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AI anxiety? Comparing the sociotechnical imaginaries of artificial intelligence in UK, Chinese and Indian newspapers

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Abstract

A growing body of work insists that artificial intelligence (AI) must be regarded as a sociotechnical imaginary in the manner of earlier technologies. In this paper we contribute to this field by investigating the representation of AI across very different countries and across time to assess whether these representations are influenced by their socio-economic, political, and cultural contexts, and whether they change over time. By applying computational topic modelling methods, we investigate narratives around AI in 9 newspapers across the UK, China and India over a time frame of 12 years, from 2011 to 2022. Our results indicate that there are both dystopian and utopian narratives associated with AI, as indeed there have been with other technologies. Debates about AI tend very much to reflect national priorities, preoccupations, hopes and fears, all of which are projected onto emerging AI technologies.

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Keywords
Artificial intelligence, sociotechnical imaginaries, AI representation, industrial revolution, computational communication

Introduction

This paper contributes to an important and growing body of work that insists that artificial intelligence (AI) must be regarded as a sociotechnical imaginary in the manner of earlier technologies (Jasanoff, 2015). We are interested in discovering the public narratives surrounding AI as these narratives themselves influence the development, use and regulation of the technologies as well as illuminating the character of the societies from which these imaginaries spring (Natale, 2019). Cave et al. (2020) argue that public narratives attached to AI tend either towards the utopian or dystopian, promising either human freedom or enslavement, but it is not clear to what extent these narratives are universal or culturally and temporally specific. In this paper we contribute to this field by investigating the representation of AI across very different countries and across time to assess whether these representations are influenced by their socio-economic, political, and cultural contexts, and whether they change over time. We examine how artificial intelligence is imagined in the public spheres of the UK, China and India over the space of twelve years from 2011 to 2022.

AI imaginaries of the future

AI imaginaries and their constituent narratives have a long history. Turing's seminal proposal and vision of a machine sparked debates concerning the potential and limitations of combining technology and intelligence, ultimately inspiring conceptions of general or strong AI in the future (Natale, 2021). At the same time, interactions between humans and machines have been ongoing for more than half a century. From the Turochamp, a chess program developed by Turing and Champernowne in 1948, to the computer program AlphaGo that recently defeated top human players. Similarly, from ELIZA, the world's first chatbot developed by Weizenbaum in the mid-1960s, to the recent emergence of the Large Language Model based ChatGPT, which has garnered significant global media attention. Moreover, in the widely popular Marvel Comics' character-based superhero films Iron Man and Black Panther, sophisticated AI assistants J.A.R.V.I.S. and Griot frequently collaborate with the protagonists, often displaying some degree of self-awareness. Consequently, with the continuous development of technology, AI is often connected with daily life in diverse forms, and the accounts arising from these experiences have exerted a measure of influence on both the imaginary and the actual application of AI. Although AI imaginaries have a long history, in this article, we will focus our attention on emergent narratives found in newspapers, where attention to AI has grown exponentially in recent years.

Jasanoff defines sociotechnical imaginaries as the 'collectively held, institutionally stabilised, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology' (2015, p. 4). As Cave et al. argue, however, this definition excludes sociotechnical imaginaries that are not collectively shared, institutionally stabilised, desirable or supportive of science (2020, p.7). In other words, this definition overlooks the possibility of ethical and political contestation of sociotechnical imaginaries. Sociotechnical imaginaries may be more or less widely shared by particular groups within and across societies; they may be more or less institutionally

stable; they may see the technology as more or less socially desirable; and may be more or less supportive of science and scientists.

Pursuing this line of contested AI social imaginaries, Cave and Dihal (2019) surveyed 300 works of fiction and non-fiction, arguing that narratives of AI fall into four utopian and/or dystopian dichotomies: 'the hope for much longer lives ('immortality') and the fear of losing one's identity ('inhumanity'); the hope for a life free of work ('ease'), and the fear of becoming redundant ('obsolescence'); the hope that AI can fulfil one's desires ('gratification'), alongside the fear that humans will become redundant to each other ('alienation'); and the hope that AI offers power over others ('dominance'), with the fear that it will turn against us ('uprising'). Bucher (2017, p. 41) introduces the concept of algorithmic imaginary, which refers to the ways in which people perceive and interact with algorithms. This concept allows for a discussion of the social power of algorithms and provides insights into how people can be given a 'reason to react' within the current social media landscape.

Sartori and Bocca (2023) surveyed over 5000 people affiliated with the University of Bologna to discover emotional responses to these eight AI narrative possibilities and perceptions of their realisation over the course of 15 years. Their results show that respondents were least concerned about freedom, gratification, and alienation, and that these scenarios were moreover considered the most likely to happen. These results were broadly consistent with those found in the UK (Cave and Dihal, 2019). One striking feature was that even supposedly utopian narratives (immortality and dominance) aroused considerable concern, suggesting that at least for those surveyed here, the AI social imaginary is, in contrast to Jasanoff's definition, predominantly negative and deeply contested, as there is disagreement even about whether the supposedly positive features of AI are indeed positive. Sartori and Bocca refer to high levels of concern as 'AI anxiety' and relate this to Western conceptions of modernity, in which ideas of scientific and technological progress are accompanied by risk and uncertainty about the future, as well as to a perceived lack of scientific literacy among the general population. This would suggest that 'AI anxiety' is not only a treatable condition but could be specifically endemic to the West. Sartori and Bocca, in keeping with most of the literature on AI anxiety, tend to regard it as an irrational fear standing in the way of scientific progress.

