Scientific knowledge dissemination in the multilingual and digital era: A multimodality-enhanced genre analysis of Chinese epidemiologists' COVID-19 posts on Sina Weibo

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Abstract

The emerging digital genres distributed via social media platforms have been increasingly prominent in disseminating scientific knowledge to the public audience. During COVID-19, Sina Weibo, the biggest Chinese microblogging website, became the primary medium through which epidemiologists communicated knowledge of public health to the generalist audiences. Through the lens of genre theory, this exploratory qualitative study examines a corpus of 72 Weibo posts in Chinese language written by three reputable medical scholars. Six major moves with multiple steps were identified. We found that both multimodal resources and rhetorical strategies were employed to perform the identified moves for various functions. This study represents one of the first attempts to investigate emerging digital genres for public scientific knowledge dissemination in a non-English language. It also seeks to establish the interrelations between the identified moves and the multimodal resources along with rhetorical strategies used by microbloggers. As such, it contributes to our understanding of evolving genred activities in the increasingly multilingual and multimodal ecology of public genres for scientific knowledge dissemination.

Keywords: Digital genres, public science, genre analysis, Chinese social media, COVID-19.

Resumen

La divulgación del conocimiento científico en la era digital y multilingüe: Un análisis de género multimodal de publicaciones sobre la COVID-19 de epidemiólogos chinos en Sina Weibo

Los géneros digitales emergentes que se difunden a través de las redes sociales han adquirido una creciente relevancia en la divulgación del conocimiento científico al público general. Durante la pandemia de la COVID-19, Sina Weibo, el mayor sitio web de microblogueo de China, se convirtió en el principal medio a través del cual los epidemiólogos comunicaron conocimientos sobre salud pública al público general. Desde la perspectiva de la teoría del género discursivo, este estudio cualitativo-exploratorio examina un corpus de 72 publicaciones en chino en Weibo escritas por tres reconocidos académicos del ámbito médico. Se identificaron seis movimientos principales, cada uno con múltiples pasos. Observamos que se emplearon tanto recursos multimodales como estrategias retóricas para llevar a cabo dichos movimientos con diferentes funciones. Este estudio representa uno de los primeros intentos de investigar los géneros digitales emergentes para la divulgación científica pública en un idioma distinto del inglés. Asimismo, busca establecer las interrelaciones entre los movimientos identificados, los recursos multimodales y las estrategias retóricas utilizadas por los microblogueros. De este modo, contribuye a nuestra comprensión de las actividades genéricas en evolución dentro de una ecología pública cada vez más multilingüe y multimodal para la difusión del conocimiento científico.

Palabras clave: Géneros digitales, ciencia pública, análisis de género, redes sociales chinas, COVID-19.

1. Introduction

One of the transformative phenomena in science communication is the emergence of open digital genres that communicate science to non-expert public audiences. Such open approaches to science dissemination are part of the citizen science movement and add to the social value of science production (Pérez-Llantada, 2021). During the COVID-19 global pandemic, countless epidemiologists shared their knowledge and sources on social media platforms. In many countries, Twitter is the most influential outreach tool to connect epidemiologists with their disciplinary communities and the lay public (Côté & Darling, 2018). In China, Sina Weibo, the biggest Chinese microblogging website is seen as the Chinese version of Twitter, involving an average of 530 million monthly active users in March 2021 (Ren & Guo, 2024). During the COVID-19 pandemic, these active users and public health professionals established a participatory framework for heated discussion and debate on real-time updates and possible proactive measures to be taken. These Chinese epidemiologists, most of whom were physically located outside China, exerted a major impact on Chinese society by informing and

educating the public Chinese-speaking netizens about COVID-19 related scientific knowledge.

