

A Multidimensional Discourse Analysis of Vaccine Representation in News Media

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Abstract: The development and dissemination of COVID-19 vaccines have transcended the realm of scientific inquiry, becoming deeply entwined with political discourse due to the contentious nature of their effects and the significant economic and political interests at stake. This study employs a corpus-assisted discourse study (CADS) approach, integrating critical discourse analysis (CDA) and corpus linguistics (CL), to dissect the representations of COVID-19 vaccines across three English-language newspapers from the U.S., Hong Kong China, and Chinese mainland. By examining the discursive strategies and narrative constructions in these publications, the study aims to uncover the preferred ways in which each newspaper frames the vaccine issue and elucidate the intricate interplay between vaccines, media, and politics. The findings contribute to a nuanced understanding of how media narratives shape public perception and influence policy discourse in the context of a global health crisis.

1. Introduction

On 11 March 2020, the World Health Organization declared the novel coronavirus COVID-19 a global pandemic of international concern. This has triggered a worldwide “race” to develop an effective and safe vaccine [1, 2], as vaccination is considered as one of the most effective public health interventions in controlling the pandemic [3]. The success of vaccine development is not only a breakthrough in science but, more importantly, an indication of geopolitical power and influence in the international arena, as immense economic and political interests are involved in the development and distribution of vaccines [2].

However, even when the vaccines are in supply, the achievement of herd immunity is largely dependent on public acceptance and a high rate of vaccination [4]. According to WHO, vaccine hesitancy has become one of the top ten threats to global health. While previous studies have highlighted that public acceptance of the COVID-19 vaccines is significantly associated with the safety, efficacy, and risk of the vaccines [5], some other studies have pointed out that the

widespread misinformation in the media increases public doubts and hesitancy over the safety of vaccines [3]. It has been found that the way how media communicate information on vaccines can influence public perception, decision-making, and protective behaviors [6].

Previous studies have shown that representations of vaccine issues in the media have been highly politicized and polarized [7]. While many studies have been conducted to investigate media representations of COVID-19 vaccines in different socio-political contexts such as U.S., Hong Kong China, and Australia, few studies have provided a comparative study of COVID-19 vaccines in different socio-political contexts to explicate the complex relations between vaccines, media, and politics. It is thus of great interest to compare to what extent these newspapers construct the same issue similarly or differently, and the socio-political factors behind their preferential ways of constructions.

2. COVID-19 vaccines, politics, and news media

The successful development of vaccines can not only help a country restore the damaged economy and return life to normalcy but also gain new economic and geopolitical opportunities [7]. COVID-19 vaccine, thus, has become “a new site for global competition and contestations” [8]. Even before completing phase three clinical trials, many developed countries began to pre-order and stock vaccines in mid-August 2020. Before this, the politicization of public health measures in response to COVID-19 and inadequate mitigation measures have already plagued public confidence in government actions and acceptance of vaccines.

With the pandemic out of control in several countries, “blaming games” and conspiracy theories have been emerging and escalating in the geopolitical narratives, especially between U.S. and China [9]. In the early pandemic, China was blamed and criticized for silencing reports and mishandling the disease at home and abroad. In April 2020, after successfully controlling the pandemic, the Chinese government started health diplomacy by providing medical and economic assistance to other pandemic-hit and entrapped countries. However, the Trump administration declared its retreat from the World Health Organization and refused to join the COVID-19 vaccine initiative COVAX amid the aggravating pandemic [10].

Hong Kong, a Special Administrative Zone (SAR) of China, exercised relative autonomy in procuring its vaccines under the “One Country, Two Systems” policy. On 1st December 2020, the Hong Kong China government announced a vaccine procurement program with two manufacturers: Sinovac Biotech and Fosun Pharma (7.5 million doses, respectively). Although doses have been sufficient to cover the entire population, the vaccination program is still sluggish. In recent years, Hong Kong China has been in political turmoil, with social movements and unrest occurring increasingly, such as the Umbrella Movement in 2014 and protests against the extradition bill in 2019.

Although the fast record of vaccines is supported by governmental and institutional efforts, the equitable distribution of vaccines has been confronted with unprecedented challenges. This has given rise to vaccine nationalism, which is “the mindset and act of gaining preferential access to newly developed COVID-19 vaccines by individual countries (higher-income countries, in particular)”. Vaccine nationalism has impeded fair access to vaccines among nations and is regarded as a ‘catastrophic moral failure’ by WHO.