AI representation in news media

While AI anxiety may seem prevalent on examination of survey data or staples of popular culture such as television series and films, a focus instead on how AI is imagined in news media reveals a different, much more positive picture of AI's potential. This suggests that different social imaginaries of AI may be found depending on where we look or whom we survey, whether they belong, for instance, to economic, political, and/or scientific elites.

To date, the majority of studies have focused on countries in the Global North. Chuan et al. (2019) analyse the framing of AI in five US national newspapers between 2009 and 2018, and their results indicate that the benefits of AI are more frequently discussed than the risks. The positive imaginaries of AI have often been associated with its benefits to the economy and human well-being, whereas concerns are expressed about the implications of AI for privacy and job opportunities (Chuan et al., 2019, p. 342). Shaikh and Moran (2022) analyse media coverage of facial recognition technology, one of the more controversial applications of AI, in 23 US-based news outlets classified by political partisanship. Although some ethical concerns such as bias, privacy and surveillance exist across the ideological spectrum, right-leaning media tend to emphasise the useful applications of facial recognition more often than their more liberal counterparts (Shaikh and Moran, 2022, p. 17). The study also reveals the significance of AI companies as dominant sources of

information to media organisations, which helps to explain why AI might be positively reported (Shaikh and Moran, 2022, pp. 15-16).

In a similar vein, Brennen et al. (2018) analyse six British mainstream outlets and point out that industry sources' own announcements about their products and initiatives largely dominate the media presentation of AI. Moreover, ideological differences between outlets were also found to influence their coverage: left-wing media tended to more often emphasise ethical issues and potential job losses while right-wing media paid greater attention to potential economic and political benefits, which indicates that media reports on AI are somewhat politicised (Brennen et al., 2018). Brennen et al. (2022) subsequently take a different methodological approach—critical discourse analysis—to capture media narratives around six notable AI-related events in the UK, and they identify two common techniques that media outlets adopted to mediate the imagination of AI: the choice of sources and the making of comparisons between human capabilities and AI systems (p.28).

To ascertain how AI is imagined in continental Europe, Vergeer (2020) conducts a longitudinal analysis to investigate how newspapers in the Netherlands portrayed AI issues between 2000 and 2018. The study reveals that the amount of AI coverage was influenced by media type, as attention paid by economic and national newspapers is much higher than in popular and Christian newspapers especially since 2014 (p. 381), suggesting that AI is still primarily a concern for Dutch political and business elites. The study also showed that tech firms, scientific institutes and the self-driving car industry were sources leading the discussion of AI, and positive sentiment in media reporting was generally higher than negative sentiment over time, although differences between types of newspapers did exist (Vergeer, 2020, pp. 381-387). Hansen (2022) compares the discursive features of Danish newspapers and magazines from the 1980s. The results indicate that sampled media outlets tend not to distinguish between 'the human-machine relationship of AI and the human-centred principles of intelligence amplification (IA)' (p. 56), with the latter notion referring to another category of AI which 'takes humans as the starting point by focusing on aiding and augmenting, rather than replicating human intelligence' (p. 60). Based on an analysis of 520 news articles from newspapers in Germany, France and the UK, a recently released report by Barassi et al. (2022) reveals that while media discourse about certain aspects, such as human error in AI, is gradually emerging and creating a platform for debate, overall discourses remain inconsistent, contradictory and juxtaposing.

When it comes to AI technology, China and India are two of the fastest-growing countries in the Global South. Zeng et al. (2022) compare the discourse of AI in Chinese mainstream media and Chinese social media, and their study found no significant difference between the discourses on *People's Daily Online* and *WeChat*. They found that sources from industry and political actors dominated this economic-oriented discussion in China, and attributed the overall strong positive evaluation of AI to top-down communication, but also noted that drastic changes could happen in response to changes in policy (Zeng et al., 2022). However, in terms of specific AI ethics, Mao and Shi-Kupfer (2021) argue that some diversity exists in online discussions on Chinese social media platforms. Although similar assessments of both risks and opportunities made such online discussions generally neutral, discussions on WeChat tended to be more elite-led and focused on policy recommendations, while discussions on Zhihu are often led by members of the general public and focus on how individuals and society can maintain competitiveness in the era of AI (Mao and Shi-Kupfer, 2021, p. 14). Noort (2022) argues that pride, hope and fear are the three prevalent emotions associated with China's international AI narratives, based on an analysis of AI-related videos posted on the CGTN YouTube channel. Hope reflects China's wish to catch up with the US in the international AI race; fear underlies US concerns about China's AI developments and also represents a

general fear of risks that AI could pose to society, particularly with respect to potential job losses and privacy; and pride connotes a nationalist sense of China's rapid technological developments and achievements in AI-related technologies which help China establish a global identity as a 'future global AI power' (Noort, 2022, p. 10). For India, although technology is 'deeply embedded in India's national imagination for development' (Radhakrishnan, 2021, p. 7), to our knowledge, no study to date investigates the sociotechnical imaginaries of AI in the context of Indian media coverage.