A survey of literature indicates that scholars have examined Twitter as a medium used by academics for public science knowledge communication in the English language (e.g., Graham, 2021; Tardy, 2023a). Yet, there is a paucity of studies on such open science communication to the public in non-English languages. Moreover, most extant research on Sina Weibo discourse during the COVID-19 pandemic was approached through the lens of content analysis (e.g., Carvajal-Miranda et al., 2020) or thematic analysis (e.g., Xi et al., 2021), rather than from a genre perspective (see Swales, 1990). Given the fact that language use indexes sociocultural dynamics, understanding how the influential Chinese epidemiologists based in the US disseminate scientific knowledge in their first language illuminates how transnational researchers serve as brokers to marshal their multilingual and bicultural knowledge, in an effort to bridge the science communication gap for an audience population with a non-English-speaking background. Against the backdrop of globalization, this inquiry sheds light on our understanding of how cross-border scientific communication for the generalist audience happens. To understand globalized knowledge dissemination to non-expert audiences in a non-English context, this study adopts a genre analytical perspective, addressing the public communication of science (Pérez-Llantada, 2021), to examine the rhetorical structure of Chinese epistemologists' posts on Sina Weibo during COVID-19. To further reveal the innovative features in the focal Weibo posts as instantiations of an emerging digital genre, we also explored the multimodal and rhetorical resources employed by epidemiologists to perform the rhetorical moves.

In what follows, we begin by reviewing research on new digital genres in promoting public science and the use of Sina Weibo during the global pandemic. We then illustrate how genre analysis has been employed as a robust framework for analyzing social media genres. Next, we share research on our genre analysis of 72 Weibo posts composed by three Chinese prominent public health scholars during a six-month time frame amidst the COVID-19 peak from 2021 to 2022. Finally, we discuss the implications of this study and how it contributes to our understanding of open science communication online

2. Literature review

2.1. Digital genres for promoting public science

The emergence of new digital genres coincides with the ever-growing need for open and accessible communication of public science, especially when people face the daunting challenges of climate change, the COVID-19 pandemic, and the spread of misinformation in today's world (Tardy, 2023a). Despite some doubts about the effects of public science promotion (Breeze, 2021, 2023), Stilgoe et al. (2014) point out that the legitimacy of science dissemination to the public sheds a positive light on governance by encouraging institutions to rethink their policies and win public trust. While most people acknowledge the dividends of promoting public science, what is equally important is the role of the media that mediates the communication of scientific knowledge. Social media technologies have given rise to the emergence of new digital genres for science communication between experts and non-experts (Luzón & Pérez-Llantada, 2022), such as three minutes theses (e.g., Zou & Hyland, 2022), graphical abstracts (e.g., Hendges & Florek, 2019; Sancho Guinda, 2019), and research websites (Lorés, 2020). Communication on social media, a space of highly interactive and social nature, has also evolved into "more stable-*ish* and recognizable categories of social action" (Tardy, 2023b, p. 184). As an example, science microblogs have been emphasized in previous research as one of the most influential and efficient media and genres to facilitate the scientific knowledge exchange through the interactions between academics and non-expert netizens (e.g., Freddi, 2020; Kouper, 2010; Luzón, 2013; Luzón & Pérez-Llantada, 2022; Reid & Anson 2019).

A major strand of research on science microblogging focuses on its interactive features. One possible reason why the interactions between science microblog writers and non-expert audiences have caught extensive attention is "context collapse" (Marwick & Boyd, 2011). As Tardy (2023a) puts it:

> Writers no longer can assume their audience will simply be other specialists or only non-specialists; instead, they must assume a range of audiences will access and engage with their texts, perhaps in different ways (p. 10).

Such an eroded boundary begets challenges for science microblog writers to accommodate a large group of followers with idiosyncratic reading preferences and social backgrounds. One need for scientists to communicate

scientific knowledge in a collapsed context is to establish proximity with the non-expert readers. Hyland (2010) defines proximity as "a writer's control of rhetorical features which display both authority as an expert and a personal position towards issues in an unfolding text" (p. 117), which can be negotiated through adjusting the organization, argument structure, credibility, stance, and engagement in texts.

