

Cultural Factors Shaping Digital Human Applications Between The United States and China

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Abstract. From appearance to intellection, anthropomorphism is the core technology of digital humans. In the process of interacting with real human societies in various countries, digital humans are shaped and guided by local cultures while also generating notable cultural responses. This paper employs a combination of secondary data analysis, content analysis, and sentiment analysis to conduct a comparative analysis of the development of digital humans in the United States and China. In the process of research, cultural theories such as Social Construction of Technology, Hofstede's Cultural Dimensions, Technological Imaginaries, and Stuart Hall's Encoding/Decoding Model are combined. Through the comparative analysis of the distribution industry, image shaping and application of the digital human, and the current situation of audience response, the cultural logic and mode of action behind it are discovered.

Keywords: Digital human; Social Construction of Technology; Hofstede's Cultural Dimensions; Technological Imaginary; Stuart Hall's Encoding/Decoding Model.

1. Introduction

Digital human is a digital intelligent entity created through various digital intelligent technologies and possesses characteristics such as human appearance, voice, language, body movements, and thinking functions. With the support of large models, digital humans can have functions such as learning, generation, and interaction [1].

Advancements in technologies of computer graphics, motion capture, machine learning, high-precision rendering, and speech synthesis [2], coupled with the commercial valorization of Metaverse culture, have created favorable conditions. Driven by the Matthew effect, the digital human has undergone a rapid and substantial expansion around the world in recent years. At present, the research on digital humans is still in the field of technical research, or the impact on the overall human society. This paper aims to complete the research from the perspective of how different local cultures influence the development of emerging technologies.

The United States and China are widely considered to be archetypal representatives of Western and Eastern cultures, respectively. These national characteristics—technological prowess in the United States and demographic advantage in China—serve as important driving forces for their respective industrial developments. The development of digital humans in the United States and China, as an emerging field, follows the common trends of the digital human industry while exhibiting distinct differences in industrial structure, creative production, and public sentiment.

This paper analyzes the macro impact of culture on the layout of the digital human industry based on Social Construction of Technology[3], discusses the mesoscopic impact of culture on the creation and operation digital human products in combination with theories Hofstede's Cultural Dimensions[4], and studies the micro impact of culture on how the audience views digital humans in combination with theory Technological Imaginary[5]. In addition, Stuart Hall's Encoding/Decoding Model[6] is also integrated in this paper. This paper selects countries with large cultural differences to study the commonalities and differences of the current local culture on the digital human applications, to provide a cultural perspective for the further development of emerging industries.

2. Literature Review

The Internet Society of China hosted the China Digital Human Conference and released the China Digital Human Development Report in 2024[1]. The third annual Influence Index Report was also released at the China Online Audio-Visual Conference that year. After the 2019 edition, the United States published the National Artificial Intelligence Research and Development Strategic Plan again in 2023[7].

While the digital human (referred to as virtual humans in some articles) industry is booming under the guidance of policies, the social ethics are also being discussed. David Burden and Maggi Savin-Baden (2019) explored virtual human creation and related ethical challenges[8]. Anika Nissen, Colin Conrad, Isabella Seeber, Aaron J. Newman (2025) have also paid attention to the physiological and psychological impact of virtual influencers on the audience[9]. This paper attempts to combine previous theories and research to expand the impact of different local cultures on the development of digital humans.

3. Methodology

This paper adopts a multi-level focus research approach encompassing macro, meso, and micro level perspectives to examine the topic. Quantitative and qualitative approaches were utilized. To investigate industrial structure, creative production, and public sentiment, secondary data analysis, content analysis, and sentiment analysis were applied, respectively.