Beyond the country-specific perspective, some studies comparatively examined how AI is imagined across national borders. Ouchchy et al. (2020) conducted a content analysis to observe media representations of AI-related ethical issues between 2013 and 2018 from a global perspective by searching English-language publications across the Nexis database. Their results show that rather than anxiety and criticism, most articles adopt a balanced position. Sun et al. (2020) longitudinally analyse how four western mainstream newspapers from the USA and UK have portrayed AI in the past decades. The earliest news in this sample can be traced back to 1977 in *The New York Times*, although AI features prominently only from 2014. The study identifies 'robots/humanoid, brain science/intelligence, and government regulation' as the most prevalent topics and suggests that media coverage examines the benefits of AI more frequently than the risks (Sun et al., 2020, p. 13). Similarly, through analysing news framing of AI in four media outlets from the USA and UK between 2010 and 2021, Nguyen and Hekman (2022, p. 7) identify four 'meta-frames', namely, politics, economics, research/science and society and culture, that occur widely in AI-related news reporting.

The existing research on media coverage in both North and South suggest that news media tend to focus more on the benefits of AI than on the risks, in contrast to more dystopian perceptions commonly found in popular cultural texts such as films and television series, as well as in surveys. It would moreover appear that news coverage of AI is dominated by political and economic elites who have an interest in the development of AI technologies, and is more in line with the definition of social imaginary introduced by Jasanoff (2015) than the amended definition proposed by Cave et al. (2020).

Methodology

Since most studies to date primarily focus on countries in the Global North, in this study we examined newspapers from countries with different levels of economic development and contrasting social and political contexts: the UK, China and India. Previous comparative studies of other topics have demonstrated that ideological diversity among media could affect their coverage in many ways, as can a country's degree of market orientation (Duan and Miller, 2021). In light of such findings, we sought to capture ideological and economic diversity in our own dataset. After we weighed factors such as ideological diversity, type of newspaper and data continuity over the years, three newspapers were selected for each country. By analysing media content in various countries, this study aims to provide a more comprehensive understanding of how AI is perceived and imagined in different cultural and social contexts. It should be noted that even if we consider diversity such as ideological diversity in our media sample selection in each country, analysing by country may still not be able to capture the full complexity and diversity of AI imaginaries within a particular country due to regional and demographic variations. This leaves room for future research.

For the UK, we included *The Times*, *The Guardian* and *The Daily Telegraph* in our dataset to reflect long-standing ideological differences in the British media landscape. For India, *Times of India*, *Indian Express* and *Hindustan Times* were selected. Despite the lack of systematic study on

the ideological spectrum of the Indian press, a comparative study has shown that the *Times of India* is relatively less devoted to the issues and viewpoints normally interrogated by left-leaning media, such as freedom and human rights (Ahmad and Sahu, 2019). This assessment is corroborated by Media Bias/Fact Check (MBFC), which characterises the *Times of India* as a right-centre newspaper while the other two are characterised as left-centre. For China, *China Daily*, *Global Times* and the Hong Kong-based market-oriented *South China Morning Post* are included in our dataset. In order to coherently cluster relevant topics from news coverage and present trends over time, we selected English-language newspapers where possible, or otherwise chose the English version of their multilingual selections. Previous studies show that while sporadic representation of AI in mainstream media originates in the 1970s, significant growth occurred in the 2010s for many countries and across media outlets (Sun et al., 2020; Vergeer, 2020; Hansen, 2022), so we decided to set our timeframe from 2011 to 2022 (31 October). The Nexis newspaper database was used for data collection since it contains most of our selected newspaper titles and time range. It should be noted that data for *China Daily* and *Global Times* from 2011 to 2013 are not included by Nexis. Instead, we obtained data for this period from their official databases and merged these into our dataset. After retrieval of articles from databases and completion of a de-duplication process, we finally obtained 23,745 articles related to the keyword 'artificial intelligence' in 9 newspapers across the UK, China and India over a time frame of 12 years.

