Article

War, Tool, Race or Building? A comparison of vaccine metaphors between (translated) media and scientific reports in the age of COVID-19

Yufeng Liu
Department of Chinese and Bilingual Studies, The Hong Kong Polytechnic University, Hong Kong, PRC

Department of Linguistics and English Language, Lancaster University, Lancaster, UK

Dechao Li
Department of Chinese and Bilingual Studies, The Hong Kong Polytechnic University, Hong Kong, PRC

Abstract
News reportage is one of the major means of scientific communication to the public, but science information can be misrepresented in news. In this study, we used a corpus-assisted discourse analysis approach to examine the use of COVID-19 vaccine metaphors across news, translated news and scientific articles and how metaphorical frames may have differed based on genre and translation. Results reveal that there are shared (HUMAN, RACE and WAR) and unique (BUILDING, PASSPORT and TOOL) source domains between news articles (original and translated) and scientific reports. Interestingly, the study reveals that translation plays a role in the discursive construction of news values, such as *Proximity* and *Negativity*, which engenders frame shifts in news production for different target readers. The study concludes by advocating the use of a BUILDING metaphor to map COVID-19 vaccine/vaccination for the benefits of health communication. It has further revealed the complicated nature of scientific communication through (translated) news and calls attention to the political intention of news translation.

Corresponding author:
Yufeng Liu, Department of Linguistics and English Language, Lancaster University, Lancaster LA1 4YW, UK.
Email: yufengliu@lancaster.ac.uk

Correction (January 2024): There have been changes in the bold font for some of the Chinese characters in the text since the original publication of the article.

Introduction

The metaphorical framing of COVID-19 has received considerable scholarly attention in the news context (Taylor and Kidgell, 2021). However, metaphorical framing of COVID-19 vaccines has been much less investigated than pandemic metaphors, despite the impact of metaphor use on vaccination intentions (Scherer et al., 2015). Abdel-Raheem and Al-khammash's (2021) work is an exception, which explores Saudi women's vaccine hesitancy in response to pro- or anti-vaccination frames in written news reportage and multimodal cartoons. Their results show that written news has a greater impact on vaccine hesitancy than cartoons, with the former also being the focus of the current research. Nonetheless, journalistic scholars barely pay attention to metaphorical frames in COVID-19 news, though COVID-19 news itself is of their interest (Santos-Gonçalves and Napp, 2022).

Aligned with prior research, this study holds that metaphor is 'too pervasive and useful a tool for communication and thinking to be avoided or censored because it can do harm as well as good' (Semino, 2021: 56). It attempts to identify appropriate metaphorical framing for covid vaccination through a corpus-assisted comparative study of news and scientific articles. It also analyzes how news translation might alter metaphorical frames for readers of different socio-political backgrounds. In fact, variation in metaphor use by genre and translation in news remains overlooked in academia, partly because translation in news production and its dissemination receive little attention in journalistic research (see Valdeón, 2017). This comparative study of (translated) news and scientific reports is chosen for three reasons: first, news reportage is one of the major means of scientific communication to the public[1] (Rode et al., 2021); second, news and science are often placed in a controversial and interactive relation (Tsfati et al., 2011), where coronavirus disease science, including vaccine information, can be misrepresented in news (Hart et al., 2020); and third, metaphor frames in both science and news are important carriers of meaning (Zhang, 2021). In so doing, the study aims to explore the dialectic relations between science, news and news translation in an era in urgent need of effective communication.

The three research questions to be addressed in this study are:

RQ1. What are the metaphorical frames used for COVID-19 vaccines in news, translated news and scientific articles?

RQ2. Do translation and genre variation cause shifts in metaphorical frames of COVID-19 vaccine?

RQ3. According to Semino's (2021) three criteria for evaluating metaphor effectiveness, which of the available metaphors is considered the most suitable for mitigating potential counterproductive framing effects and, simultaneously, enhancing health communication during the pandemic era?

COVID-19 pandemic and vaccine hesitancy

The infectious disease COVID-19 has caused over six hundred million confirmed cases and over six million deaths globally as of November,2022.[2] To cope with this dreadful pandemic, multiple vaccines have been developed, including the Pfizer/BioNtech Comirnaty vaccine, the AstraZeneca/Covishield vaccine, the Janssen/Ad26.COV 2.S vaccine, the US Moderna COVID-19 vaccine, the Sinopharm COVID-19 vaccine and the Sinovac-CoronaVac vaccine.[3] In spite of the relatively rich provision of vaccine options, low vaccine acceptance rates are reported in Europe, North America and African countries, *inter alia* (Sallam, 2021). Aside from economic reasons, psychological explanations such as mistrust of vaccine reportage are also documented in a cross-nation comparative study (Machingaidze and Wiysonge, 2021), although empirical evidence to support this claim is still lacking. As of November, 2022, about 68.5% of the world's population has received at least one dose of a COVID-19 vaccine. Around 69% of the population in the United States have been fully vaccinated, demonstrating a slightly higher acceptance rate than the world average but only two-thirds of that in countries such as the United Arab Emirates, China, Singapore and Spain.[4] Anti-vaccine campaigns have been taking place on social media, more dominantly on Facebook.[5] The disparately distributed rates of vaccine acceptance observed in these regions contradict the aspirations of scientists and health professionals who strongly advocate for individuals to seek protection through COVID-19 vaccination.

As illustrated in Introduction, science depends on news reportage to communicate knowledge to the general public, but is also likely to be adversely affected by fake news and misinformation. The current study focuses on how news and the translated news diverge from scientific reports in metaphor use to frame covid vaccines, thereby exploring the vaccine hesitancy from the perspective of news narratives, which, to the best of our knowledge, has not been discussed before.

Metaphor and framing

Frame is about selection and salience, that is, to choose to highlight some aspects but hide others (Entman, 1993). This is also what metaphors do (Semino et al., 2018) as the cross domain-mapping principle of the Conceptual Metaphor Theory (CMT) (Lakoff and Johnson, 2003[1980]) accentuates some shared aspects of two objects and de-emphasizes others. Hence, metaphor scholars also use the term 'metaphorical framing' to refer to this framing function of metaphors and the product of such a framing practice is mentioned as 'metaphorical frames'. Metaphorical framing of certain events in speeches, news, and social media posts can be studied to tease out the contour of people's (un)changed understanding of the world, including COVID-19 (e.g., Liu and Li, 2022, 2023; Semino, 2021). While journalists explore metaphors (e.g., Gravengaard, 2012) to understand newswork, they rarely connect metaphors with framing or study metaphorical frames in COVID-19 news.

