closely on AI and other technologies. Now, with increased geopolitical competition comes the new stipulation that only those who agree with "American values" can share in those benefits. When signing an executive order to promote industrial competition, Biden said, "In the competition against China… let's show that American democracy and the American people can truly outcompete anyone" (Biden 2021), again displaying the aforementioned faith in American exceptionalism and a philosophically Protestant Good AI Society grounded in hard work and aiming for domestic benefit. When the Protestant Ethic and the technological sublime arose in the US, the US realistically did not have to compete with other countries for technological dominance. Adapting to the rise of China will require a reworking of American priorities to ensure the US is not left behind, mired in blind faith in the exceptionalism of American innovation.

5.2 China

Out of many viable philosophies, Confucianism became entrenched in China because of the advantages it offered in flexibly governing the vast area of mainland China populated by groups with different local cultures and customs (Goldin 2015; Hsiung 2011). According to Confucianism, all beings must respect the five key hierarchical relationships and strive to follow the *dao* to preserve harmony (He 2015). The *dao* intermingles the "right" and the "good" to represent the way things should be (Wong 2012). Harmony is not just a goal of following the *dao* but also a way of following it. It involves balancing competing notions and is situational and context-dependent, leading Wong (2012) to characterise harmony as a "process" more akin to "harmonisation" than a static state.

The *dao* interacts with Confucian technology ethics to encourage "human flourishing", guided by the continuous process of harmonisation, with a particular focus on social roles (Wong 2012). The Confucian Good AI Society involves the government laying out a vision of harmony and stability, which others work to follow, as a father would traditionally govern a family. This can be observed in the AIDP and Action Plan and the highly paternalistic draft regulations on recommendation algorithms. Roberts et al. (2021a) interprets the explicit references to "social construction" and "preserving social stability" in the AIDP as "human-centric" in the sense that it prioritises China as a society, rather than the individual. This is seen in how surveillance systems prioritise recall over precision, resulting in more "harmful actors" being identified but also in more false positives (Roberts et al. 2021b), as well as the government being given more latitude to collect personal information and deploy algorithms (Toner et al. 2021). Confucianism's rise was at least partly due to the need to govern a large country in ancient times. Today, Confucianism seems to provide a foundation for a more inward-facing vision of a domestic Good AI Society emphasising internal harmony, but must adjust, given the rise of globalism. As Goldin (2015) writes, Confucians "attempted to adjust themselves to the world rather than to master it", a fundamentally more peaceful approach than the Protestants' aim for world mastery and reflective of the Confucian emphasis on "self-realisation" over concern with external affairs (Fung 1922).

That the CCP clearly has an outward-facing vision to achieve global leadership in AI, however, shows that China's current government is not a monolithic embodiment of Confucianism, instead adopting a more external orientation that would promote China on the global stage. The presence of "harmony" in two ethics principle-sets would seem to paint a picture of the good governance of AI as a project for humanity by referencing the need for AI to accord with "humanity's values" and "[enhance] the common well-being of humanity" (Beijing Academy of Artificial Intelligence 2019a; MIIT 2018). However, this is premised either on a narrow definition of "humanity" as "those who support the CCP"—which the government's use of AI implies—or on the assertion that humanity has a common value-set. These nebulous values allow the CCP to exert considerable latitude in how it interprets the principles. Some of this flexibility, like mass data collection, may genuinely (or at least ostensibly) be in the interest of public safety. Others, like the mass surveillance and detention of minority ethnic groups, are impossible to justify as conforming to "human values,

ethics, and morality", regardless of the interpretive latitude provided by a stance of value pluralism (MIIT 2018). The idea of "social security" echoes the prioritisation of stability embedded in the guiding documents and raises the question of who defines the "human values" and "human rights" that AI is supposed to respect. Given China's explicitly stated plan to lead in AI development and governance (State Council, 2017a) and new ethics specifications (Ministry of Science and Technology 2021), this indicates an intention to establish what humanity will prioritise and what it will overlook, foreshadowing a clash with "American values".