Recchia (2020, p. 383) advocates the use of computational methods to investigate narratives around AI since such methods can analyse large quantities of text and help researchers to reveal 'important texts, patterns, and nuances that could easily have been missed without digital help'. In this study, we use BERTopic (Grootendorst, 2022), a computer-assisted topic modelling technique, to conduct topic clustering analysis and discover which topics are associated with artificial intelligence and whether these topics change over time. Compared with conventional modelling techniques, for example, Latent Dirichlet allocation (LDA) and Non-Negative Matrix Factorization (NMF), which often fail to account for the context of words in a sentence and semantic relationships among words, BERTopic provides more coherent topic representation that overcomes limitations inherent in the conventional bag-of-words representation (Grootendorst, 2022, pp.1-2). The algorithmic process of this study consists of three stages. First, the all-MiniLM-L6-v2 embedding model, known for its strong performance with English documents, is selected and applied to generate embeddings. Second, the Uniform Manifold Approximation and Projection (UMAP) is used to reduce the dimension of the embeddings, and Hierarchical Density-Based Spatial Clustering of Applications with Noise (HDBSCAN) is used to cluster the reduced embeddings to clusters with a certain level of relevance, which prevents unrelated documents from being counted. Third, a class-based Term Frequency-Inverse Document Frequency (c-TF-IDF) is applied to simplify and extract topics, and the Maximal Marginal Relevance (MMR) is used to improve the coherence and diversity of topic words. In short, such a technique can apply topic modelling to a large volume of text and produce more compact topics. It renders topics easy to explain while preserving important vocabulary details in topic descriptions. However, a notable disadvantage of this method is that it assigns each article to a single cluster, thereby associating it with a single topic. In addition, the sentiment attached to each topic will not be displayed directly, it must be inferred through keywords. In so doing, we generated the list of clusters ranked by their frequency and by how these clusters changed over time in the past 12 years, as shown in Chart 1–3. To enhance the accuracy of our topic analysis, we additionally generated inter-topic distance and hierarchical clustering. These techniques were employed to gain a deeper comprehension of the interrelationships among the identified clusters, thus facilitating a more precise interpretation of the prominent topics.

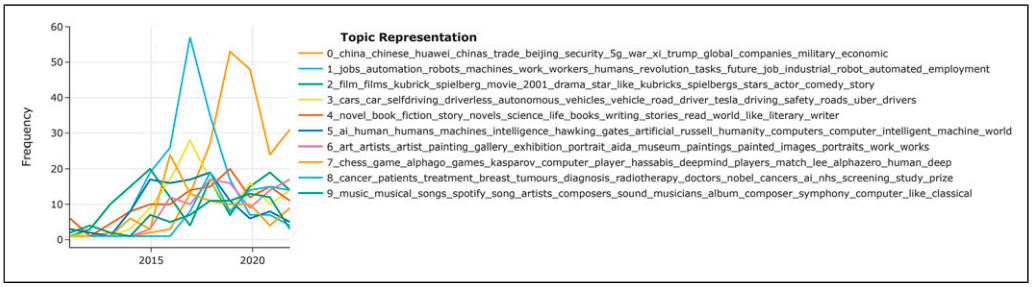


Chart 1. Topics over time in UK newspapers.

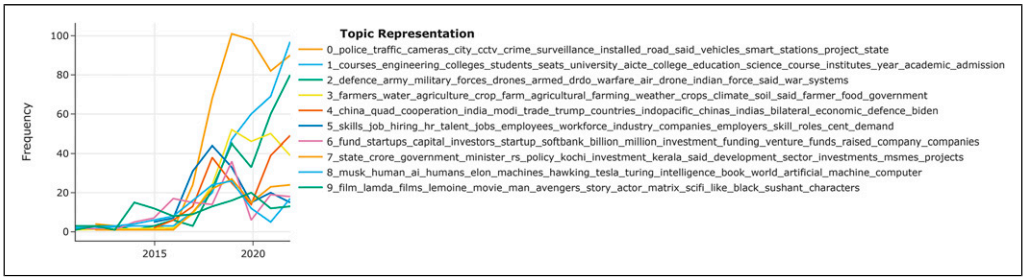


Chart 2. Topics over time in Indian newspapers.

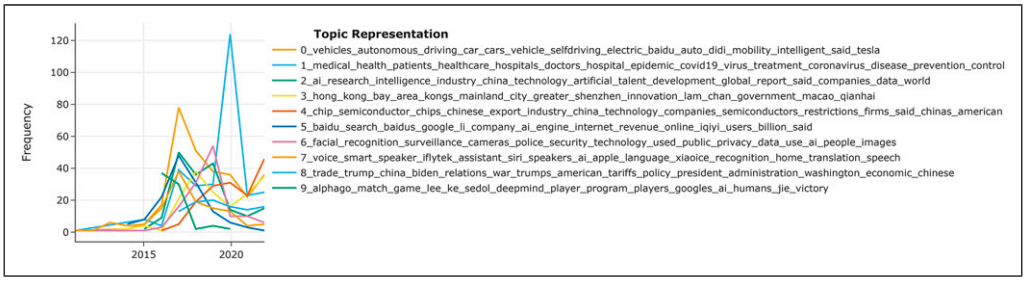


Chart 3. Topics over time in Chinese newspapers.

Are AI imaginaries collectively held transnationally?

As we have noted, according to Jasanoff, there are several characteristics of sociotechnical imaginaries. They are collectively held, institutionally stable, publicly performed visions of desirable futures, and are supportive of science and technology. Cave et al. (2020) introduce the idea that sociotechnical imaginaries may be ethically and politically contested.