Previous research suggests translation alters metaphorical frames in news, possibly indicating newspapers' ideological manipulation (Liu and Tay, 2023). Different

translation strategies can result in readers encountering entirely different metaphors. This differs from Valdeón's (2017) view of translation as gatekeeping where journalists determine which news articles to translate. The modification of metaphors in translated reports reveals potential manipulation by newspapers in each news article.

Another surprising fact for journalists is that scientific articles are also full of metaphorical language, as metaphors play an importantly epistemic role in science (Kompa, 2022). For instance, physicists may use the terms 'waves' and 'particles' to describe phenomena, despite there being no actual liquid or solid entities involved. Therefore, in scientific articles on Covid vaccines, there are also a significant number of metaphors used to explain the production and working mechanisms of the vaccines. Comparing metaphors in scientific articles to those used in source news articles and their translations may reveal how journalists and scientists prioritize different aspects of vaccines.

Methodology

Corpora

In this study, three corpora are used to investigate whether genre (news *versus* science) and readership (English *versus* Chinese) impact the use of metaphorical frames for COVID-19 vaccines. The data has been taken from the New York Times English corpus (NYT_En), the New York Times Chinese corpus (NYT_Ch) and the COVID-19 corpus (COVID-19).

The NYT_En corpus and the NYT_Ch corpus are created based on news articles reporting the COVID-19 vaccines starting from January 1st, 2020 to September 30th, 2021 on the *New York Times*'s English (https://www.nytimes.com/) and Chinese (https://cn.nytimes.com)[6] official websites. This time range is selected because January 2020 marks the isolation and sharing of the first novel coronavirus strain[7] whereas in September 2021, close to half of the world population have received at least one dose of a COVID-19 vaccine.[8] The data for this study was selected using a three-step procedure: first, using the data scraping software Octoparse Version 8.5.8[9] to retrieve all English and Chinese news articles published within the designated time range from the two official websites; second, examining the news headlines of the retrieved articles and retaining only those that contain the English word 'vaccine/vaccination/vaccinate' or the Chinese phrase '疫苗 yìmiáo' (literally, vaccine);[10] and third, only keeping articles that have the English source text (ST) and the Chinese target text (TT). In total, the NYT_En corpus consists of 59,205 word tokens from 45 English original news articles and the NYT_Ch corpus is composed of 54,318 word tokens from 45 Chinese translated news articles. Figure 1 below provides a visual representation of the temporal distribution of news articles.[11] Notably, the reporting on Covid vaccines did not emerge until May 2020, with a significant increase in coverage observed primarily in December 2020 and June 2021, comprising seven and six articles, respectively.

The COVID-19 corpus, available as an open access resource on Sketch Engine (https://ske.li/covid_19), encompasses over 370,000 scientific research articles addressing coronavirus and related subjects.[12] These research articles primarily originate from the
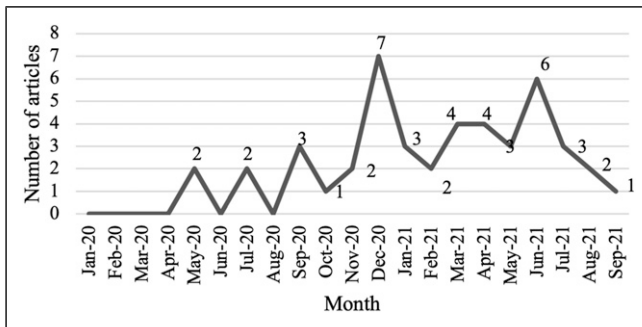
Figure 1. Visualization of the number of vaccine reports in the *New York Times* over time.

COVID-19 Open Research Dataset (CORD-19), which incorporates data obtained from PubMed's PMC open access corpus, WHO's listing of COVID-19 research articles, as well as bioRxiv and medRxiv preprints using the search terms 'COVID-19' and 'coronavirus research'. Notably, the COVID-19 corpus features extensive metadata encompassing essential information such as authorship, DOI, journal details, publication dates, and article titles. The same time range is selected when retrieving data from this corpus. As of September 30th, 2021, the corpus has a size of over 200 million word tokens. Searching 'vacci*'[13] in the corpus on Sketch Engine returns 327,888 concordance lines. The COVID-19 corpus represents a collection of scientific genre on COVID-19, since the sources are from medical and research corpora (see above). The NYT may also introduce scientific information to the general public, but its reports are of a generalized nature and composed by news journalists. This distinction underlies our categorization of news and science genres. Noteworthily, the scope of the current study is limited to metaphor use in framing covid vaccines, rather than medical issues that require more expertise.

Process of analysis

Using AntConc version 4.0.3,[14] we downloaded 1,327 concordance lines of 'vacci*' from the NYT_En corpus and 1,776 concordance lines of '疫苗' from the NYT_Ch corpus (search window size: 150 characters). Furthermore, 1,200 concordance lines of 'vacci*' were randomly sampled from the COVID-19 corpus (search window size: 150 characters). Table 1 summarizes the types and numbers of concordance lines for subsequent manual metaphor analysis.

Concordance lines were imported into Microsoft Excel Spreadsheet from AntConc and Sketch Engine. The authors highlighted concordance lines that might involve metaphors using the conditional formatting function in Excel, making them ready for the subsequent manual coding. Fuoli et al.'s (2021) metaphor coding method that combines the Pragglejaz Group's (2007) metaphor identification procedure (MIP) and Cameron's (2003) vehicle identification procedure was borrowed to code these concordance lines for the vehicle and topic of metaphors, and Ahrens and Jiang's (2020) Source Domain

Table 1. Description of the concordance lines used for the current analysis (window size: 150 characters).

NYT_En corpus		NYT_Ch corpus		COVID-19 corpus	
Search word	No. of lines	Search word	No. of lines	Search word	No. of lines
Vacci*	1327	疫苗 (vaccine)	1776	Vacci*	1200

Notes: NYT_En Corpus refers to the English vaccine reports from the *New York Times*; NYT_Ch Corpus refers to the Chinese vaccine reports from the *New York Times*; COVID-19 Corpus refers to the scientific articles on COVID-19.