3.1. Secondary data analysis

“Comparison of Industry Distribution of Digital Humans in the U.S. and China Dumbbell Plot” (Figure 1) is based on primary data from Allied Market Research, filtered and processed through further calculations, and graphically generated for this paper. This paper focuses solely on comparative analyses rather than specific market sizes. In accordance with the report publisher’s restrictions on public domain data publication, only processed secondary data are graphically presented, without the “other” category. The original report website has been cited in the text. The calculation formula for the rates (R) shown in Figure 1 is:

$$R(i \text{ in } China \text{ or } USA) = R(i, total) \times R(China \text{ or } USA \text{ in the } i \text{ total}) / \sum_{i=A}^H (R(i, total) \times R(China \text{ or } USA \text{ in the } i \text{ total})) \quad (1)$$

In which *i* represented different categories (A to H). A to H represent ‘BFSI’ to ‘other’ categories. The original rates of each category were summarized considering worldwide nations, not only China and the U.S. The calculation formula was adopted to separately determine the summarized participation rates for China and the U.S.

3.2. Content analysis

Ten representative digital humans (five from each country) were selected based on follower size, platform diversity, functional roles, character variety, and the local origin of creators and audiences. Each individual is treated as a coding case. The research objects of representative digital influencers are encoded and shown in the manner of name, visual Image, gender, role, creators, platform presence, and key attribute were systematically gathered (Figure 2). The information of representative digital influencers was collected from official websitesocial media, and news reports. These data were structured into a comparative matrix for systematic analysis of cultural patterns.

3.3. Sentiment analysis

Based on controversy, representativeness, and prominence, two specific digital human videos from different countries were selected to collect comments. Those videos were published across multiple platforms. To minimize audience differences, two platforms are selected per video.

110 comments regarding “Hua Zhibing enrolled at Tsinghua University” were collected (55 from Bilibili and 55 from Wechat Public Platform), and the videos were published by Tsinghua University. 110 comments regarding “After 19th birthday: Lil Miquela got program memories necklace” were collected (55 from YouTube and 55 from Instagram), and the videos were published by Lil Miquela.

Categorize the comments by summarizing the overall content. The XLM-RoBERTa model, implemented in Python, was used to analyze sentences in the user comments. By comparing the differences in the audience’s attention and sentiment, the cultural logic was analyzed.

4. Results and Analysis

4.1. Comparative analysis of industrial distribution

The United States digital avatar market size was valued at USD 6.59 billion in 2023 and is expected to grow at a CAGR of 45.2% from 2024 to 2030[10]. The core market size of China's digital human will be RMB 20.52 billion in 2023, and is expected to reach 48.06 billion yuan in 2025[11]. The digital human industry is booming in both the United States and China. Due to the inconsistency of standards in the current market report statistics, this paper does not compare the overall market size of digital humans in the United States and China. This section does not compare the overall market size of digital humans in the United States and China; just focuses solely on analyzing the share of the digital human industry within various sectors of each country’s own market, using the respective national market size as the baseline. The comparative analysis of industrial distributions aims to shed light on the underlying cultural logics driving these differences.

Based on the detailed description of the distribution and proportion of the global digital human industry distribution and proportion in 2023, and the share of each country in different industries.[12] This paper calculates the industrial distribution of digital humans in the United States and China, and forms a comparative Figure 1.