The first task is to define what we mean by collectively held. Are we looking for collective imaginaries that are transnational in scope shared by two or more countries? Or are we thinking about sociotechnical imaginaries that are bounded or contained by the borders of individual nation-states? In order to answer this question, we must of course first identify the content of the AI

imaginaries. Cave and Dihal (2019) argue that narratives about AI fall into four utopian/dystopian dichotomies: 'immortality' versus 'inhumanity'; 'ease' versus 'obsolescence'; 'gratification' versus 'alienation'; 'dominance' versus 'uprising'. Here, we will assess the extent to which these narratives are present or absent from newspaper discourse, and additionally whether other narratives are present. As a shorthand, we refer to these four paired narratives as imaginaries of health, work, sociality, and power, and they may be regarded as component elements, potentially amongst others, of AI imaginaries.

Evidence that sociotechnical imaginaries are shared across borders can be assessed at least in part by examining whether the most popular topics are shared across countries. In the subsequent analysis, the trends of the most prominent topics in each country will be analysed, and the topics will be classified according to the narrative categories proposed by Cave and Dihal (2019), as shown in Table 1. It should be noted that the notion of 'imaginaries' or 'sociotechnical imaginaries' is a broader and complex concept, that is constituted by specific representations and narratives referring to particular domains, here we focus on newspaper narratives that are one of a number of components of the AI sociotechnical imaginaries.

Health

Health imaginaries in various countries show a certain degree of commonality. Research highlights at least four roles that AI can play in the medical system, namely, pushing frontiers, democratising expertise, automating drudgery and allocating resources (Price, 2019, p. 132). In the imaginaries revealed by British and Chinese newspapers, AI is seen as an increasingly important factor in the diagnosis and prevention of diseases. The British media mentioned the application of AI in the diagnosis and treatment of cancer in Topic 8. From a practical point of view, the UK is one of the countries that actively applies AI technology to the diagnosis and treatment of diseases at the national level. In his speech at NHS Expo 2018, then-Health Secretary Matt Hancock stressed the importance of embracing AI in the UK healthcare system and the potential benefits of a tech-driven NHS (Hancock, 2018). This coincides with a significant increase of Topic 8 in British newspapers. Soon after in 2019, the British government announced that it would invest £250 million in exploring the healthcare applications of artificial intelligence supported by the nationwide NHS AI Lab, such as using AI to improve cancer screening, predict demand for medical resources, and help to identify patients most at risk of critical diseases, thereby helping the British public to improve their health (Department of Health and Social Care, 2019). In other words, the UK's application of AI in its healthcare system is national and systematic.

Similarly, Topic 1 reflects that the Chinese media has painted a picture of the application of AI in medicine and healthcare having potential benefit to doctors and patients. At the same time, China has developed new imaginaries of applications related to the current reality under this theme, for example, the application of artificial intelligence in disease control and prevention in the era of the pandemic. The growth trend of Topic 1 in Chinese media is a reflection of social reality. The prominence of Topic 1 fluctuated in the short term, but it grew rapidly in 2019 with the outbreak of COVID-19, then becoming absolutely dominant in 2020. In contrast, the other two leading topics, Topic zero and Topic 4, saw a decline in Chinese media during this period. China's adoption of AI in healthcare is driven both by government and by private companies. During the COVID-19 pandemic, the Chinese government launched the National Health Code System and the Big Data Itinerary Card, both of which are supported by big data and artificial intelligence. During a certain period of time from 2020 to 2022, these applications became deeply integrated into people's daily lives and played an important role in disease prevention and control, social management, and

Table 1. List of narratives and prominent topics across countries.

Narratives	UK topics	Indian topics	Chinese topic
Health	Topic 8: Cancer, patients and use AI to diagnose diseases		Topic 1: Medical, disease control and the role of AI in healthcare industry
Work	Topic 1: Jobs, automation and the consequences for employment Topic 3: Cars, autonomous and the future of transportation	Topic 1: Courses, colleges and preparing students for the future Topic 3: Farmers, weather and integration of AI in agricultural production Topic 5: Skills, hiring and demand for a highly skilled workforce Topics 6: Investor, company and accelerating growth Topic: 7: Kochi, Kerala, and driving development forward Topic 8: Musk, hawking and navigating the future of intelligence	Topic 0: Vehicles, self-driving and the future of transportation Topic 2: AI research, technology and technological development trends in China and the globe Topic 3: City, innovation hub and the greater bay area Topic 4: Semiconductor, chip industry and their development prospect Topic 5: Baidu, google and tech firms' battle for market
Sociality	Topic 2: Films, cinema and imaginary of AI in movies Topic 4: Novel book, fiction story and imagination in literature Topic 5: AI, humans and its implications for future humanity Topic 6: Artists, painting and the evolution of arts Topic 9: Music, musical and the impact on musician	Topic 9: Film, sci-fi and imaginary of AI in movie	Topic 7: Voice recognition, smart speaker and AI-powered virtual assistant
Power	Topic 0: China, US and global power dynamics Topic 7: Chess, AlphaGo and the battle of intelligence	Topic 0: Traffic, cameras and the integration of AI in city management Topic 2: Defence, army and the AI-powered modern military Topic 4: Sino-India, indo-pacific and the global economic and multilateral relations	Topic 6: Facial recognition, surveillance cameras and security versus privacy Topic 8: Trade, tariffs and Sino-US political and economic relations Topic 9: AlphaGo, DeepMind and the battle for superiority in strategic games

government decision-making, but concerns have also been raised about personal privacy and data security (Dong et al., 2021). Private Chinese AI companies have likewise used algorithms to distinguish between COVID-19 infections and infections by other respiratory diseases during the global pandemic (McCall, 2020). An Internet health management platform called Ping An Good