Verification Procedure (SDVP) was used to verify source domain and target domain of metaphors. The MIP[15] is a widely used approach in metaphor research that compares the basic meaning of a linguistic unit with its contextual meaning to assess its metaphoricity. The Pragglejaz Group's work (2007) outlines a step-by-step guide for implementing the MIP. Cameron (2003) expanded on the MIP with a vehicle identification procedure that analyzes metaphors in phrases, sentences, paragraphs, or longer text strings and identifies the vehicles and topics of the metaphor.

The SDVP systematically determines the source domain of a metaphor, using corpus-based resources such as the Suggested Upper Merged Ontology (SUMO, https://www.ontologyportal.org), WordNet (wordnetweb.princeton.edu/perl/webwn), Handian Dictionary (https://www.zdic.net), and the Word Sketch function in Sketch Engine (https://www.sketchengine.eu) (see Ahrens and Jiang, 2020: 47, Figure 1 for a step-by-step guide). Simultaneously identifying vehicles using the vehicle identification procedure and source domains using SDVP allows for analyzing metaphors at different levels, with vehicles providing context and domains offering a more schematic understanding.

Example 1,[16] below, gives a brief illustration of the coding principle of metaphors in the English source text (ST) and the Chinese target text (TT) from the NYT corpora.[17]

(1) ST: Think of vaccine antibodies like a **sea wall** designed to protect a town from a storm surge.
  TT: 可以　把　疫苗　抗体　想象　成　一道　**海堤**,　用　来　保护
      kěyǐ　bǎ　yìmiáo　kàngtǐ　xiǎngxiàng　chéng　yīdào　**hǎidī**　yòng　lái　bǎohù
      can AUX vaccine antibody imagine　be　a　**seawall**　use　for protect
      城镇　　免　　受　　暴风　　巨浪　　　的　　　袭击。
      chéngzhèn　miǎn　shòu　bàofēng　jùlàng　　de　　　xíjī
      town　　avoid　　through wild wind　huge wave　AUX　　attack

In example 1, 'sea wall/海堤' is the unit of analysis, where: the vehicle is 'seawall'; the source domain is also 'SEAWALL';[18] and the topic or target domain is 'VACCINE'. Thus, the conceptual metaphor is 'VACCINE IS SEAWALL'.

For coding reliability, the first author devised and refined a stepwise manual, with a second coder randomly coding 10% of data. The inter-coder reliability is 'substantial' (Cohen's kappa = .745, Landis and Koch, 1977). Deviations were discussed and codes finalized jointly.

The following Results section summarizes the main patterns of metaphor identified in this research. The standard Key Word In Context (KWIC) concordance view is used to demonstrate patterns of co-occurrence, and sentence examples from the concordances are given in cases in need of more context.

Results

Overview

The main patterns of source domains for vaccine metaphors identified in this research are summarized in Figure 2, where the frequency percentage is calculated by $\frac{\text{Number of meaphors for the domain}}{\text{Total number of metaphors across domains}} \times 100\%$.[19] Results show that the three corpora share the source domains of HUMAN (43.27% in COVID-19 versus 19.10% in NYT_En versus 23.46% in NYT_Ch), RACE (0.96% versus 12.36% versus 4.94%) and WAR (8.65% versus 23.60% versus 18.52%). Among these domains, HUMAN (a total of 85.83%), WAR (a total of 50.77%), and RACE (a total of 18.26%) dominate the three corpora. Moreover, domains used in news and translated news involve more value judgments than that in scientific reports as evidenced by the evaluative domains BET, TOOL, GAME and VIOLENCE, which are used exclusively in either the NYT_En corpus or the NYT_Ch corpus, and the descriptive BUILDING (28.85%) domain used exclusively in the COVID-19 corpus. Differences between the NYT_En corpus and the NYT_Ch corpus are also observed, such as FIRE, ORGANISM and VIOLENCE domains used exclusively in the English news and the SCHEME domain used exclusively in the translated Chinese news. Moreover, the percentage of the WAR domain has decreased from 23.60% in the original English corpus to 18.52% in the translated Chinese corpus, whereas that of the PASSPORT domain has increased from 7.87% to 19.75%. Despite these general patterns of similarity and difference across the three corpora, more nuanced analyses should also focus on the less abstract and more contextualized vehicle terms as well as the metaphorical lexicalization, which will be elaborated further in the following sections.

Shared HUMAN, RACE and WAR domains between science and news

The COVID-19 corpus, the NYT_En corpus and the NYT_Ch corpus use similar and different vehicle terms and lexicalization for HUMAN, RACE and WAR domains, as summarized in Table 2. Overall, the two news corpora use more diverse varieties of vehicle terms and lexis than the science corpus for these source domains. News, translated news and science genres all recognize the urgency of vaccine development with the 'race' frame, as illustrated in examples 2 and 3, although such an emphasis is more highlighted in the NYT_En corpus (12.36%) and the NYT_Ch corpus (4.94%) than in the scientific corpus (0.96%). While the science corpus regards the coronavirus as what researchers are racing against (in example 2), the two news corpora render it into a political competition where China is racing against other countries (in example 3).
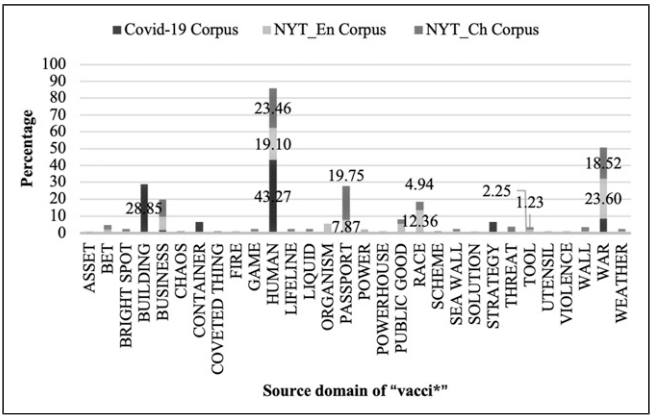
Figure 2. Relative frequency of metaphors of vacci* in corpora of news, translated news and science.

(2) … researchers are **racing** against time to develop vaccines and test anti-viral drugs in clinical trials… (The COVID-19 corpus)

(3) ST: The political stakes in the **race** for a vaccine are particularly high for China's ruling Communist Party.
   TT: 对　　执政的　　中国共产党　　　　来说,
   　　duì　zhízhèngde zhōngguógòngchǎndǎng láishuō
   　　for　ruling　　Chinese Communist Party AUX
   　　疫苗　**竞赛**　的　政治　　代价　尤为　关键
   　　yìmiáo **jìngsài** de　zhèngzhì　dàijià yóuwéi guānjiàn
   　　vaccine **race**　AUX　political　cost　　very　crucial

Similar patterns are observed for the WAR domain, where the significance of vaccines is exhibited with war-related frames, such as *weapon*. Nonetheless, while the science corpus directly mentions vaccines as 'weapons' against the pandemic *enemy* (in example 4), the two news corpora also highlight wars triggered by the vaccine, such as a global *spy war* (in example 5), and even weaponize the vaccine itself (in example 6).