To respond to the challenges of extending the reach to a public audience, science microbloggers have employed different strategies. For example, Tardy (2023b) examined 50 Tweetorials and identified eight moves to engage the lay audience: "announcing the topic", "establishing exigence", "establishing credibility", "building curiosity", "expanding on the issue", "proposing actions and solutions", "closing the thread", and "promoting the thread" (p. 194). Researchers also found that science microbloggers tend to include their personal experience to bring up scientific issues (Kouper, 2010), use personal expressions to provide their evaluations (Luzón, 2013), and establish a relatable persona to shorten the author-audience social distance (Tardy, 2023a). In addition, science microblog creators employ multimodal resources such as images (Tardy, 2023a). They also adopt various linguistic strategies to create proximity and dialogic relationships with the public audience, such as informalizing discourse and blending discursive practices by borrowing discoursal features from other genres (Luzón, 2013), purposefully selecting the use of pronouns, using questions, and adopting a conversational style (Freddi, 2020). Together, these studies indicate the evolving features in genres for public knowledge dissemination afforded by new media technologies. Yet, among the existing research, little if any centers on non-English science microblogs used in non-English speaking social contexts. In addition, despite the major focus on science microbloggers' strategies to engage the public audience, we still lack an understanding of how these resources and strategies are interrelated to the rhetorical moves in science microblog posts. To address these gaps, first, we collected science microblogs in a non-English (i.e., Chinese) language posted on Sina Weibo, the most influential social media platform in China for epidemiologists to disseminate public health knowledge amidst COVID-19 pandemic; then, we analyzed the moves and the multimodal resources and rhetorical strategies employed by the microbloggers to perform the moves.

2.2. Sina Weibo

As the most popular microblogging platform in China (Gao et al., 2012) with the function of instant messaging, Weibo played a prominent role during

COVID-19 for information exchange and provided help for people to distinguish symptoms of COVID-19 and other similar infections (Huang et al., 2020). Given the impact Weibo exerted during the global pandemic, scholars have conducted content analysis on Weibo posts to understand what themes or topics emerged during the COVID-19 in Chinese society (e.g., Carvajal-Miranda et al., 2020; Musolff et al., 2022; Xi et al., 2021). As the Chinese version of Twitter[1] (Ren, 2018), Weibo shares multiple similarities to Twitter, such as having a word limit for the length of posts and supporting the use of hashtags and URLs (Gao et al., 2012). In addition, scientists' Twitter accounts with more than 1000 followers are identified as popular among non-expert audiences (Côté & Darling, 2018); similarly, a high number of followers of scientists' Weibo accounts is understood to be an indicator of a greater level of credibility regarding health-related topics among the public (Lee & Sundar, 2013). In terms of the differences between Twitter and Weibo, Gao et al. (2012) conclude that Weibo users tend to use fewer hashtags and URLs and avoid discussions on institutions or political parties. These nuanced programmatic differences, in addition to the different social context where Weibo is situated and the different language used and target audiences, indicate the divergence between Twitter and Weibo. We therefore need further research on science microblogs on Weibo as a lesser-known digital genre.

2.3. Genre analysis

Genre theory offers a fruitful framework for analyzing public science communication (Pérez-Llantada, 2021) and has been extensively applied in relevant research. For example, Luzón (2019) explores the role of multimodality in the genre of online science videos; Hendges and Florek (2019) examine how graphical abstracts serve as a promotional genre that attracts a wider range of audiences; Zou and Hyland (2022) conducted a cross-genre study to compare academic microblogs and three-minute theses. Tardy (2023a) examined Twitter communication during the COVID-19 pandemic through adopting the concept of genre as a category of discourse that shares communicative purposes (Swales, 1990). As previous research shows, genre theory serves as a robust framework for researchers to examine the strategic practices of genre producers and reveals genre characteristics of evolving and emerging digital genres.

3. Method

This exploratory study seeks to shed light on the genre features of Chinese epidemiologists' Weibo posts. The analysis of move structure, also known as move analysis, remains a robust method to reveal the features of a genre. *Move structure* refers to the sequence and pattern of *rhetorical moves*, which is identifiable by the rhetorical aim and function (Swales, 1990). A rhetorical move is a functional segment within discourse, identified based on its role in advancing the writer's intentions. Some moves may be obligatory in a genre while others can be optional. Each rhetorical move contributes to the overall objective of the genre. For example, the main rhetorical purpose of a thank you note could be demonstrating gratitude, so it is anticipated that one obligatory move is *showing appreciation*. A move can be made up of a sentence, a phrase, a paragraph or more. Our aim is not to generate an overarching, static template of focal Weibo posts but to explore the potentials of the *move structure* and various strategies within the genre set (i.e., epidemiological Weibo posts) used to achieve a similar broad communicative purpose (i.e., engagingly disseminating COVID-19 epidemiologic knowledge). Specifically, the study aims to answer the following research questions:

1. What is the rhetorical move structure of Chinese epidemiologists' Weibo posts intended for public health knowledge dissemination during COVID-19?