Growing numbers of research have been devoted to examining the interplay between media representations of vaccines and the underlying socio-political contexts. It has been found that how media communicate vaccine information is closely related to the socio-political contexts [8]. However, most of these studies more frequently rely on either a close qualitative/content analysis of a small sample of texts or a mere quantitative analysis of data. It’s a pity that few of them take

advantage of theories and methods of both computational linguistics and CDA. The current research, thus, adopts a corpus-assisted discourse study by combining theories and methods of both CL and CDA to obtain different insights that cannot be observed from purely manual and qualitative analysis.

3. Methodology

3.1 Data Collection and Corpus Building

Three large corpora have been built by retrieving all the news reports concerning COVID-19 vaccines from *China Daily* (CD), *The New York Times* (NYT), and the *South China Morning Post* (SCMP). The word *vaccine* is used as the search term, with the timeframe set from 1 January 2020 to 30 September 2021. The time is chosen when the COVID-19 vaccine has not become a topic before 2020, and the roll-out of vaccines is relatively subliminal amid the prevalence of vaccine hesitancy. The news articles were extracted from the Dow Jones news database Factiva (<http://global.factiva.com>). Factiva is an international news database with 28 languages available, which covers more than 32,000 sources. The keyword search yielded three subdivided corpora after manually eliminating some irrelevant information such as copyright, load time, headline, and byline in the articles. The NYT corpus contains 2824 news articles and 2,533,114 tokens, CD 609 articles and 336,799 tokens, SCMP 1184 articles and 1,004,638 tokens.

3.2 Analytic Methods and Procedure

The study adopts a corpus-assisted discourse study (CADS) which combines the corpus analytic methods with the discourse historical approach (DHA). While the benefits and potentials of combining CL and CDA have been well acknowledged in previous studies, a more ‘balanced’ synergy of CL and CDA has been emphasized in recent studies [11]. On the one hand, a corpus-assisted discourse study allows us to examine large amounts of naturally occurring data, quantify them, and identify their ‘latent patterning’ [11]. On the other hand, a more qualitative analysis can be done by investigating the co-occurrences of a word or a phrase in context [12, 13]. DHA views language as a social practice and the context of language use to be crucial. It aims to “deconstruct the hegemony of specific discourses by deciphering the ideologies that serve to establish, perpetuate or resist dominance” [13].

The present study first uses KH coder to generate a correspondence analysis by producing a two-dimensional scatter diagram. KH coder is a free software designed for content analysis and text mining (<https://khcoder.net/en/>). Correspondence analysis could visualize words that share a similar appearance pattern corresponding to a certain variable (i.e., time, gender, age, etc.) based on the chi-square value. Besides, Wordsmith 7.0 will be used to identify the discursive strategies (i.e., perspectivation) for constructing the COVID-19 vaccines by concordance analysis.

4. Findings

4.1 Correspondence analysis

The correspondence analysis shows different perspectives or aspects of the vaccine discussions in terms of the distribution patterns of the prominent tokens. The distribution of prominent tokens in CD reveals that almost equal weight has been given to media representations of COVID-19 vaccines in the three topical threads, which could be reflected by the number and concentration of tokens in each period (Figure 1). CD has shifted from focusing on domestic vaccine research and

development to underscoring the vaccine collaboration among countries, urging global vaccine equity, and paying efforts to provide the Chinese vaccines to countries in need as a “public good” after the initial success of clinical trials of vaccines. SCMP displays more concerns about vaccine development and research at the global level, presenting the contentious nature of vaccine development among great powers (Figure 2). Besides, it shows more local concerns about the availability of vaccines in Hong Kong China and the safety and efficacy of these vaccines for people. NYT is more focused on the success of U.S. drugmakers such as Pfizer and Moderna in clinical trials, which can be seen from the concentration of prominent tokens during this period (Figure 3). Besides, after the clinical trials of vaccines have been proven successful, it displays concerns about the safety of vaccines and challenges to vaccines caused by the virus mutations. Overall, the correspondence analysis identifies three discourse strands: vaccine research and development, clinical trial results, and post-vaccination (Figure 4).