(4) In addition to the prevention and control of the epidemic, vaccines and drugs are the two major **weapons** to overcome the epidemic. (The COVID-19 corpus)

(5) ST: Race for Coronavirus Vaccine **Pits Spy Against Spy**
   TT: 新冠　　疫苗　与　全僵　**间谍　战**
   　　xīnguàn yìmiáo yǔ quánqiú **jiāndié zhàn**
   　　coronavirus vaccine and global　**spy　war**

(6) ST: …accused a pair of Chinese hackers [on Tuesday] of **targeting** vaccine development on behalf of the country's intelligence service…

Table 2. Vehicle terms and lexis for HUMAN, RACE and WAR domains across corpora.

	NYT_En corpus			NYT_Ch corpus			COVID-19 corpus		
	Vehicle	Lexis	Freq	Vehicle	Lexis	Freq	Vehicle	Lexis	Freq
HUMAN	*Candidate*	candidate(s)	16.85%	*Candidate*	候选 (candidate)	22.22%	*Candidate*	candidate candidates	42.31%
	Dangerous Person	menace	1.12%	*Non-speculator*	没有投机取巧 (not to speculate)	1.23%	*Family Member*	family viral vaccine	0.96%
	Hidden Person	hiding in plain sight	1.12%						
RACE	*Race*	race racing scrambling for	12.36%	*Race*	全球竞赛(global race)	4.94%	*Race*	racing	0.96%
WAR	*Weapon*	shot knocked out	17.98%	*Weapon*	抗击(fight against) 对抗(combat) 攻击(attack)	6.17%	*Weapon*	weapons fight against combat	6.73%
	Struggle	vaccine struggle	1.12%	*Struggle*	斗争(struggle)	1.23%			
	War	information war deployment battle	4.49%	*War*	信息战(information war) 情报(intelligence) 全球间谍战(global spy war)	11.11%	*War*	combating pan-coronavirus vaccine strategy	1.92%

TT: 两名   中国   黑客 代表   该国   情报部门,
liǎngmíng zhōngguó   hēikè dàibiǎo   gāiguó qíngbàobùmén
two   Chinese   hacker represent China   Intelligence Department
瞄准   疫苗   开发   发起   **攻击**
miáozhǔn yìmiáo   kāifā   fāqǐ   **gōngjī**
target   vaccine   development   launch   **attack**[20]

Analyses of the RACE and WAR domains showcase the political intention of the two news corpora in contrast to the relatively more descriptive nature of the science corpus. In fact, the diversification of vehicle terms and lexis for HUMAN domains in Table 2 has further strengthened this point. Due to space limitations here, only part of the modified concordance lines in the two NYT corpora are given in Table 3 to exemplify how vaccine is not merely described neutrally as a 'candidate', but also as a dangerous person, for example, a 'menace', thereby conveying a negative connotation.

Unique building, passport and tool domains between science and news

This section discusses BUILDING metaphors used exclusively in the COVID-19 corpus, and PASSPORT and TOOL metaphors used only in the two news corpora. Table 4 showcases the contexts where vaccine is framed as a *constructed building* and the vaccine R&D is framed as the *building construction process* in the COVID-19 corpus.

The scientific research articles are prone to provide more descriptions of how vaccines are developed (e.g., *developing vaccines is like constructing a building*) and what functions they have (*binding organism segments and providing a solid shelter*). By contrast, news reports tend to focus on the political impact of covid vaccines (*vaccines are*

Table 3. Selective (modified) concordance lines of 'vacci*' for HUMAN domains in the *New York Times*.

Corpus	Left context	KWIC	Right context	Source domain
NYT_En	Aimed at convincing people that the	vaccine	is a **menace** rather than a lifesaving, economy-rescuing miracle	HUMAN
NYT_En	But spy work is also intensifying as researchers share more	vaccine	**candidates** and antiviral treatments for peer review	HUMAN
NYT_Ch	该机构已经表示这款 (the organization already expressed that this)	疫苗(vaccine)	没有投机取**巧** (does not **speculate** anything)	HUMAN
NYT_Ch	美国有三种候选 (The US has three **candidate**)	疫苗(vaccines)	处于后期试验阶段 (in the post-test stage)	HUMAN

Table 4. First 10 concordance lines of 'vacci*' for BUILDING metaphors in the COVID-19 corpus.

Left context	KWIC	Right context
After the successful docking study, the	vaccine	**construction** was performed
After successful docking, three	vaccines	were **constructed** using the selected epitopes which is supposed to be directed to fight against the SARS-CoV-2
And were selected for further analysis and	vaccine	**construction**
PADRE sequence is an important sequence which was used in	vaccine	**construction**
The secondary **structures** of the	vaccine	**constructs** were predicted using the PRISPRED 4.0 prediction method
The 3D **structures** of the	vaccines	were then generated using online server RaptorX
The **constructed**	vaccines	should have very good binding affinity towards these segments of the MHC complex
To carry out the	vaccine	**construction**, four candidate proteins of the virus were identified and selected from the NCBI database
To **construct** the	vaccines	three different adjuvants were used
The MHC class-I and MHC class-II epitopes, determined for potential	vaccine	**construction**

political tools for diplomacy or vaccines are passports). Table 5 illustrates the contexts where vaccine is framed as a *diplomatic tool* and a *passport* in news.

The distinct usage of BUILDING metaphors in scientific writing and PASSPORT and TOOL metaphors in news reporting serves to emphasize two intriguing aspects: the potential political underpinnings behind news coverage and the comparatively objective nature of scientific writings. This contrast between metaphors in these domains raises intriguing questions about the nature of objectivity in communication. The exclusive prevalence of BUILDING metaphors in scientific writing may reflect a concerted effort to maintain objectivity, ensuring that research outcomes are conveyed in a relatively un-biased manner. In contrast, the prevalence of PASSPORT and TOOL metaphors in news reporting highlights the news media's inclination to cover politically charged subjects that are likely to spark diverse opinions (e.g., the issuance of '*vaccine passports*'), as well as the challenge of absolute objectivity in journalism, where language can inadvertently introduce subjective interpretations.