2. What multimodal resources and rhetorical strategies are employed to perform the identified moves?

3.1. Data collection

As mentioned previously, this study seeks to understand the rhetorical moves and resources, including multimodal and linguistic, employed by the Chinese epidemiologist microbloggers to disseminate science to the lay public. To this end, we select public health professionals who are identified as having committedly disseminated COVID-related knowledge on Weibo and attracted strong followings. Three specialists were chosen based on their prominence and influence on Weibo, which were reflected by the frequencies of their posting COVID-19 related epidemiological content and the number of their followers, along with the authentication of their offline professional identity by the Weibo management team (see Table 1).

The selection of the Weibo posts for analysis is based on the goal to provide a representative sample of each professional's Weibo posts within the focal time frame –that is, November 2021 to April 2022, when the rampant "Omicron wave" around the globe happened. We conducted an initial screening of Weibo posts produced by the three epidemiologists based on the following selection criteria: (1) The posts should be originally produced by the microbloggers. (2) The content should be about disseminating information about COVID-19 to the public. (3) Reposts of previous posts and Weibo long articles (i.e., another genre on Weibo) should not be included. After the initial screening, drawing on the random sampling method (Daniel, 2012), we selected 24 posts during the six-month time frame from each microblogger. With the assistance of an online tool (randomlists.com), each post has an equal probability of being selected. Such a method helps us avoid biased selection and may represent the Weibo posts written by the three microbloggers during the focal time frame. Table 2 presents the information of the corpus of our selected Weibo posts.

Username (English Translation)	On Weibo since…	Followers[2]	Weibo Authenticated Profile Information
@美国癌症医生张玉蛟教授 (American Cancer Doctor Professor Yujiao Zhang)	6 Feb. 2017	493.3K	Ph.D., Scholar at MD Anderson Cancer Center, US-based.
@子陵在听歌 (Ziling is Listening to the Songs)	7 Jan. 2010	868.5K	Ph.D., Scholar at USA Department of Health and Human Services, US-based.
@阿司匹林42195米 (Aspirin 42195 meters)	7 Aug. 2017	95.7K	Ph.D., Public Health Scholar, US-based.

Table 1. Epidemiologist microbloggers followed in this study.

Username (English Translation)	Number of posts	Characters (Chinese)	Avg. Characters Per Post (Chinese)
[1] @美国癌症医生张玉蛟教授 (American Cancer Doctor Professor Yujiao Zhang)	24	21,218	884
[2] @子陵在听歌 (Ziling is Listening to the Songs)	24	9,539	397
[3] @阿司匹林42195米 (Aspirin 42195 meters)	24	20,278	845

Table 2. The corpus of the selected Weibo posts.

3.2. Data Analysis

A move is defined as "discoursal or rhetorical unit that performs a coherent communicative function in a written or spoken discourse" (Swales, 2004, p. 228). Moves can be obligatory and optional and do not follow a fixed order or clear boundaries (Bhatia, 1993/2013), which implies that a move structure is not a static template but a fluid hermeneutic. CARS model (Swales, 1990) and Bhatia's (1993/2013) move structure in legislative writing serve as exemplary resources for move structure analyzers. Based on the Swalesian model, Feng (2019) summarized different levels of how genres can be analyzed, which includes a sequence of moves being identified to achieve communicative purposes and linguistic and semiotic resources used to realize the moves. Following Feng (2019), we believe that situated in the communicative purpose(s) of a genre, rhetorical moves and linguistic and semiotic resources are correlated essential levels on which genre analyzers should focus their attention. In the following sections, we will illustrate how we analyze the moves, and explain the multimodal resources and rhetorical strategies employed to realize the rhetorical moves identified.