Doctor, headquartered in Shenzhen, uses AI-based systems to interactively collect and sort patient information in order to provide it to remote doctors so that they can provide patients with better medical services regardless of geographic limitations (Jiang et al., 2021). Thus, the application of AI in China's medical industry was already under exploration prior to COVID-19, and the global pandemic has only accelerated the integration of AI and the medical system. It is worth noting that the handling of legal and regulatory aspects of medical AI is also an important factor that can promote (or restrict) its continued development, since it relates closely to the privacy and experience of the public (Pesapane et al., 2021) and thereby garners social and media attention.

In contrast to the British and Chinese cases, the Indian media we surveyed did not explicitly mention topics related to AI in healthcare. However, previous studies show that India possesses factors that can potentially lead to AI adoption, such as its STEM-focused university education providing a large talent pool, its early accumulation of software and computing power, and human resources requisite to handling big data in virtue of its large population, etc. (Mahajan et al., 2019). The Indian government is also actively supporting AI startups, such as in a series of financial and policy support measures from the Karnataka government (Paul et al., 2018). Although India has made some developments in the application of AI to the medical field, such as in radiology diagnosis, it remains the case that developing countries, including India, still generally lag behind developed countries in the adoption of AI, including in medicine (Mahajan et al., 2019). Moreover, as Kalyanakrishnan et al. (2018, p. 167) noted, 'limited access to information and education, poor quality of service delivery due to lack of infrastructure and corruption, and a debt trap from high out-of-pocket expenses' could be regarded as root causes of poor health in Indian populations. Thus, while new applications of AI in Indian healthcare can certainly benefit public health, it may have been regarded as a lower priority than addressing existing underlying and systemic problems, which would correlate with the comparative lack of coverage for this topic in the Indian media surveyed here.

Although AI health imaginaries vary between countries depending on their economic development and social conditions, the topic of AI in healthcare generally revolves around technologies that may provide longer and healthier lives, and thereby carries popular imagination towards the related utopian narrative of immortality.

Work

Intelligent machines have long been regarded as potential workplace competitors to human beings, up to and including the possibility of some jobs disappearing entirely. However, there are also notions that AI will actively help economic development and even provide novel employment opportunities, especially in the so-called 'missing middle' job market, and perhaps striking a balance between 'humans complement [ing] machines' and 'AI give [ing] humans superpowers' with the result that 'each push [es] the other to higher levels of performance' (Daugherty, P. R., & Wilson, 2018, p. 8). Our results show that the economic implications of AI are treated in all three national contexts, but again take different forms. In the UK, the second most popular topic, Topic 1, has to do with jobs and the employment consequences of automation and robots. The keywords associated with this topic reflect an apparent focus on the extent to which AI will replace humans at work, up to and including potentially making them wholly redundant. Of course, this eventually can be construed as either a promise or a threat: the promise of a life free from drudgery, or the threat of an immiserated unemployment. In the UK discourse, however, AI is largely perceived as a threat to middle class professions such as those of accountants, solicitors, journalists and university professors.

In contrast, Chinese newspapers appear to emphasise the positive implications of AI in the workplace. Topic zero in Chinese media concerns autonomous driving, as does Topic 3 in UK newspapers. Unlike Topic 3 in the British media, however, 'driver' as a keyword has not been so prominently related to the topic of AI as it has in the Chinese media. The names of certain domestic and international companies that are developing rapidly in the field of autonomous driving appeared frequently, for example, Baidu, Didi and Tesla. The imaginary of self-driving vehicles therefore seems more related to a future of transportation that will offer people the chance to travel more freely. The emergence of more positive imaginaries associated with self-driving technology in China coincides with the results of a transnational survey on self-driving technology, which found that Chinese respondents had a more positive perception of self-driving cars than did British respondents: 49.8% of Chinese respondents reported a very positive attitude towards autonomous and self-driving vehicles, compared with only 13.9% in the UK for the same question (Schoettle and Sivak, 2014, p. 6).

By contrast, Indian discussions of autonomous driving and AI in employment did not appear so prominently as media talking points. Although Topic 5 denotes a focus on jobs, the emphasis here appears to be on employment opportunities and the demand for a highly skilled workforce that the development of AI will create, rather than on the spectre of technological unemployment. This focus on potential positives as opposed to the threat of AI to jobs is also suggested by the fact that the second prominent topic in Indian media, Topic 1, concerned the education sector. The keywords reflect a focus on technical disciplines represented by STEM in the Indian university sector, that is, courses that will prepare students for the future and educate the future workforce about AI. University STEM education will provide a large pool of technical talent, which is regarded as an important precondition for India's future development in the field of AI (Mahajan et al., 2019). By contrast, education does not appear in the top ten topics in either the UK or Chinese media cases, and this major difference may reflect a comparatively high general emphasis in India on education, particularly in computer science and engineering subjects. Against this backdrop, it is easy to see AI as a source of economic opportunity; as a way of achieving greater prosperity rather than as a threat to a prosperity already attained, and to see education in allied subjects as a primary mechanism for attaining prosperity.