In conclusion, the selective use of metaphors in these distinct domains sheds light on the complexities of communication and information dissemination. It prompts further exploration into the underlying motives and influences behind linguistic choices, urging us to critically evaluate the impact of language on shaping our understanding of the world and the news we create and consume.

Table 5. Selective concordance lines of 'vacci*' for TOOL and PASSPORT metaphors in the New York Times.

Corpus	Left context	KWIC	Right context	Source domain
NYT_En	State news media reports have also rejected accusations that China is using	vaccines	as a **diplomatic tool**, while government-backed academics assert that	TOOL
NYT_En	Dimas covas, the director of butantan institute, called the	vaccine	an "excellent" **tool** "waiting to be used in a country where currently 1000 people are dying	TOOL
NYT_Ch	...否认了关于中国将(...deny the accusation that China takes)	疫苗 (vaccine)	用作外交工具的指控...(as a **diplomatic tool**)	TOOL
NYT_En	...If	vaccines	become a **passport** to doing different things, ...	PASSPORT
NYT_En	They hope to set a policy this summer for accepting	vaccine	**passports**	PASSPORT
NYT_En	Many countries are considering issuing	vaccine	**passports** for entry into public facilities	PASSPORT
NYT_Ch	...如果(if)	疫苗 (vaccine)	成为做不同事情的**通行证**的话(becomes the **pass** to doing different things)	PASSPORT
NYT_Ch	有迹象表明怀疑会有**增**无**减**。(signs show that suspicion will increase rather than decrease)	疫苗 (vaccine)	**护照**的计划还可能**加剧**与新冠病毒**疾病**有关的民族主义(**passport** programme may make coronavirus-related racism worse)	PASSPORT
NYT_Ch	许多国家正在考虑**颁**发进入公共设施的(many countries are considering issuing)	疫苗 (vaccine)	**护照**。尽管如此就**连**中国的官方媒体**也**承认...(**passport** to entering public facilities. Despite that, even the Chinese official media admitted that...)	PASSPORT

Translation shifts of metaphorical frames in news

The preceding analyses mainly showed variations in metaphor use between genres (news and science). However, this section will investigate in detail the frame shifts observed from English source texts to Chinese target texts in the news corpora.

Dominant changes in the two news corpora include a decrease in the use of the WAR domain by 5.08% and an increase in the use of the PASSPORT domain by 11.89% from the English STs to the Chinese TTs (see Figure 2 in Results section). Nonetheless, there is no significant variation in the types of vehicle terms for the WAR domain in the two news corpora. Instead, more diverse war-related lexis is used in the

Chinese TTs, as can be seen from Table 2 in Results section. Based on a manual comparison of the ST and TT of each concordance line, the study finds that the reason for a decrease in the use of the WAR domain in the TTs lies in an extensive use of the lexis 'shot' in the STs, which does not have a counterpart in the Chinese language. Example seven illustrates how the dead metaphor[21] 'shot', used in the STs to depict vaccine application process as *a bullet fired from* the needle to the virus, is paraphrased as 'injection' in the TTs. This is because in Chinese, there is no shot-like dead metaphor used to describe the injection of a vaccine. Meanwhile, the PASSPORT domain is more frequently seen in TTs because '护照(passport)' occurs repeatedly in the Chinese news reports, while the STs usually use pronouns to refer to this entity, as can be seen in example 8.

(7)   ST: The Pfizer and BioNTech vaccine is delivered as a **shot** in the arm, like other typical vaccines.

    TT: 与   其他   典型的   疫苗   一样,   辉瑞   和   BioNTech
          yǔ   qítā   diǎnxíngde   yìmiáo   yíyàng   huīruì   hé   BioNTech
          AUX   other   typical   vaccine   same   Pfizer   and   BioNTech
          的   疫苗   是   在   手臂   上   **注射**   的。
          de   yìmiáo   shì   zài   shǒubì   shàng   **zhùshè**   de
          AUX   vaccine be   AUX   arm   AUX   **injection** AUX

(8)   ST: Governments typically talk about **them** as a way to open up economies.

    TT: 政府   谈到   疫苗   **护照**   时,   通常   将   其   作为
          zhèngfǔ   tándào   yìmiáo   **hùzhào** shí   tōngcháng jiàng   qí   zuòwéi
          government talk about vaccine **passport** AUX usually   AUX   it   be
          开放   经济   的   一种   方法。
          kāifàng   jīngjì   de   yìzhǒng fāngfǎ
          open   economy   AUX   one   method

More radical changes are observed in news headlines where metaphors are omitted, replaced and added in the translation process mainly for two reasons: first, to catch the Chinese target readers' attention by highlighting the parties played in the vaccine conflict such as China and the US, as in examples 9 and 10; and second, to make criticisms on China more implicit for the Chinese target readers, as in examples 11 and 12 (see further below).

In example 9, the English metaphor 'VACCINE IS INFORMATION WAR' is omitted in its TT, whereas Americans refusing vaccination is highlighted for the Chinese readers. Similarly, in example 10, China and the US as *race competitors* in this 'VACCINE R&D RACE' are added to the TT, thereby whetting the Chinese readers' appetite.

(9)   ST: Get Ready for a Vaccine **Information War**

    TT: 如果 有 了 新冠 疫苗 但 美国人 拒绝 接种 怎么办
          rúguǒ yǒu le xīnguàn yìmiáo dàn měiguórén jùjué jiēzhǒng zěnmebàn
          if have AUX covid vaccine but Americans refuse inoculate what to do

(10)   ST: Future Vaccines Depend on Test Subjects in Short Supply: Monkeys
       TT: 新冠   疫苗   研发背后   的 中 美 '战略   猴子   储备' **竞赛**
           xīnguàn yìmiáo yánfā bèihòu de zhōng měi zhànluè hóuzǐ chǔbèi **jìngsài**
           covid vaccine R&D back   AUX China US strategy   monkey reserve **race**

In example 11, the TT uses the lexis '僵局stalemate' to emphasize the idea of vaccine storage being treated as a *competition*. However, in the ST, this competitive aspect is diminished, as the focus shifts to highlighting China as an obstruction (*standing in its way*). In example 12, the TT entirely omits the 'vaccine as a bullet' concept. This metaphor, implying Chinese individuals seeking the 'shot' without knowledge of the vaccine's effectiveness, could create an unfavorable impression. By introducing the 'competition' metaphor in example 11 and omitting the 'shot' metaphor in example 12, criticism towards China is subtly toned down, possibly to cater to the sensibilities of Chinese readers of *The New York Times*.