3.2.1. Move structure analysis

For move analysis, we drew on the analytical framework of move analysis in Swales (1990) and Bhatia (2014 [2004]). The two researchers, who had received academic training in discourse analysis, conducted the first round of coding for the first ten microblog posts in the same dataset independently with the assistance of the qualitative analysis tool Atlas.ti (https://atlasti.com/). The first round of coding familiarized us with the patterns emerging from the dataset and generated a group of codes of moves to work from. Following the first round of coding there were long hours of discussion between the two authors, where we revised our scheme to merge similar moves, downgrade sub-moves to steps and upgrade steps that carry main functions to the status of main moves, resolve any discrepancies between the list of moves we had generated and reach a consensus on the final version of move lists. Next, we used the final list of moves to code the rest of the data independently. Finally, we resumed the discussion and kept refining the structure of moves based on our notes taken during the two rounds of coding. We calculated the percentage of the moves by counting how many posts the move appeared in. For example, Move 1 appeared in 69 posts out of 72 posts (i.e., the number of our corpus), and so its percentage is 96%.

3.2.2. Multimodal resources and rhetorical strategies

We adopted a bottom-up approach to coding the multimodal resources and rhetorical strategies, meaning that the resources identified and strategies mainly come from the data itself. The iterative coding process was guided by Braun and Clarke (2012). We categorized the visuals manually and coded the rhetorical strategies employed in the microblog posts based on our native knowledge of Chinese. Additionally, we identified the relations between the rhetorical moves and the multimodal resources and rhetorical strategies. Due to the constraints of the programmatic setting of the Weibo platform, all the visuals are attached as separate pictures after the textual section. Therefore, to identify the moves associated with these visual resources, we looked for the cues in the textual parts. Next, to decide on the functions of identified visuals in Weibo posts, we drew on the image-text relationships explained in Marsh and White (2003) and the functions of visuals found in similar studies of social media discourse (Feng, 2019; Luzón, 2019). Table 4 presents the function and the associated moves of the visuals.

In terms of the analysis of the functions of rhetorical strategies, we drew on Luzón (2013), where she analyzed rhetorical strategies employed by microbloggers to communicate scientific discourse in science microblogs written in English. The identification of moves associated with rhetorical strategies was based on their location in the texts. Following the same cross-coding process as that for move analysis, the two coders normed and generated the types and counts of the multimodal resources and rhetorical strategies employed by the corpus authors.

4. Findings

4.1. Six moves

Table 3 illustrates the six moves and affiliated steps identified in our corpus. Tables 4 and 5 present the multimodal resources and rhetorical strategies that the microblog writers employed to realize the moves.

Moves & Steps	Definition	% of the posts (x/72)
M1 Orienting audiences to the topic	**Engaging the audience with the topic**	96%
S1 Pointing out the main issue S2 Contextualizing the topic S3 Offering a synopsis	Directly introducing the main issue Providing the social or academic background of the topic Presenting highlights of the post	
M2 Teasing out main points (optional)	**Engaging the audience with bullet points of the main issue under discussion, usually in the form of questions or numbered items**	19%
M3 Reporting supporting sources	**Reporting relevant academic evidence (e.g., articles, news reports, or scholars' quotes)**	82%
S1 Describing design of academic sources (optional) S2 Listing main points of relevant sources	Describing the methods of academic article (e.g., participants, treatments, and experimental procedures) Listing findings in academic articles, and/or statistics of news reports, and/or the opinions from other scholars	
M4 Explaining the cited sources (optional)	**Unpacking academic information in the cited sources in an accessible way to extend the reach**	36%
M5 Expressing authorial interpretation (optional)	**Providing authorial understandings on the topic**	53%
M6 Drawing conclusions	**Offering final remarks about the topic**	65%
S1 Offering takeaways S2 Making predictions S3 Calling for action S4 Looking into the future (optional)	Teasing out key information Making a prediction about the trend of the COVID-19 pandemic in the future Giving suggestions on what the public or the country can do to make the situation better Building the public hope for the future	

Table 3. Move structure of the epidemiologists' Weibo posts.

4.1.1. Move 1: Orienting audiences to the topic

Move 1: Orienting audiences to the topic consists of three steps (see Figure 1).

Step 1: Pointing out the main issue describes the topic related to COVID-19 under discussion by depicting the status quo of the COVID-19-related challenges or introducing a scientific advancement in tackling the pandemic. A common rhetorical strategy employed in this step is the use of rhetorical questions.