5.3 Comparison: sublime AI society vs harmonious AI society

The primary commonality between Chinese and American AI policies is a drive to be a (if not the) world leader in AI. While the US has been consistent in its confidence in American innovation but flip-flopped between including its allies and expecting them to follow America's lead, China has been more hesitant in emphasising innovation as it attempts to balance social stability and disruption, but consistent in displaying its hegemonic desires. There is also a difference in the degree to which the two emphasise diversity in development.[11] Both countries' philosophies underlie visions of a "Good Domestic AI Society". In this section, we will compare them in context to examine whether they are truly incongruous.

The Protestant Ethic emphasises the individual's responsibility and rights, while Confucianism trusts leaders to guide the people towards a harmonious society. The former works to dominate nature and does not necessarily put the collective at the forefront, while the latter can sacrifice individual rights (interpreted from a Western perspective). Both, however, aim to foster a flourishing human society, and contain elements that could be held in common with a perspective shift. For example, American ethicists would not disagree with the notion that a safer and more stable society is desirable. However, the Chinese government's methods of achieving this (for example, mass surveillance and social credit scoring) speak more to its desire to maintain autocratic rule. Conversely, few in China would say that more individual prosperity and technological innovation would be a bad thing (especially given the government's drive to achieve a "moderately prosperous society" (Leng and Shen 2020)). However, the lack of government correction of market priorities would raise concerns that progress is not adequately guided. The core missions of each approach are not incompatible. However, each must broaden its approach to look beyond geographical boundaries. The drive to maximise the spoils of AI for just one people will inherently create conflicts even when they can be overcome.

Global conflict is not in keeping with each countries' vision of a Good Domestic AI Society, requiring each to move beyond approaches that strive for internal benefits while eyeing the external world with suspicion. Both approaches offer a path to move beyond a Good Domestic AI Society to a "Good Global AI Society". The Protestant Ethic's ascetic roots required the faithful to live morally and work hard to prove that one was among the saved. However, AI promises a vast amount of material wealth that could feasibly decrease, if not eliminate, the need for individual work (Toews 2021). Everyone can be part of the AI-elect. If these advances in AI emerge in the United States, Americans would have to move beyond the America-exclusive vision of the technological sublime to the more inclusive vision of the railroad and telephone, fostering an altruistic urge to share the fruit for the good of all—as these technologies have benefitted the US more for being shared—instead of hoard them for domestic benefit.

Confucianism entrusts leadership to a ruler, but the ruler's legitimacy is dependent on their ability to maintain stability. Confucian scholar Mencius said that "The people are of supreme importance, the altars of the soil and grain are next, and the ruler is of least importance", and when a lord "endangers the altars of the soil and grain", threatening the stability of society, they should be replaced (Mencius and Ivanhoe 2009). Rulers are responsible for serving the people's best interests; if they create chaos—either domestically or internationally—replacement is justified. Serving the people's best interests includes respecting the views of different groups within a country and an obligation not to provoke conflict with other countries. If China pulls ahead in AI, the CCP would be under pressure to embrace the internal harmonisation process required for external harmony. Harmony does not require total agreement, a sentiment reflected in teachings such as "君子和而不同", which can be translated as "the [person of noble character] is in harmony but does not follow the crowd" (Confucius 2021), emphasising the importance of pursuing inner harmony and tolerating individual differences to move towards harmonious society. Were the CCP to tolerate rather than suppress dissent, it could provide a foundation for an inclusive harmonisation process grounded in a desire to create societal prosperity—a goal shared with the US.

[11] The Beijing AI Principles do mention that "the development of AI should reflect diversity and inclusiveness", but this does not seem to be backed by initiatives to increase diversity in STEM like in the US (Beijing Academy of Artificial Intelligence 2019a).