(11)   ST: Taiwan Wants German Vaccines. China May Be Standing in Its Way
       TT: 台湾   疫苗   **僵局**   谁   之   过:
           táiwān yìmiáo **jiāngjú** shuí   zhī   guò
           Taiwan vaccine **stalemate** who   AUX   fault
           当   公共   卫生   采购   变成   政治   问题
           dāng gōnggòng wèishēng cǎigòu biànchéng   zhèngzhì   wèntí
           when public   health   purchase become   political   issue
(12)   ST: Vaccine Unproven? No Problem in China, Where People Scramble for **Shots**
       TT: 新冠   疫苗   效果   未知   急于   接种   的
           xīnguān   yìmiáo   xiàoguǒ wèizhī jíyú   jiēzhǒng   de
           corona   vaccine   effect   unknown eager (to) get vaccinated AUX
           中国   人   并不   担心
           zhōngguó rén   bìngbù   dānxīn
           Chinese   people   not at all worry

These shifts in the translation of metaphors hint at the fact that translation does play a role in media communication to different groups of people. These shifts are derived not only from the innate linguistic differences between two different language systems but also from the value judgments placed by the news outlet on different entities in different contexts.[22]

Discussion

The advocacy of building metaphor

Here, we discuss the appropriateness of the metaphorical frames analyzed in Results section to address the third research question. We adhere to Semino's (2021) three criteria for evaluating metaphor effectiveness in health communication:

Overall, effective metaphors tend to involve (a) complex and abstract target domains that are not linked to preexisting strongly held beliefs and evaluations; (b) source domains that are widely accessible, well-delineated and image-rich, (c) precise and clearly applicable mappings from source to target domains, which make a metaphor 'apt'. (Semino, 2021: 54)

We argue that metaphors used in news such as PASSPORT, TOOL and RACE, are not appropriate for health communication because they, like WAR metaphors, have 'potentially counterproductive framing effects' (Semino, 2021: 52). When a vaccine becomes a political resource, its credibility will be questioned. Instead, we propose to frame the covid vaccine as BUILDING, which meets the three criteria stated above. First, the BUILDING metaphor represents a physical object in the human world, having less of a political orientation. Second, BUILDING is widely accessible, well-delineated and image-rich due to its ubiquity (i.e., everywhere in the modern world), and varieties of types (e.g., European and American styles), shapes (e.g., square-like *Siheyuan* in North China and oval *Colosseum* in Rome), manufacturing materials (e.g., concrete or metal) and construction techniques (e.g., 3D Volumetric Construction or Hybrid Concrete Building Technique). This richness of implicature enables it to correspond to different types of covid vaccines that are developed through inactivated virus technology (e.g., Sinovac) or mRNA technology (e.g., Pfizer-BioNTech), etc. Third, with the first two criteria met, it facilitates the applicable mappings from the source BUILDING to the target covid vaccine/vaccination.

Specifically, the job that BUILDING metaphors can do includes but is not limited to the following:

- convey the myriads of covid vaccines currently available to people based on different construction methods (e.g., inactivated virus technology-based Sinovac and mRNA technology-based Pfizer-BioNTech);
- portray covid vaccines as a shelter for people from the pandemic, albeit in different quality levels, rather than a political tool or a prize for a political race;
- highlight the availability of various vaccine construction materials and the importance of updated/seasonal vaccines for renovating the protective shelter;
- explain vaccination as a process of selecting a vaccine construction to one's liking, adding no value judgments to one's choice;
- and indicate future updates of covid vaccines (e.g., vaccine construction method and style may change when new technologies are available).

It is noted that metaphors such as SEAWALL, WALL, and POWERHOUSE used in the corpora are less politically biased and may encourage the vaccine uptake by conveying the positive aspects of vaccines. However, when assessed against the second criterion, which emphasizes the widely accessible and image-rich features, they are found to be less suitable compared to BUILDING metaphors. Furthermore, TOOL metaphors, while capable of conveying some positive messages, can also be easily associated with political ideologies, such as being viewed as a 'diplomatic tool'.

Consequently, they may not fully meet the first criterion, which emphasizes the need for neutrality and avoidance of political connotations. Moreover, they are less image-rich than BUILDING metaphors, thereby less likely to comprehensively encompass every facet of a vaccine, including its material, technology, function, and working mechanism.

Although we propose the use of descriptive BUILDING metaphors because they are beneficial for health communication, we also acknowledge that news outlets may prioritize news values over the effective transfer of scientific information. Therefore, this suggestion only serves as a reminder for news professionals and readers that an alternative frame exists which can facilitate better communication without excessively emphasizing entrenched political beliefs. However, it is ultimately up to news professionals to select what to report when news values and public health priorities come into conflict. The current study reveals that the NYT journalists and translators have chosen news values over public health priorities. The following section will further explain how the NYT utilizes different metaphors in the STs and TTs of the news reports to prioritize various news values.

Translation in the discursive construction of news values

The analysis results above have shown that translation can cause shifts to the metaphorical frames used in the news. Although such shifts occur mostly because of the innate linguistic differences between English and Chinese languages, omitting, adding or substituting the ST metaphorical frames in the TTs are also motivated by a variety of news values. Simply put, we conclude that translation becomes a way to construct news values in discourse.

In Discursive News Value Analysis (DNVA), news values are 'how newsworthiness is communicated and negotiated through discourse', thereby focusing not on 'how an event is selected as news', but on 'how it is constructed as news' (Bednarek and Caple, 2017: 43). There are 11 types of news values in total in DNVA (55), among which, *Proximity* (i.e., the event is discursively constructed as geopolitically or culturally near) and *Negativity* (i.e., the event is discursively constructed as negative) are the main motivations for the *News York Times* to make substantial changes to the news headlines when translating the original English news reports into Chinese, as illustrated in examples 9–12. The Chinese readers are more attracted to China-related reports out of a sense of geopolitical proximity, and thus the NYT tends to highlight the involvement of China in the translated Chinese news headlines, which may engender frame shifts such as from dependence on a limited supply to an R&D race in example 10.

Moreover, it is assumed that news values are in flux where negativity can be uplifted and downplayed for different target readers via translation. Negativity towards China in the English STs may be downplayed in the Chinese TTs, (see examples 11–12). Likewise, negativity towards the pandemic misinformation may be shifted to the negativity towards the US in the Chinese TTs (see example 9), thereby catering to the target readers' geopolitical stance.