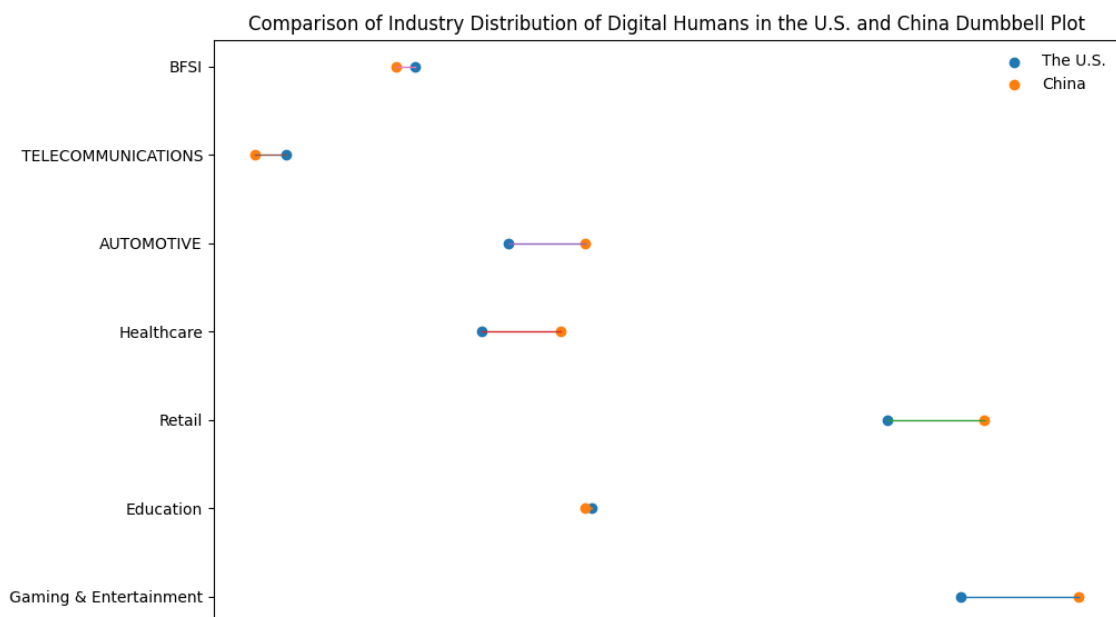


Figure 1. Comparison of Industry Distribution of Digital Humans in the U.S. and China

As shown in Figure 1, the two countries are structurally similar in terms of industrial proportions, with Gaming & Entertainment and Retail for relatively high proportions. To a certain extent, this is limited by the fact that the current digital human technology is still in its infancy. Acting according to the human mindset is the core of the digital human. Compared with healthcare, education, telecommunications, gaming and entertainment are far more tolerant of digital humans. Players readily accept avatars whose cognition is less than human, as the stakes are low and the novelty can even enhance the experience. By contrast, professional or service critical fields demand digital humans with far more human like reasoning. This is the reason why the United States and China both started to develop digital humans from the game and entertainment industry, and the game and entertainment industry accounts for the largest proportion at the initial stage. The current digital human belongs to the stage of high entertainment and low service. From social construction of technology perspective, the present form of digital humans reflects the interpretive flexibility negotiated among multiple social groups, like technology developers, industry gatekeepers, audiences and so on. When digital humans can complete the replacement of high-service or even professional positions, the industrial layout will be updated and iterated accordingly.

It is worth noting that the United States has a higher proportion than China in the Education, Telecommunications, and BFSI sectors. China has a higher proportion than the United States in Gaming and Entertainment, Retail, Healthcare, and Automotive. It should be emphasized again that these proportions are based only on the respective national totals.

As an emerging industry, the layout of digital humans in the United States and China is different, which is inevitably affected by the cultural environment and existing resources.

The United States maintains a leading position in scientific research and economic development. Congressman Richard Hudson emphasized (2025) that America is the world's economic powerhouse, leading the world in innovation, and hosts top technology companies[13]. The U.S. National Science Foundation announced 11 new AI research institutes with a \$220 million investment, expanding the initiative to 40 states and D.C. in 2021[14]. The advantages of scientific research and financial orientation have contributed to the higher share of digital humans in education, telecommunications, and BFSI than in China.

China has remained the world's top manufacturing hub for 14 consecutive years, said China's Ministry of Industry and Information Technology (2024) [15]. Ministry of Commerce of the People's Republic of China (2024) expresses that China's e-commerce remains world's largest online retail market for 11 consecutive years (2024) [16]. China is a big country in manufacturing and online retail, which also gives digital humans fertile soil in the field of e-commerce and industrial services.






With the gradual advancement of the digital human mindset, it is possible to complete tasks in different industries in the role of people. Different cultures also have different emphases in their outlook for digital humans. The 2023 update to the U.S. National Artificial Intelligence Research and Development Strategic Plan centers on making long-term investments, addressing the ethical, legal, and societal implications of AI[17]. The report released by the Internet Society of China (2024) advocates the transformation of digital humans from media humans to service humans and then to career humans; to quickly evolve from digital humans to intelligent digital humans [1].