Step 2: Contextualizing the topic provides the social or academic background for the issue to be discussed. The content in this step is supported by multiple sources, such as newly published articles, anecdotes, personal experience, and news reports.

Step 3: Offering a synopsis summarizes the gist of the microblog post for the audience in the length of one or two sentences. The opening move resembles the function of the opening moves in both academic and non-academic genres, such as "establishing the territory" in research articles (Swales, 1990) and "announcing the topic" in Tweetorials (Tardy, 2023b).

Step 1: Pointing out the main issue
(Blogger [3])
所谓"新冠引起脑萎缩"是咋回事？
What is the meaning of the so-called "COVID-19 causing brain atrophy"?

Step 2: Contextualizing the topic
(Blogger [3])
最近，《自然》杂志一篇关于新冠感染和大脑改变相关的研究，引发广泛关注。
应该如何理解这篇研究的意义？我们是否需要为「新冠可能引起脑萎缩」而感到担忧？
Recently, a study on the correlation between COVID-19 infection and changes in the brain published in the journal "Nature" has attracted widespread attention. How should we interpret the significance of this study? Do we need to be concerned about the possibility of "COVID-19 causing brain atrophy"?

Step 3: Offering a synopsis
(Blogger [3])
新冠气溶胶在空气中20分钟减少90%
这是英国布里斯托尔大学的"气溶胶研究中心"刚发表的一篇预印本论文。
COVID-19 aerosols decrease by 90% in the air within 20 minutes. This is a preprint paper just published by the "Aerosol Research Centre" at the University of Bristol in the United Kingdom.

Figure 1. Examples of Move 1.

4.1.2. Move 2: Teasing out main points (optional)

Move 2: Teasing out main points usually takes form in a list of numbered sub-topics. These numbered points can serve as a guide for readers. It either exists as a standalone optional move or is merged with **Move 1 Step 3: Offering a synopsis**. The purpose of this move serves the similar purpose as elucidated in Luzón (2013, 2019), namely, facilitating a smooth process for the audience to understand the main points that the authors intend to convey. Incorporating a list of subtopics helps break down scientific materials into manageable parts, aiding in the logical flow of the posts and emphasizing each important point individually. The move in Figure 2 demonstrates the post writers' audience awareness and intention to increase the accessibility of the scientific content.

(Blogger [2])
1. Cell发表了华盛顿大学Veesler组文章 (...)
1. Journal Cell published an article from Veesler's research group from the University of Washington (...)

2. 德国LMU Munich在Lancet上报道了接种疫苗后发生Omicron感染。
2. LMU Munich in Germany reported cases of Omicron infection occurring after vaccination in The Lancet.

Figure 2. Example of Move 2.

4.1.3. Move 3: Reporting supporting sources

The move of **Reporting supporting sources** was identified as a highly frequent one (see Figure 3). The optional **Step 1: Describing design of academic source** briefly introduces the methods of the academic article

that the microbloggers drew on. This step establishes a coherent transition from the last move that summarizes the main points of the post to the scholarly evidence cited to support the main points. Different from academic articles, where the design of the cited studies is introduced in academic language, the microblog writers use relatable language to conduct this step.

Step 2: Listing main points of relevant sources appears to be an obligatory sub-move, where the microblog writers list findings and statistics from the sources cited, sometimes along with the source author's opinions on the topic issue. **Move 3: Reporting supporting sources** reveals the science microbloggers' intention of constructing authors' credibility and authority. This move also indicates that the microblog writers' composing process is influenced by their disciplinary writing background. That is, the three epidemiologists are all research scientists in the medical related field, and the academic source attribution is commonly employed as a convention in their field.

Text 3 Examples of Move 3
Step 1: Describing design of academic source
(Blogger [2])
该研究由南非Netcare医疗集团发表，比较了南非49个医院的6342个Delta流行高峰的感染者和2351个Omicron流行高峰的感染者的临床表现。
The study, conducted by the South African Netcare healthcare group, compared the clinical manifestations of 6342 Delta variant-infected individuals during the peak of the outbreak in 49 hospitals in South Africa with those of 2351 Omicron variant-infected individuals during the peak of the Omicron outbreak.