Conclusions

The study conducts a corpus-assisted discourse analysis of covid vaccine metaphor patterns in news, translated news and scientific reports. It investigates whether and how genre and translation impact the use of metaphorical frames for covid vaccines. While the three corpora share the HUMAN, RACE and WAR domains, they differ in their use of vehicle terms and lexicalization. Overall, news involves more value judgments in the metaphorical frames, for example, the PASSPORT and TOOL metaphor, whereas scientific reports use more descriptive frames, for example, the BUILDING metaphor. Translation plays a role in frame shifts in news, motivated by the discursive construction of news values for readers with different socio-political backgrounds. More importantly, translation can uplift and downplay these news values, which may not be acknowledged by news professionals and readers. Moreover, the study suggests using the BUILDING metaphor to frame COVID vaccines/vaccination for better health communication.

The contributions of the current study are manifold. It is the first investigation to compares news, translated news and scientific reports in the COVID-19 pandemic and explore their relations in health communication. It calls attention to newspapers' translation practice that is often invisible in media reportage. More importantly, it assumes that translation plays a significant role in the discursive construction of news values, especially placing those news values in flux through an uplifting and downplaying practice. Methodologically, the study provides more evidence for the integration of traditional cross-domain mapping in CMT and the vehicle-topic pairing in authentic discourse, which may shine new light on future research.

Nonetheless, the study is also limited in several ways. Although the *New York Times* is an influential newspaper in the United States and even in the broader English-speaking world, it cannot represent the news industry. Future work can triangulate the results using reports from other newspapers. Moreover, the corpus method is unable to exhaust all vaccine-related metaphors, and the occurrences of lexicalization in concordance lines does not represent the whole picture of the three corpora. Another limitation of this study is the lack of information regarding the translators of the news articles, although it is assumed that all articles underwent editorial screening before publication. Further research could investigate the specific workflow and procedures involved in news translation. Hence, in modest terms, the study only scratches the surface and paves way for more comparisons of scientific and (translated) news communication of covid vaccines in the future.

Acknowledgements

Declaration of conflicting interests

Funding

ORCID iD

Yufeng Liu ⬤ https://orcid.org/0000-0002-3423-664X

Notes

1. While news media is a key channel for science communication, it is crucial not to overemphasize its importance. Other sources like public health campaigns, political discourse, and social media also significantly influence individuals' perspectives on science.
2. See WHO website https://covid19.who.int/
3. See https://www.who.int/news-room/q-a-detail/coronavirus-disease-(covid-19)-vaccines
4. See https://ourworldindata.org/covid-vaccinations
5. See https://www.bbc.com/news/blogs-trending-58167339
6. *The New York Times (NYT)* launched its Chinese-language website with the objective of serving the growing middle class in China, who are "educated, affluent, global citizens" (see https://archive.nytimes.com/mediadecoder.blogs.nytimes.com/2012/06/27/the-times-is-introducing-a-chinese-language-news-site/). However, while people in Hong Kong SAR and Macau SAR can access this website without any difficulties, readers residing in Chinese mainland may need to utilize virtual private networks (VPNs) to access it due to occasional blocking of the website within the Chinese mainland (as reported by Hobbs and Roberts, 2018).
7. https://www.globaltimes.cn/page/202104/1220889.shtml
8. https://ourworldindata.org/covid-vaccinations
9. For more information, please refer to the official website of Octoparse: https://www.octoparse.com/.
10. We selected articles that mentioned vaccine in the headline because we aimed to focus our data on vaccines, rather than simply mentioning COVID-19 vaccines in passing. Moreover, the search terms 'vaccin*' and '疫苗 (yìmiáo)' alone can meet our requirements, rendering the inclusion of other search terms such as 'immuniz*' unnecessary. This is because in Chinese, 'immuniz*' (接种/注射, jiēzhòng/zhùshè) is a transitive verb or a noun that must be used in conjunction with '疫苗 (yìmiáo)' to convey the intended meaning. Our approach involved conducting separate searches for Chinese and English news reports, and each sorted report was manually cross-referenced with its corresponding text. This method ensures a minimal likelihood of overlooking any vaccine-related news reports.
11. A comprehensive list of the news articles, along with their respective publication dates, can be accessed through the following link: https://doi.org/10.6084/m9.figshare.22818134

12. For more information on the COVID-19 corpus, please access: https://www.sketchengine.eu/covid-19-corpus/
13. In corpus wildcards, 'vacci*' includes all words that begin with 'vacci', such as vaccine, vaccines, vaccinated, vaccination, etc.
14. AntConc is an open-access corpus software developed by Laurence Anthony (https://www.laurenceanthony.net/software/antconc/)
15. While MIP is the primary guideline for metaphor identification, we also incorporate Steen et al.'s (2010) updated MIPVU, which considers both direct (similes and analogies) and indirect expressions of metaphor.
16. To demonstrate the word-by-word analysis, examples listed in the current paper are glossed by means of the Leipzig Glossing Rules.
17. More on the coding manuals can be accessed at https://figshare.com/s/c970cdf1deae6690ae79.
18. In this study, we aim to avoid oversimplifying source domains, preventing the dilution of their pragmatic significance. Therefore, we did not label 'seawall' as a generic 'OBJECT'. Nevertheless, we classified vehicle terms that were closely related under a single source domain, like 'candidate' and 'a hidden person' under the HUMAN domain, and 'battle' and 'weapon' under the WAR domain.
19. Frequency alone isn't the sole measure of significance, yet it serves as a starting point for a detailed qualitative analysis. In the Translation Shifts section, we detailed the varying usage frequencies of the WAR and PASSPORT domains in the news corpora through manual analysis.
20. In this study, the HUMAN category is a category by exclusion, that is, vaccine given human-like agency but not within a previously identified frame. Moreover, HUMAN metaphors and anthropomorphism differ from each other. Metaphors involve a mapping between two domains, like a vaccine being a 'good candidate' linking its protective ability to an interviewee's competence. This differs from an 8-year-old boy anthropomorphizing his teddy bear by talking to it.
21. Dead metaphor is a metaphor that has lost the original imagery of its meaning by extensive, repetitive, and popular usage. In this case, 'shot' is widely used in everyday language to represent the injection of vaccines.
22. In this study, metaphors serve as illustrative instances for analyzing changes in news translation, given their capacity to convey value judgments and fulfill significant framing functions. Subsequent research endeavors may explore the potential extension of these changes to other linguistic phenomena.