The shaping of digital humans at the cultural level is not only limited to the industrial structure and group of policymakers, but also more producers and audiences are also influencing the development of digital humans. This will be analyzed in detail in the following two sections.

4.2. Comparative analysis of creative production

At present, many digital humans are widely employed and popular. Figure 2 presents representatives with significant attention and meaning assigned by their creators in the aspects of visual image, role or function, and brand operation.

Lil Miquela, Blawko22, AYAYI, and Tian Yu fall under the realistic visual image—one of the three: realistic, anthropomorphic, or cartoonish. The meticulous coding of the shape also means bearing the corresponding expectations. Pick up commercials as a fashionist, or appearing as cultural symbols. Experiments have shown that although virtual influencers have a lower impact on purchase intention than real humans, it still has a positive effect on promotion[18]. Choosing digital humans as brand ambassadors can minimize reputational risk, cut costs, and enhance novelty-driven appeal. Both the East and the West are making attempts to shape virtual humans into influencers. The difference is that the shaping process and tendency are influenced by national culture.

Country	the United States				
Name	Miquela Sousa	Blawko22	Realqaiqai	Ellie	Raxana
Visual Image					
Gender	Female	Male	Female	Female	Female
Role	Fashionist, Singer	Model, Rapper	Toddler	Health Interviewer	Anchor
Creator	Brud, Inc.	Brud, Inc.	Serena Williams, Alexis Ohanian, Invisible Universe	University of Southern California	Defiance Media
Platform Presence	Instagram, YouTube, TikTok, X	Instagram, YouTube, TikTok, X	Instagram, YouTube, TikTok, X	USC Institute for Creative Technologies and DARPA	Defiance Media
Key Attribute	Top-tier in follower count	Controversial rapper	Highly popular child virtual character	Assisting in PTSD screening is effective.	News anchor's simulacrum

Country	CHINA				
Name	AYAYI	天好 Tian Yu	洛天依 Luo Tianyi	央视网小C China Central Television's xiao C	采销东哥 (Marketing Department Dong Ge)
Visual Image					
Gender	Female	Female	Female	Female	Male
Role	Fashionist	Dunhuang Flying Apsara	Singer	Presenter	Salesperson
Creator	Shanghai Ranmai Information Technology Co., Ltd	Dunhuang Costume Culture Research and Innovation Design Center; Beijing Yuanyuan Technology Co., Ltd	Shanghai Henian Information Technology Co., Ltd	China Central Television	JINGDONG
Platform Presence	REDnote, Weibo, Douyin	Douyin, Bilibili, Weibo	Bilibili, Weibo, Douyin	CCTV, Douyin, Weibo, Bilibili, REDnote	JINGDONG
Key Attribute	China's first hyper-realistic digital personal	Chinese chic style	Top-tier in follower count	Government media endorsement	Entrepreneurial simulacrum

Figure 2. Cultural Encoding of Ten Digital Humans

According to the data of 2023 drawing on Hofstede’s cultural dimension (Figure 3) [19], the United States scored higher in Individualism, Uncertainty Avoidance, and Indulgence. China scored higher in Power Distance, Motivation towards Achievement and Success, and Long-Term Orientation. Among those, Power Distance shows the largest difference, while Motivation towards Achievement and Success is more similar and scores high.