While the Chinese media does not appear to share the Indian media's specific focus on AI-related education, coverage of AI in China does seem to suggest that AI is seen as a source of potential economic development for specific regions and for the development of new industries or the transformation of existing industries, a perspective held in common with Indian media representations of AI. Specifically, Topics 6 and 8 in Chinese media and Topics 2, 4 and 5 in Indian media have homogeneous thematic cores discernible from their keywords. AI and related technology industries and enterprises are regarded as sources of development for new industries or ways of transforming existing industries. Meanwhile, Topic 3 in Chinese media and Topic 7 in Indian media are both relevant to regional development. As can be seen from the keywords, Topic 3 talks about the development of the Greater Bay Area, consisting of nine mainland cities together with Hong Kong and Macao, and about the vision for the construction of an innovation city and hub. Building the Greater Bay Area into an international science and technology innovation centre is also the development route clearly proposed by the Chinese government in 2019. Topic 7 in Indian media talks about Kochi, Kerala, and about driving development forward there with the support of state government policies and investment. Kochi is the site of an information technology Special Economic Zone called SmartCity Kochi, and is also regarded as Kerala's industrial centre and important investment destination (Kuriakose and Philip, 2021).

The above similarities and differences demonstrate that the imaginaries of work and AI in different countries are closely related to their actual developmental status and economic prospects. The developing economies of India and China focus more on AI as a source of potential positive economic development and industrial transformation than does the UK, where technology-driven economic change is perceived as a threat to established middle class professions previously thought immune to the risk of technological unemployment; potentially a deeply unsettling prospect for readers drawn largely from that social class.

Sociality

The presentation of AI imaginaries concerning cultural impacts on human sociality is prominent in British newspapers but not in Indian or Chinese newspapers. Arguably, the persistent presence of AI as a theme in Anglophone novels and films indicates that AI is a staple talking point in British society. It is a contentious issue that provokes both utopian fantasies and dystopian fears, in a manner that is perhaps typical of technologies at a particular stage in their development, before they have a chance to become part and parcel of everyday life and become thoroughly domesticated. In British media, Topics 2, 4, 5, 6, 9 are particularly relevant. As can be seen from the keywords, Topics 6 and 9 refer to the potential of AI in creative and artistic works, such as painting and music creation, and of possible impacts and evolution in these fields. Topics 2 and 4 denote AI imaginaries in literature and films.

In contrast, there is only one topic in Indian media related to such sociocultural imaginaries. Topic 9 concerned AI imaginaries in film, and broad imaginaries of human beings and AI in literary and artistic works. The Chinese media also only have one topic related to these types of imaginary, Topic 7, but this more precisely mentioned a specific real-world application of AI—the voice assistant—a reflection of China's development in the field of smart speakers and AI assistants. Large Chinese technology companies such as Baidu, Xiaomi and Tencent are actively entering into the research and production of smart speakers, and have already surpassed some leading international competitors in sales of voice-activated devices (Shepherd and Liu, 2019). The keywords from Topic 7 do not contain terminology with negative connotations, and considering the rapid development of related applications in China in recent years, reflect the embracement of such technologies to a certain degree. Given worldwide attention to the launch of ChatGPT, a generative pre-trained transformer chatbot launched in November 2022, and its powerful language proficiency, it can be speculated that AI-based voice assistants will soon have great potential to provide human social partnership and to satisfy (or, more cynically, to prey on) human desires for social interaction within the information society.

Power

The AI media imaginaries across the three countries with respect to questions of power and control can be further subdivided into discussions on three types of power, that is, hard power, administrative power and intellectual power. In the domain of hard power competition, the most popular topic in the UK (Topic 0) and fifth most popular in India (Topic 4) both relate to the relationship of each country with China, primarily to the bilateral relationships between China and the UK or between China and India, respectively. The predominant view in both the UK and India is that China represents an economic and military competitor; a hostile or at least a potentially hostile state; and technological advances such as AI are seen through this lens of national competition. As scholars have pointed out, as two geographically close and highly populous countries, the potential for

competition between a rising China and a rising India will exist in many fields for a long period of time (Scott, 2008). Will the state of play in AI represent an advantage or a disadvantage in the context of competition with China? In contrast to both the British and Chinese media, the military implications of AI are to the fore in Indian media, featuring as the third most popular topic (Topic 2). A plausible explanation for this is that the profile of potential military conflict in general is much higher in India as a result of its long-standing military and territorial rivalry with Pakistan. If so, this would support the view that existing concerns already prevalent in national public spheres are given a particular AI inflection. National competition is by no means absent from AI reporting in China, but the role of economic adversary is not reciprocally cast as the UK or as India, but as the USA, with associated trade issues figuring as the ninth most popular topic (Topic 8). While it can be argued that the frame of national self-interest is common to all three cases, the particular expressions of it are asymmetric: media in the UK and India clearly perceive China as a threatening AI competitor, whereas the only competitor Chinese media appears to be concerned about is the USA. Thus, the AI imaginaries revealed in the media of the three countries seem inseparable from the macro-context of international relations and geopolitics.