Step 2: Listing main points of relevant sources
(Blogger [1])
香港大学医学院3月8日发表的最新疫情推测分析，推算出香港每日新增病例数已于3月4日达顶峰，预计于4月23日将下降至三位数，即1000人以下，并从5月中旬持续稳定在两位数。
The latest speculative analysis on the epidemic, released by the University of Hong Kong's Medical School on March 8th, estimates that the daily number of new cases in Hong Kong reached its peak on March 4th. It is expected to decline to a three-digit figure (i.e., below 1000) by April 23rd and continue to stabilize at a two-digit figure from mid-May onward.

Figure 3. Examples of Move 3.

4.1.4. Move 4: Explaining the cited sources (optional)

Move 4: Explaining the cited sources blends in the writers' own voices (see the example in Figure 4). This move serves to tailor information for the audience's needs. Specifically, in this move, the authors unpack the dense academic information in the cited academic sources by transforming the original academic information into something understandable to the audience. Of note, not all the writers explicitly performed this move in their posts. Some of them only used cited sources as evidence to construct

credibility and then jumped to the conclusion to offer suggestions based on their interpretation of the cited sources. This move demonstrates the writers' audience awareness of anticipating the challenges that the generalist audience experienced while processing the academic information.

(Blogger [1])
值得一提的是，被感染与确诊感染在数据上是有很大差别的。由于大部分人都是轻症或者无症状感染，所以并没有去做检测核酸，从而永远不知道自己己被感染。因此，美国今后二个月报道的每日病例数只会在40万以内波动，远小于实际感染人数。
It's worth noting that there is a significant difference between those actually infected and those confirmed. Since most people have mild or asymptomatic infections, they may not do a COVID testing, and thus may never know they have been infected. Therefore, the daily reported cases in the U.S. over the next two months are expected to fluctuate within 400,000, much lower than the actual number of infections.

Figure 4. Example of Move 4.

4.1.5. Move 5: Expressing authorial interpretation (optional)

Move 5: Expressing authorial interpretation (see example in Figure 5) is distinguished from the **Move 4: Explaining the cited sources** because in Move 5, the microblog writers take a step further to go beyond explaining what is illustrated in the cited source by making interpretations ("so what" statements) to organically combine their expertise and the information introduced in the sources. In academic communication, authorial interpretation plays a prominent role. In the emerging digital genres for science dissemination, such a move seems to carry a similar purpose of presenting authorial voices. **Move 5: Expressing authorial interpretation** shows traces of how the microblog writers draw on the genre feature in academic scientific writing by incorporating their own authorial voice, which may be valued by their Weibo followers who trust their expertise on epidemiology.

(Blogger [1])
这印证了我在2020年下半年在凤凰新闻中的预警"中国疫情上半场刚结束，现在是中场休息，下半场有多严重还未知晓"。
This confirms the warning I announced in the second half of 2020 on Phoenix TV News: "The first half of the China epidemic has just ended; now is half-time, and how severe the second half will be is still unknown."

Figure 5. Example of Move 5.

4.1.6. Move 6: Drawing conclusions

Move 6: Drawing conclusions is employed by the writers to offer final remarks about the topic discussed (see example in Figure 6). For this move, the writers used three obligatory steps and one optional step. **Step 1:**

Offering takeaways echoes **Step 3: Offering a synopsis** in **Move 1: Orienting audiences to the topic.** This step is possibly due to the authors' procedural knowledge of how people read Weibo posts. That is, Weibo readers typically scroll down the Weibo page on their phone screen for information takeaways. Due to this programmatic design, the readers may skim the beginning and ending paragraphs without reading every paragraph. Thus, providing takeaways as the last move serves to better engage with the readers' non-linear reading habit for quick location of information. **Step 2: Making predictions** and **Step: 3 Calling for action** help readers identify the trends of COVID-19 and prepare for possible future situations, which may influence public viewpoints and decision-making by the authorities. **Step 4: Looking into the future** appears in less than half of our corpus of posts. This step accords with "pathos" in rhetoric, appealing to readers' emotions by building public positivity for the future. Affecting the confidence of the public is also one way that genres of scientific communication exert impact on the society.