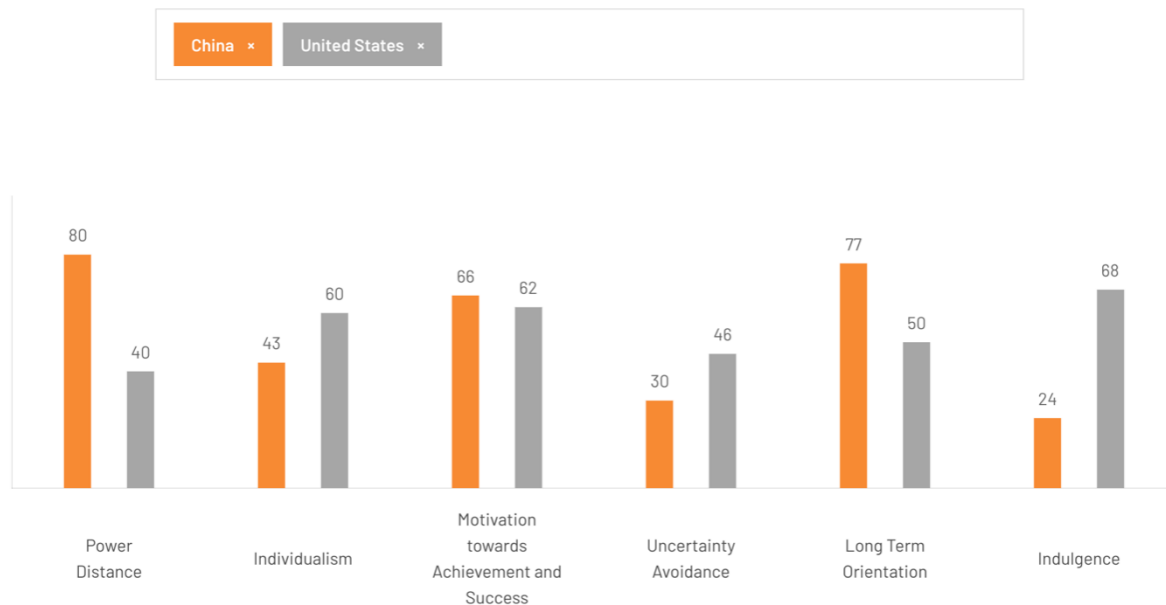


Figure 3. Drawing on Hofstede’s cultural dimension

Lil Miquela, an iconic virtual influencer in the United States who appeared in the public view in 2016, has a wealth of character details and clear personality traits, and will express her preferences on social media and participate in public issues. Even in the first two years, she did not announce the identity of the virtual person, and it was not announced until April 2018[20]. Lil Miquela's ability to make the fake appear real is based on her expression of opinions, emotions, and life’s detailed presentation.

This is consistent with the discourses of low power distance and individualism. This stems from the discourses of low power distance and individualism. The author cares about the right to express opinions and emotions, and gave Lil Miquela the same power to think and express as a real human. Blawko22, who is characterized by tattoos and face masks, interacts with Lil Miquela several times on social media. The culture of Blawko22's endorsement is attracting Target Audiences who are interested in Gen Z interested in gaming, streetwear, and subculture. The soil of low power distance and individualistic culture allows and tend to give characters a pluralistic label, complex emotions, and autonomy to explore social issues. High Indulgence will consider giving the characters more intriguing features.

The high cultural soil of power distance, collectivism, long term orientation, and restraint will portray the characters based on the collective memories. Cultural symbols can evoke resonance and coagulative power. For influencers, “self-conflict” is less frequently shown. In the discourses, stability and positivity are emphasized. As China's first hyper-realistic digital person, AYAYI has always maintained a cold perfectionist character. It's hard to feel mood swings and personal attitudes toward social issues in her work. Similarly, Tian Yu is more focus on cultural symbols and doesn’t express opinions about controversial topics.

To emphasize the unique personality of a character, creators often design visual images to be cartoonized during coding. For example, Realqaiqai in the U.S. uses a baby-like design to attract families and highlight playfulness, while China’s Luo Tianyi employs Moe Aesthetics to foster imaginative engagement. The cartoonization of visual images can avoid the uncanny valley effect to

a certain extent. This is very necessary for the audience group to be children or teenagers. Maintaining approachability fosters parasocial interactions between digital characters and young audiences.

When digital humans are assigned professional roles, their visual encoding typically does not seek realism or cartoonishness. For example, Ellie, who is used for medical treatment in the United States[21], and Xiao C, the presenter of CCTV in China. Ellie's digital human identity can alleviate the bad emotions that people with mental illness have when they face real doctors. CCTV's Xiao C and other digital humans designed for e-commerce or customer service have also redefined their functional roles and responsibilities by harnessing the limited resemblance to human appearance. This appearance enables users to attribute responsibility to the operations team behind the digital human.