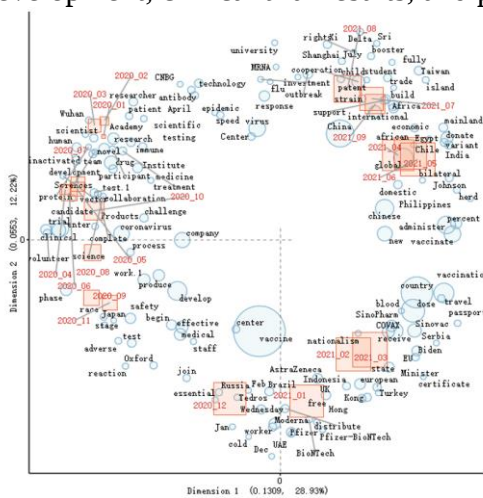


Figure 1 Correspondence analysis of CD

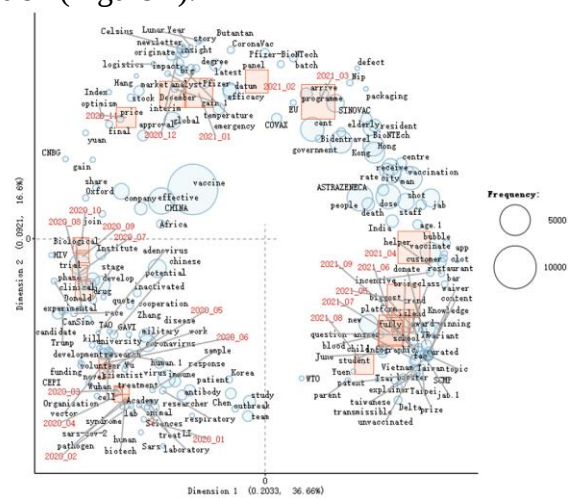


Figure 2 Correspondence analysis of SCMP

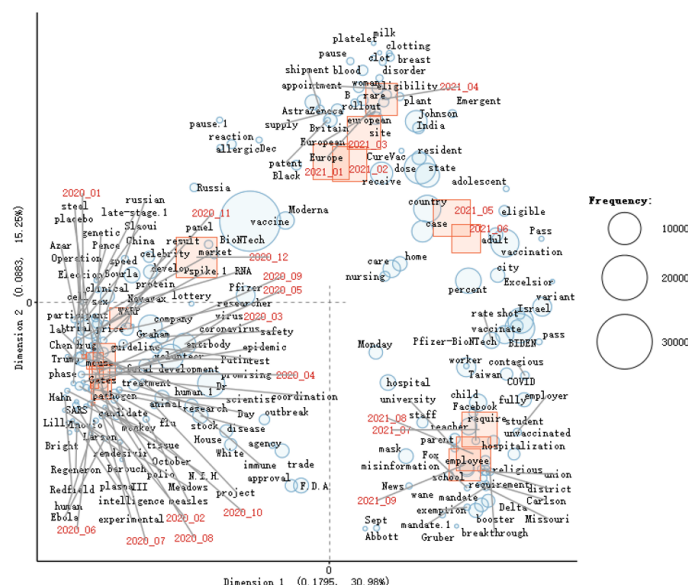


Figure 3 Correspondence analysis of NYT

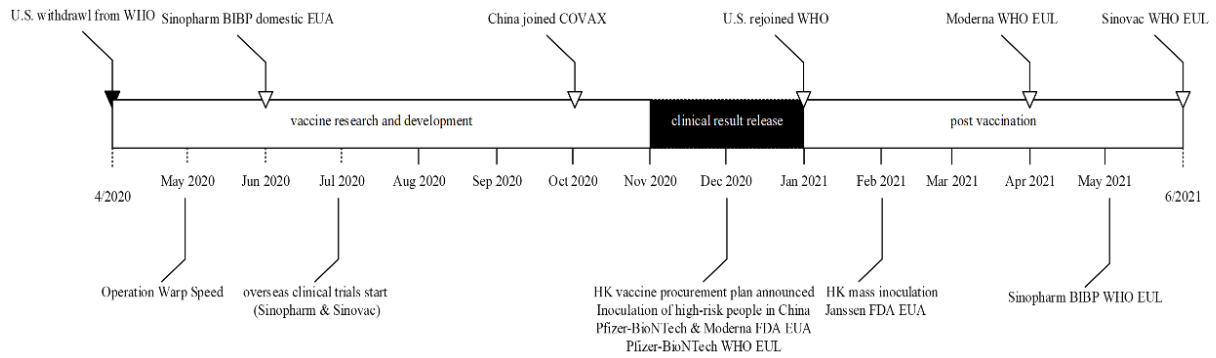


Figure 4 Summary of correspondence analysis

4.2 Analysis of discursive strategies

Perspectivation strategy refers to the positioning of the speaker's point of view or expression of involvement. It can be realized through reporting, description, narration, or quotation of the issues, events, or utterances [12]. The discursive devices used for perspectivation strategy include direct, indirect, free indirect speech, or deictics, etc. The current analysis focuses on how the perspectives or viewpoints are positioned towards the vaccine brands in three corpora. One primary concern is what sources of attribution are represented in the news report, as it can reveal the particular ways of alignment and disalignment of each newspaper. The sources of attribution are manually categorized into business, expert, government, news, public, organization, other countries, and study.