With respect to representation of administrative power, state use of AI for surveillance purposes has a very high profile in Indian media, where it is the most popular topic, while it is the seventh most popular topic in Chinese media. In contrast, it fails to appear even among the ten most popular topics in the UK case. Specifically, Topic zero in Indian media describes AI-empowered administration in the context of traffic and city management, though treatment of the topic is ambivalent. It can be inferred from the keywords that, on the one hand, monitoring traffic and cities through police traffic cameras and city CCTV can reduce the occurrence of accidents, ease urban traffic and, to a certain extent, meliorate crime rates. On the other hand, such measures can be perceived as an overextension of administrative power and as a means to dominate the general public. Topic 6 in Chinese media is somewhat similar to Topic zero in Indian media. Both topics concern AI-empowered authoritative power in social management, navigating potential trade-offs between providing people with a safer environment on the one hand, and raising concerns that the administrative power of AI will exert too much control over personal privacy on the other. The prominence of this topic in Indian and Chinese media, and its comparative absence in the UK, may have been influenced by the different degrees of comprehensiveness in data privacy legislation in each country. Where relevant laws more greatly restrict government power and contain more comprehensive provisions already protecting the privacy of ordinary people, fewer privacy concerns about government applications of AI might be expected.

In the domain of imaginaries about intellectual power, Topic 9 in Chinese media shows similarities with Topic 7 in British media, in that both depict the amazing advantages of AI in strategy games that were once dominated by human intelligence, and use these observations to entertain fears that AI intelligences might one day rise up and usurp the position of their masters.

Conclusion

While this study has produced some evident commonalities in the sociotechnical imaginaries of AI across two or more countries, these similarities are insufficient to sustain the argument that such sociotechnical imaginaries are collectively held transnationally. What appears to be more likely the case is that the implications of AI are parsed through the lens of existing hopes and fears within national public spheres, and where those existing concerns do in fact align, albeit there is evidence of transnational attention given to AI, this does not necessarily amount to an AI imaginary being held collectively or in common. A working hypothesis for future research would be that countries

sharing similar levels of economic development and similar political systems display greater commonality in terms of AI imaginaries. There is clearly a higher degree of 'AI anxiety' expressed in the British newspapers sampled here than in either the Indian or Chinese newspapers. The higher level of anxiety about this technology in the UK newspapers seems symptomatic of a feeling, both at an individual and a national level, of a loss of standing in the world, whether in the form of individual redundancy or that of increasing economic and political dominance by other countries. In contrast, Indian and Chinese newspapers surveyed here tended to focus on the economic opportunities presented by AI, signalling a growing confidence that the future belongs to them.

We draw three conclusions from our research. The first is to endorse Cave et al. in their critique of Jasanoff's definition of sociotechncial imaginaries extending it to occasions where technological consequences are viewed negatively as well as positively. In other words, there are both dystopian and utopian narratives associated with AI, as indeed there have been with other technologies. We should hardly be surprised by this. We also suggest that in principle AI sociotechncial imaginaries can be transnational in character and we should be careful not to succumb to methodological nationalism in assuming that sociotechncial imaginaries are nationally bounded. The second conclusion is that AI imaginaries, although they have a longstanding presence in film, literature and academic research (e.g. Natale, 2021), have recently emerged in newspaper discourse and still relatively unstable. Future AI imaginaries will continue to draw on past and present narratives as we can see if we consider the current debates about generative AI such as ChatGPT.

AI imaginaries continue to be relatively unstable due to the evolving nature of the topics associated with AI in newspapers, which tend to change from year to year. AI technologies are becoming part of everyday life but before being entirely domesticated, they pass a stage of contention in which the meaning of the technology is debated. While this phase is most apparent in UK media discourse, there is also clear contention in both the Indian and Chinese media landscapes over the application of AI. The third conclusion is that there appears to be a network of similarities and differences in AI imaginaries across different countries. Certainly, there is no single shared transnational AI imaginary in evidence, although if we have chosen more economically and socially similar countries we suspect that we would have found greater evidence of shared transnational imaginaries. The debates we found about AI tended to very much to reflect national priorities, preoccupations, hopes and fears, all of which are projected onto emerging AI technologies. The key difference we found between UK, India and China was the much greater concern for the potential threats posed by AI to both individual lives, livelihoods and national destinies, which is indicative of a pervasive AI anxiety on a number of different scales.

Even in the UK, however, we could find much more positive narratives particularly around health. Utopian and dystopian narratives appear to exist side by side and do not necessarily engage in a dialogue with each other. This points to the heterogeneous character of AI imaginaries not only across countries but also potentially within countries.

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