6 Conclusion

In this article, we have quantitatively and qualitatively analysed the AI development policies of the US and China and assessed each country's vision of a "Good AI Society". The US vision has shifted significantly over the previous three administrations. However, under President Biden, it involves a more hands-on (even if still market-oriented) approach by the government that emphasises the value of American leadership and innovation and close collaboration with allies. Driven by individual Protestant work ethics, this is a broader vision of the technological sublime that includes global cooperation and competition with China. Meanwhile, the Chinese vision also includes global leadership and ostensibly cooperation grounded on fundamental human values, but its use of AI to abuse human rights means that collaboration may not be forthcoming. Furthermore, analysis of projects and funding shows that its goals may be over-ambitious. The Confucian ethics underlying China's development strategy support authoritarian guidance and provide a model for harmonising the need for disruption in AI development and the desire to preserve social stability.

Though neither philosophy was designed to cope with international technological competition, the visions need not be fundamentally incompatible. The Protestant Ethic places more emphasis on the individual and Confucianism on the society, yet both are aimed at benefiting "the people", and neither domestic nor international conflict are conducive to that goal. Avoiding domestic conflict requires defining "the people" to include everyone, and avoiding international conflict requires sharing the advantages of AI, as a single country hoarding its benefits will provoke conflict with other countries. Thus, international cooperation remains the only coherent option to realise a Good Domestic AI Society. This is true regarding both the benefits of AI and its development. AI demands diverse inputs to work for all people. It cannot be developed by any one country—and international talent has always been a "cornerstone of American innovation" (Rasser et al. 2019)—so genuine effort must be made to engage in shared development efforts and overcome conflictual rhetoric. However, complex geopolitical factors, including a continuing trade conflict and escalating competitive rhetoric, means that this is likely easier said than done. If the US decides that specific uses of AI (such as social scoring, referenced in the TTC joint statement) are never acceptable and refuses to engage, there will be no dialogue and thus no chance of progress. This being said, both countries want to benefit their societies; much of what stands in the way of cooperation is a desire to maintain political power and dominance both domestically and internationally. AI can reduce competition for resources and bring prosperity to all, rendering traditional ideas of geopolitical influence obsolete. Thus, governments should move beyond traditional notions of competitive geopolitical dynamics and adopt a stance of value pluralism where they acknowledge that there is room for multiple approaches to governance but are willing to engage in dialogue to outline concrete parameters of shared values for a Good Global AI Society, going beyond self-serving rhetoric of universal "human values". The current competitive rhetoric from the US and overall tensions between the two countries mean that joint action may not be forthcoming. However, if they could look at each other's viewpoints and go beyond paying lip service to the idea of AI being for everyone, it may be possible to develop AI as part of a human project—a Good Global AI Society—led by harmonious cooperation between the two superpowers.

Appendix

See Tables 1, 2, 3, 4 and 5

Table 1 Words used in diachronic analysis

Artificial	Summary	Innovate	Smart	Service
Intelligence	Research	Industry	Future	Cultivate
National	Privacy	Economy	Work	Responsible
Council	Subcommittee	United	Economy	Responsibility
Office	Commission	States	Automation	Produce
Development	Entities	Diversity	Advance	Lead
Technology	Diverse	Partnership	Accelerate	Leadership
Science	AI	Partnerships	Establish	Perception
President	NSTC	Ally	Develop	Scene
Executive	Policy	Allies	Platform	Generation
Report	Options	America	RD	Talent
Security	Organization	American	Sphere	Make
Principal	Organizations	Application	Support	Safe
Enterprise	Original	Promote	Data	Safety
Branch	Output	Develop	Demonstrate	Internet
Coordinates	Outreach	Apply	Wisdom	Strengthen
Means	Omb	China	Unit	System
Chair	Order	Compete	Robot	Mark
Initiative	Innovation	Competition	Robotic	5G

These words were compiled from the top 30 terms from tf-idf analysis of American documents and supplemented with words from the tf-idf analysis of Chinese documents