Table 1 Sources of attribution in three corpora

	CD				SCMP				NYT			
Sources	Sinovac		Sinopharm		BioNTech		Sinovac		Pfizer		Johnson	
business	76	31%	54	26%	176	18%	159	14%	855	36%	748	32%
expert	17	7%	8	4%	284	29%	398	35%	380	16%	327	14%
government	24	10%	21	10%	254	26%	204	18%	569	24%	934	40%
press	9	4%	11	5%	20	2%	34	3%	23	1%	47	2%
public	2	1%	2	1%	68	7%	91	8%	95	4%	93	4%
organization	17	7%	17	8%	20	2%	34	3%	47	2%	23	1%
other countries	90	37%	91	43%	39	4%	80	7%	95	4%	47	2%
study	10	4%	8	4%	107	11%	136	12%	309	13%	117	5%
others	0	0%	0	0%	9	1%	0	0%	4	0%	0	0%
Total	245	100%	212	100%	977	100%	1136	100%	2377	100%	2336	100%

Table 1 and Figure 5 show the distribution of different sources of attribution in three corpora. Overall, the positions are more attributed to external sources than being averred: CD (457, 56%), SCMP (2113, 66%), NYT (4713, 64%). This can be attributed to the crucial feature of news reporting which relies on making references to others' speeches to construct authority, objectivity, and credibility of news reporting. Although the three newspapers use large quantities of attribution, their sources of attribution demonstrate great variety. CD prefers to refer to speeches from other countries (181, 40%), business (130, 28%), and government (45, 10%). NYT prefers to represent voices from business (1603, 34%), government (1503, 31.9%) and expert (707, 15%). While CD and NYT more frequently refer to non-scientific voices, SCMP underlines the role of scientific voices (expert and study/research) and government (458, 22%). The sources of attribution reflect the journalistic norm of news reporting in light of the scientific nature of the COVID-19 vaccine.

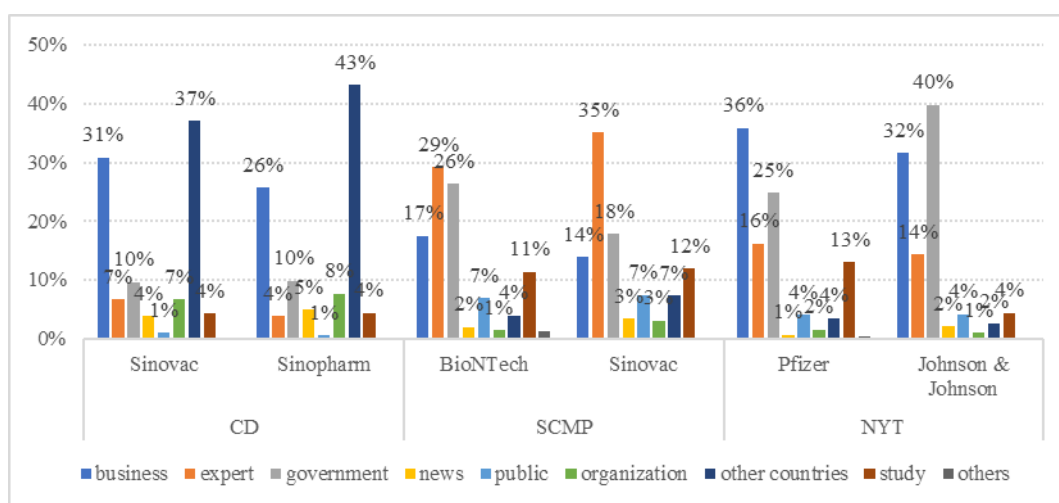


Figure 5 Distribution patterns of sources of attribution in three corpora

CD is the most certain among the three newspapers (694, 83%). And the largest share of sources of attribution has been given to other countries. The source of other countries stands out in the CD corpus to give a positive evaluation of Chinese vaccines and shows moral judgment of appreciation for the China-donated vaccines. Another important source of attribution in CD is the organizations such as the World Health Organization and GAVI. References to these organizations not only acknowledge the safety and effectiveness of Chinese vaccines but also emphasize the important role of China in ensuring the equal distribution/access of vaccines worldwide. The frequent use of foreign sources and world organizations helps to “enhance the legitimacy of the claims” CD has made on the Chinese vaccines.