References

Abdel-Raheem A and Alkhammash R (2021) 'To get or not to get vaccinated against COVID-19': saudi women, vaccine hesitancy, and framing effects. *Discourse and Communication* 16(1): 21–36. DOI: 10.1177/17504813211043724.

Ahrens K and Ahrens M (2020) Source domain verification using corpus-based tools. *Metaphor and Symbol* 35(1): 43–55. DOI: 10.1080/10926488.2020.1712783.

Bednarek M and Caple H (2017) *The Discourse of News Values: How News Organizations Create Newsworthiness*. Oxford: Oxford University Press.

Cameron L (2003) *Metaphor in Educational Discourse*. London: Continuum.

Entman RM (1993) Framing – Towards a clarification of a fractured paradigm. *Journal of Communication* 43: 51–58. DOI: 10.1111/j.1460-2466.1993.tb01304.x.

Fuoli M, Littlemore J and Turner S (2021) Sunken ships and screaming banshees: metaphor and evaluation in film reviews. *English Language and Linguistics* 26(1): 75–103. DOI: 10.1017/S1360674321000046.

Gravengaard G (2012) The metaphors journalists live by: journalists' conceptualisation of newswork. *Journalism* 13(8): 1064–1082. DOI: 10.1177/1464884911433251.

Hart PS, Chinn S and Soroka S (2020) Politicization and polarization in COVID-19 news coverage. *Science Communication* 42(5): 679–697. DOI: 10.1177/1075547020950735.

Hobbs W and Roberts M (2018) How sudden censorship can increase Access to information. *American Political Science Review* 112(3): 621–636. DOI: 10.1017/S0003055418000084.

Kompa N (2022) Insight by metaphor—the epistemic Role of Metaphor in science. In: A and K (eds) *Physics and Literature: Concepts—Transfer—Aestheticization*. Berlin: De Gruyter, 23–48.

Lakoff G and Johnson M (1980/2003) *Metaphors We Live by*. Chicago: University of Chicago Press.

Landis JR and Koch GG (1977) The measurement of observer agreement for categorical data. *Biometric* 33(1): 159–174.

Liu Y and Li D (2022) The US-China battle over Coronavirus in the news media: metaphor transfer as a representation of stance mediation. *Discourse and Society* 33(4): 456–477. DOI: 10.1177/09579265221088122.

Liu Y and Li D (2023) Metaphor translation as reframing: Chinese versus Western stance mediation in COVID-19 news reports. In: Liu K and Cheung AKF (eds). *Translation and Interpreting in the Age of COVID-1*. Singapore: Springer, 13–34. DOI: 10.1007/978-981-19-6680-4_2.

Liu Y and Tay D (2023) *Modelability of WAR Metaphors across Time in Cross-National COVID-19 News Translation: An Insight into Ideology Manipulation*. Lingua 286, 103490. DOI: 10.1016/j.lingua.2023.103490.

Machingaidze S and Wiysonge CS (2021) Understanding COVID-19 vaccine hesitancy. *Nature Medicine* 27: 1338–1339. DOI: 10.1038/s41591-021-01459-7.

Pragglejaz Group (2007) MIP: a method for identifying metaphorically used words in discourse. *Metaphor and Symbol* 22(1): 1–39.

Rode JB, Iqbal S, Butler BJ, et al. (2021) Using a news Article to convey climate science consensus information. *Science Communication* 43(5): 651–673. DOI: 10.1177/10755470211027235.

Sallam M (2021) COVID-19 vaccine hesitancy worldwide: a concise systematic Review of vaccine acceptance rates. *Vaccines* 9(2): 160. DOI: 10.3390/vaccines9020160.

Santos-Gonçalves T and Napp S (2022) Trends in the interest in COVID-19 news of the local media and their readers: The case of Spain. *Journalism* 23(12): 2608–2626. DOI: 10.1177/14648849221114736.

Scherer AM, Scherer LD and Fagerlin A (2015) Getting Ahead of illness: using Metaphors to influence medical decision making. *Medical Decision Making* 35(1): 37–45. DOI: 10.1177/0272989X14522547.

Semino E (2021) 'Not soldiers but fire-fighters'–metaphors and COVID-19. *Health Communication* 36(1): 50–58. DOI: 10.1080/10410236.2020.1844989.

Semino E, Demjén Z and Demmen J (2018) An integrated approach to metaphor and framing in cognition, discourse, and practice, with an application to metaphors for cancer. *Applied Linguistics* 39(5): 625–645. DOI: 10.1093/applin/amw028.

Steen G, Dorst AG, Herrmann JB, et al. (2010) *A Method for Linguistic Metaphor Identification: From MIP to MIPVU*. Amsterdam: John Benjamins Publishing.

Taylor C and Kidgell J (2021) Flu-like pandemics and metaphor pre-covid: a corpus investigation. *Discourse, Context & Media* 41: 100503. DOI: 10.1016/j.dcm.2021.100503.

Tsfati Y, Cohen J and Gunther AC (2011) The Influence of presumed media Influence on news about Science and scientists. *Science Communication* 33(2): 143–166. DOI: 10.1177/1075547010380385.

Valdeón RA (2017) On the use of the term 'translation' in journalism studies. *Journalism* 19(2): 252–269. DOI: 10.1177/1464884917715945.

Zhang Y (2021) Metaphor in science communication: with special Reference to jade Rabbit of the moon rover. *Science Communication* 43(6): 719–739. DOI: 10.1177/10755470211042857.

Author biographies

Yufeng Liu, is a Postdoctoral Senior Research Associate at The Department of Linguistics and English Language, Lancaster University. Her research interests lie in the intersection of metaphor, translation and journalistic studies. She has published articles in journals such as *Lingua*, *Discourse & Society* and *Social Semiotics* as well as some book chapters published by Routledge and Springer.

Dechao Li, is a Professor at Department of Chinese and Bilingual Studies, The Hong Kong Polytechnic University. His main research areas include corpus-based translation studies, empirical approaches to translation process research, history of translation in the late Qing and early Republican periods and problem-based learning and translator/interpreter training. He has published over 50 articles in journals such as *Perspectives: Studies in Translatology*, *The Translator and Interpreter Trainer*, *Interpreting*, *Discourse & Society*, *Target*, *Frontiers in Psychology* as well as some book chapters published by Routledge, Springer and Wayne State University Press.