Table 2 American documents analysed

Administration	Title	Short name	Year
Obama	Artificial Intelligence, Automation, and the Economy		2016
Obama	National Artificial Intelligence Research and Development Strategic Plan	R&D Plan	2016
Obama	Preparing for the Future of Artificial Intelligence		2016
Trump	Summary of the 2018 Department of Defense Artificial Intelligence Strategy: Harnessing AI to Advance our Security and Prosperity	DoD Strategy	2018
Trump	2016-2019 Progress Report: Advancing Artificial Intelligence R&D	R&D Progress Report	2019
Trump	Executive Order 13859: Maintaining American Leadership in Artificial Intelligence	EO 13859	2019
Trump	House Resolution 153: Supporting the development of guidelines for ethical development of artificial intelligence	HR153	2019
Trump	The National Artificial Intelligence Research and Development Strategic Plan: 2019 Update	R&D Plan 2019 Update	2019
Trump	U.S. Leadership in AI: A Plan for Federal Engagement in Developing Technical Standards and Related Tools		2019
Trump	American Artificial Intelligence Initiative: Year One Annual Report	AAII Report	2020
Trump	Executive Order 13960: Promoting the Use of Trustworthy Artificial Intelligence in the Federal Government	EO 13960	2020
Trump	Guidance for Regulation of Artificial Intelligence Applications	Regulation Guidance	2020
Trump	National Artificial Intelligence Initiative Act of 2020	NAIIA	2021
Trump-Biden	Final Report of the National Security Commission on Artificial Intelligence	NSCAI Report	2021
Trump-Biden	Final Report of the National Security Commission on Artificial Intelligence Executive Summary (published separately)		2021
Biden	Advancing American AI Act	AAAIA	2021

Table 3 Chinese national documents analysed

Name (Chinese)	Name (English)	Year
新一代人工智能发展规划	A New Generation Artificial Intelligence Development Plan	2017
促进新一代人工智能产业发展三年行动计划 (2018-2020年)	Three-Year Action Plan for Promoting Development of a New Generation Artificial Intelligence Industry (2018–2020)	2017
人工智能标准化白皮书	Artificial Intelligence Standardisation White Paper	2018
中华人民共和国国民经济和社会发展第十四个五年规划和2035年远景目标纲要	Fourteenth Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Outline of the Long-Term Goals for 2035 [excerpts]	2021

Table 4 Chinese local documents analysed

Name (Chinese)	Name (English)	Year
辽宁省新一代人工智能发展规划	New Generation Artificial Intelligence Development Plan of Liaoning Province	2017
浙江省新一代人工智能发展规划	New Generation Artificial Intelligence Development Plan of Zhejiang Province	2017
甘肃省新一代人工智能发展实施方案	Implementation Plan for the Development of New Generation Artificial Intelligence in Gansu Province	2018
广东省新一代人工智能创新发展 行动计划（2018~2020年）	Action Plan of Guangdong Province for the Innovation and Development of New Generation Artificial Intelligence (2018~2020)	2018
广西壮族自治区人民政府关于贯彻落实新一代人工智能发展规划的实施意见	Implementation Opinions of the People's Government of Guangxi Zhuang Autonomous Region on the Implementation of the New Generation Artificial Intelligence Development Plan	2018
黑龙江省人工智能产业三年专项行动计划（2018—2020年）	Three-Year Special Action Plan for the Artificial Intelligence Industry of Heilongjiang Province (2018-2020)	2018
江苏省新一代人工智能产业发展实施意见	Implementation Opinions on the Development of New Generation Artificial Intelligence Industry in Jiangsu Province	2018
广州南沙人工智能产业发展三年行动计划（2018-2020 年）	Three-Year Action Plan for the Development of the Guangzhou Nansha Artificial Intelligence Industry (2018-2020)	2018
四川省新一代人工智能发展实施方案	Implementation Plan for the Development of New Generation Artificial Intelligence in Sichuan Province	2018
安徽省新一代人工智能产业发展规划(2018—2030年)	New Generation Artificial Intelligence Industry Development Plan of Anhui Province (2018-2030)	2019
东莞市新一代人工智能发展规划(2019-2030年)	New Generation Artificial Intelligence Development Plan of Dongguan City (2019-2030)	2019
新一代人工智能创新发展试验区建设工作指引 【海南】	Guidelines for the Construction of a New Generation Artificial Intelligence Innovation and Development Pilot Zone [Hainan]	2019
杭州市建设国家新一代人工智能创新发展试验区若干政策	Several Policies for Hangzhou to Build a National New Generation Artificial Intelligence Innovation and Development Pilot Zone	2019
河南省新一代人工智能产业发展行动方案	New Generation Artificial Intelligence Industry Development Action Plan of Henan Province	2019
湖南省人工智能产业发展三年行动计划（2019-2021年）	Three-Year Action Plan for the Development of the Hunan Province Artificial Intelligence Industry (2019-2021)	2019
国家新一代人工智能创新发展试验区建设工作指引【江西省】	Guidelines for the Construction of the National New Generation Artificial Intelligence Innovation and Development Pilot Zone [Jiangxi Province]	2019