(1) Egyptian Health Minister Hala Zayed **said** that clinical trials have proved the Sinopharm vaccine to be safe and highly effective in COVID-19 prevention, especially “in prevention of COVID-19 infection with severe symptoms”. (CD)

(2) “The emergency use listing of the Sinopharm COVID-19 vaccine helped speed up vaccine access for Africa,” **said** WHO Regional Director for Africa Matshidiso Moeti. (CD)

The role of business is important in both CD and NYT, because pharmaceutical companies in China and U.S. can provide detailed information/updates about the development of vaccines, report the safety and efficacy of clinical trials, and give responses about the potential side effects/risks. While pharmaceutical companies in CD present a positive evaluation of the vaccines, companies in NYT, especially Johnson & Johnson, display more uncertainties (237, 19%) in terms of waning efficacy rate against variants, manufacturing problems, and side effects. However, these uncertainties are usually mitigated by such expressions as *suggest*, *appear*, *slightly*, *very*, *small*.

(3) Johnson & Johnson **said** in a statement that the risk of having this occur is very low, and the rate of reported cases exceeds the background rate by a small degree. (NYT)

The source of scientific voices (expert and study) accounts for the largest proportion of sources of attribution in SCMP. This reveals that SCMP attaches great importance to the information provided by experts or research/studies. A close analysis of the stances of the scientific voices finds that they show more uncertainties (208, 31%) than other sources. In particular, more uncertainties are presented towards Sinovac (213, 40%) than those of BioNTech (64, 16.5%), which indexes the different stances of experts and researchers. The presentation of competing scientific stances also indicates that SCMP tends to include “evidential balance” in the news reporting by “conveying certain levels of certainty surrounding competing claims and scientific evidence”.

(4) On Thursday, Professor Lau Yu-lung **said** demand for BioNTech jabs had outstripped that for Sinovac shots by a rate of four to one after recent reports showing the former produced 10 times

more antibodies after two doses. (SCMP)

(5) Scientists have **criticised** the way data from the trials of a vaccine made by the Chinese drug company Sinovac has been released, saying it has caused confusion. (SCMP)

Another important source of attribution in the three corpora is government. SCMP (458, 22%) and NYT (1503, 31.9%) display more frequent references to the government compared to CD (45, 10%). The prominent representation of the government suggests the important role of the government in giving official information on the effectiveness of vaccines, informing the public of the safety risks of vaccines, and taking measures to address the safety problems. The governments tend to communicate more certainties rather than uncertainties to the public, demonstrating their tendency to pacify the public's concerns or hesitancy and convince them to vaccinate. SCMP distinguishes itself from the other two corpora as it presents more speeches from the public. It displays the public's conflicting views over the two vaccines offered in Hong Kong China, and their concerns/hesitancy over the vaccines. This suggests SCMP also tends to establish alignment with the public by highlighting both the certainties and uncertainties of the vaccines from the public.

(6) I didn't book Sinovac because it seems that people who have received the shots have run into some health problems, Chiu, a housewife in her 30s, said. (SCMP)

5. Conclusions

This study gives a corpus-assisted discourse study of discursive constructions of COVID-19 vaccines in Chinese mainland, Hong Kong China, and U.S. It is found that both CD and NYT tend to construct a positive image of the Chinese or U.S. vaccines by highlighting the success of their clinical trials and high efficacy rates in preventing diseases. While CD features a positive reporting style by both highlighting the success of Chinese vaccines and other countries' welcome of China-made vaccines, NYT is more critical in its reporting by not only hailing the success of vaccines but also pointing out the uncertainties of the vaccines.

Our analysis finds that *China Daily* as an important outlet for China's external communication still functions as the government mouthpiece by aligning with the government, communicating the government's voice to the international platform, and building a positive image for the Chinese government [6]. NYT belongs to the dominant liberal and professional journalism systems. It adheres to media pluralism by supporting the U.S. interest yet aligning for or against the administration's policy [8]. Thus, NYT aligns with the government and the American people when representing the American vaccines. Although there have been constant concerns over its editorial independence and self-censorship, SCMP still maintains its editorial independence and liberal stance since it disaligns with the Chinese vaccines and Chinese authorities and tends to align with the public, scientific voices, and global authorities.

This study has shown the value of corpus-assisted discourse study (CADS) in media studies. A balanced combination of CL and DHA in our analysis has helped to reveal the dynamic relations between vaccines, politics, and media. The analysis has further proved that the complex relationship between language, media, and power can be revealed at different levels of discourse. The study has both significant methodological and practical implications. The integration of computational linguistic tools demonstrates the robustness and flexibility of corpus linguistics, which realizes the analysis of discourse at different levels. The analytic procedures, methods, and findings can contribute to future studies in vaccine/health communication, journalism, and discourse analysis.

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