In addition, there are digital humans endorsed by real people. For example, Raxana in the United States and Dongge in China. A digital human endorsed by a real person can complete the work on behalf of the real person by collecting the voice, image, and language habits of the real person. To a certain extent, such digital humans inherit the credit of real people. In this regard, the creator of Raxana explained in detail in an interview that the platform and the real Raxana constraints on the work content of digital humans. [22] Well-established contractual constraints are an effective way for digital humans to mitigate uncertainty avoidance when inheriting trust. Dongge in China is modeled after the well-known Liu Qiangdong. Endorsing by the person in charge of the enterprise or relevant professionals is a manifestation of long term orientation.

The promotion platform is also a point worth noting. In high PDI country, the participation of China Central Television, provincial broadcasters, and influential platforms in the early stage is a demonstration of taking on responsibilities for promoting and disseminating these emerging technologies.

4.3. Comparative study of people's attitudes towards digital humans

After the creator encodes a message with their intended meaning, the audience consciously engages in decoding by their own consciousness and interpretive frameworks.

“After 19th birthday: Lil Miquela got program memories necklace” and “Hua Zhibing enrolled at Tsinghua University” are controversial topics about digital human chosen from the United States and China. After coding and multiple-choice categorizing the comments. It can be found that more than half of the comments contain emotional expressions, with other aspects such as technical presentation, character setup, social impact, and others often co-occurring within the same comment.

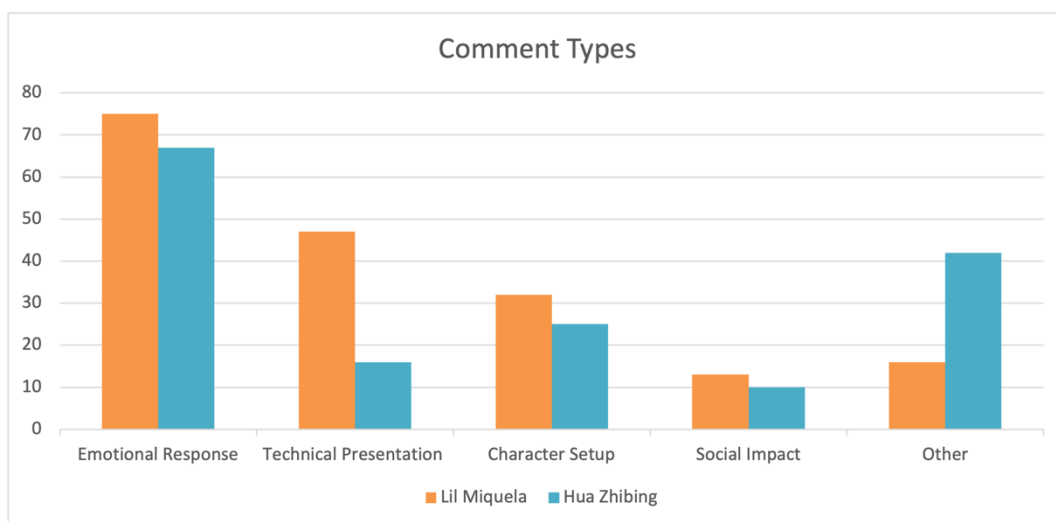


Figure 4. Comment types about Lil Miquela and Hua Zhibing

In Figure 4, the discussion of Lil Miquela is more focused on technology, such as how it is presented and whether the image looks real or fake. At the same time, the discussion of the character setting that the age will always stay at 19 years old, and social ethical considerations are also worth paying

attention to. This behavior reflects the audience's tendency toward uncertainty avoidance, which aligns with the fact that the uncertainty avoidance index of the U.S. is higher than that of China.

Compared with the shape, age, or unique character settings of Lil Miquela, the topics surrounding the character setting of Hua Zhibing such as how the digital human completes exams, graduates, and other issues that are actually relevant to real students are very hot. This is an embodiment of collectivism and long-termism cultural logic.