Table 4 (continued)

陕西省新一代人工智能发展规划（2019—2023年）	New Generation Artificial Intelligence Development Plan of Shaanxi Province (2019-2023)	2019
深圳市新一代人工智能发展行动计（2019—2023年）	New Generation Artificial Intelligence Development Action Plan of Shenzhen City (2019-2023)	2019
云南省新一代人工智能发展规划	New Generation Artificial Intelligence Development Plan of Yunnan Province	2019
成都建设国家新一代人工智能创新发展试验区实施方案	Implementation Plan of Chengdu for Building a National New Generation Artificial Intelligence Innovation and Development Pilot Zone	2020
重庆市建设国家新一代人工智能创新发展试验区实施方案	Implementation Plan of Chongqing for Building a National New Generation Artificial Intelligence Innovation and Development Pilot Zone	2020
关于推动新一代人工智能加快发展实施方案【福州】	On the Implementation Plan for Promoting the Development of a New Generation of Artificial Intelligence [Fuzhou]	2020
广州市关于推进新一代人工智能产业发展的行动计划（2020–2022年）	Action Plan of Guangzhou City on Promoting the Development of a New Generation of Artificial Intelligence Industry (2020-2022)	2020
湖北省新一代人工智能发展总体规(2020—2030年)	New Generation Artificial Intelligence Development Master Plan of Hubei Province (2020-2030)	2020
吉林省人民政府关于落实新一代人工智能发展规划的实施意见	Implementation Opinions of the People's Government of Jilin Province on the Implementation of the New Generation Artificial Intelligence Development Plan	2020
天津市建设国家新一代人工智能创新发展试验区行动计划	Action Plan of Tianjin City for Building a National New Generation Artificial Intelligence Innovation and Development Pilot Zone	2020
苏州市促进新一代人工智能产业发展的若干措施	Several Measures to Promote the Development of a New Generation Artificial Intelligence Industry in Suzhou City	2021
武汉国家新一代人工智能创新发展试验区建设若干政策	Several Policies for the Construction of Wuhan National New Generation Artificial Intelligence Innovation and Development Pilot Zone	2021

Table 5 Translations of significant Chinese terms

Chinese	English
稳中求进	Within stability, seek progress
双创	Double initiatings
创新创业	Innovation and entrepreneurship
和谐	Harmony
和谐与合作	Harmony and cooperation
和谐友好	Harmony and friendliness
合作	Cooperation
颠覆性突破	Disruptive breakthroughs
应用	Apply/application

These words were identified as significant during our documentary analysis (see Sect. 4). They include crucial words, as well as longer phrases we have translated.

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