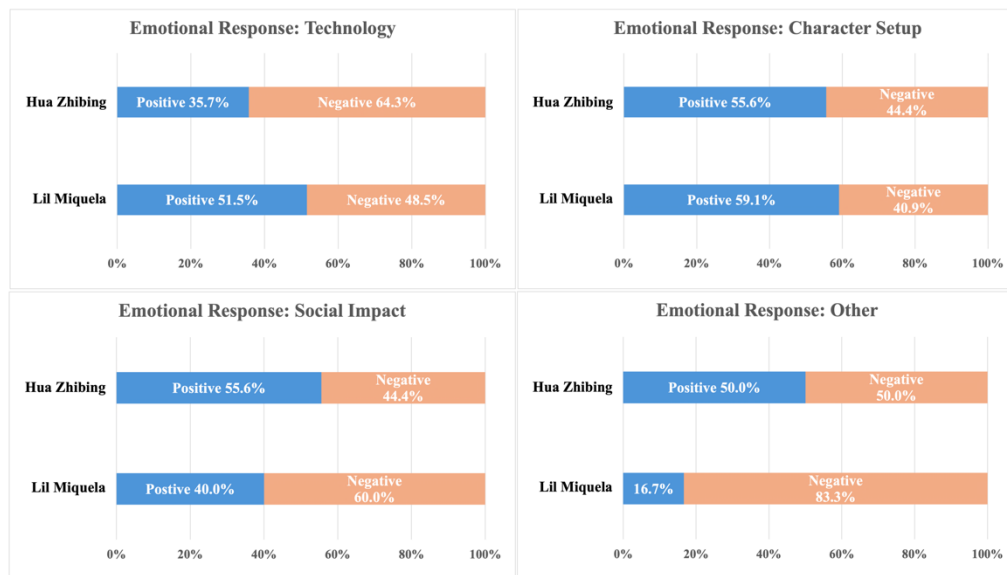


Figure 5. Comparison on different types of emotional response

It is worth noting that more than 15% of comments on Video Hua Zhibing discuss negative news related to Tsinghua University, while over than 7% of comments are positive references to Tsinghua. These comments are classified in "other". Commenters' attitudes toward Hua Zhibing are influenced by their association with Tsinghua-related news. This is a specific manifestation based on China scored higher in Power Distance.

Audiences take their own interests and culture into account when receiving information. The digital human industry is still in its infancy, and has not yet formed a closed symbiotic relationship with people. This can be seen in Figure 5 that the responses were polarized, with strong positive and negative sentiments.

In terms of overall emotional response, the proportion of negative emotions in Lil Miquela-related topics was higher than that of Hua Zhibing. This is in line with the U.S. Uncertainty Avoidance score higher than China's national culture.

In addition, it is worth noting that there are many comments and thoughts on the future with the willingness to interact with the virtual character in the commentary. “I want to sit near with Hua Zhibing in the class, I don’t need to ask the teacher questions.” -this is a comment about Hua Zhibing on Wechat Public Platform. There also are comments about the relationship between digital humans and humans. “First, they’re gonna be all nice and stuff, and then they attack. It will be humans vs. robots.”-this is a comment about Lil Miquela on YouTube.

The imaginings prompted by technology and the interactional tendencies stimulated by anthropomorphic features accompany and intertwine with the audience's contemplative thinking. This is the imagination that technology has brought to us, and it will build a new civilization that applicable to Coexist with technology.

5. Discussion and Conclusion

5.1. Limitations

This study is limited by the availability of data. There is inevitably a subjective tendency in the selection of representative figures and videos. From the cultural dimension, this paper just comparative analysis two countries is not sufficiently comprehensive.

5.2. Implications and Future Research

Culture is collective memory and programming. While humans share common logics of creation, there are also culturally specific differences in China and the U.S. Starting from entertainment and games, digital humans have expanded into various industries under the guidance of local resources and culture. The rapid rise of technology is producing significant tensions and interactions with existing cultural frameworks. Subsequent research could focus on the cognitive differences of intelligent digital humans within the framework of big data-driven models. Meanwhile, expanding the national scope of the research can provide more inspiration.

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