Step 1: Offering takeaways
(Blogger [2])
这项研究提示了CoronaVac初免＋BNT162b2加强是一个行之有效的提高抗体滴度的方案，这也是第一个相关研究，因此具有重要意义。
This study suggests that the combination of initial CoronaVac vaccination followed by a booster with BNT162b2 is a practical and effective strategy for increasing antibody titers. This is the first relevant study, and therefore, it holds significant importance.

Step 2: Making predictions
(Blogger [1])
因此，现在可能是一个获得群体免疫的最佳时间窗口。
Therefore, now may be the optimal time window to achieve herd immunity.

Step: 3 Calling for action
(Blogger [3])
最后提醒，疫情当前，给老人和脆弱人群接种是当务之急。而且因为突变株让疫苗的有效性大幅度下降，疫苗打足三针至关重要。
Finally, as a reminder, in the current pandemic situation, vaccinating the elderly and vulnerable populations is an urgent priority. Moreover, due to the significant decrease in vaccine efficacy caused by mutant strains, it is crucial to complete the full three-dose vaccination.

Step 4: Looking into the future
(Blogger [3])
对于新冠这个新型的病毒，还有太多未知，我们应该重视感染可能对大脑产生的影响，但也不必为一些非常初步的结论而过于担心。
There is still much unknown about this coronavirus. We should take seriously the potential impact of infection on the brain, but there is no need to be overly concerned about it because of very preliminary study findings.

Figure 6. Examples of Move 6.

4.2. Resources and strategies

The second research question focuses on the use of multimodal resources and rhetorical strategies employed by the epidemiologists in these Chinese

COVID-19 public health posts. We coded four parameters found in multimodal resources and rhetorical strategies: type, function, associated moves, and the frequency of their appearance in our corpus. As mentioned earlier, for guiding purposes, we generated a list of functions of visuals and rhetorical strategies from previous research on science microblogs and videos (Luzón, 2013, 2019) and text-image relationship (Marsh & White, 2003). Drawing on these functions, we coded the multimodal resources and rhetorical strategies in the identified moves. The following functions were identified in our corpus: [1] tailoring information to the audience's knowledge background; [2] engaging the readers; [3] making claims and arguments convincing & adding credibility; [4] attracting the audience's attention; [5] creating an emotional appeal; [6] decorating; [7] presenting information. Additionally, one function that was not discussed in the previous studies, [8] adding a personal touch, emerged from our data analysis.

4.2.1. Multimodal resources

The main multimodal resources identified in the focal microblog posts are visuals. We categorized the visuals into two broad types: 1) identifiable screenshots of outside sources (i.e., screenshots of academic sources, social media posts, news reports, and websites) and 2) visuals without explicit source information (pictures, infographics, and graphs and tables).

As Table 4 illustrates, the most prominent functions of these visuals are: making claims and arguments convincing and adding credibility, and presenting information. Pictures and infographics mainly carry the additional functions of engaging the readers and attracting the audiences' attention. The function of adding personal touch primarily resides in the use of pictures. In addition, the unique function of graphs and tables lies in tailoring information to the audience's knowledge background, as the generalist audience may be able to comprehend the visuals while not necessarily understanding the textual quotes from the academic sources. To further tailor information for the lay public, the writers sometimes leave annotations on the graphs and tables to increase the accessibility for the audience.

Regarding the associated moves, the use of visuals is mostly related to **Move 1: Orienting audiences to the topic** and **Move 3: Reporting supporting sources**. The Chinese epidemiologists used the visuals attached at the end

of the post to complement the opening move by establishing strong intertextuality between the textual opening move and the multimodal visuals. In addition, the use of visuals associated with Move 3 is primarily for increasing the credibility of the claims and presenting information.

Visuals	Function	Associated Moves	% of the posts (x/72)
Screenshot of academic sources (e.g., title page, charts, tables, body paragraph)	[3] make claims and arguments convincing & adding credibility [7] present information	M3	29%
Screenshot of social media post (e.g., English Twitter)		M1, M3	8%
Screenshot of websites (e.g., research team)		M3	6%
Screenshot of news reports		M1, M3	18%
Pictures	[3] make claims and arguments convincing & adding credibility [7] present information	M1, M3, M6	22%
Infographics	[2] engage the readers [3] make claims and arguments convincing & adding credibility [4] attracting the audience's attention [6] decorate [7] present information [8] adding personal touch	M1, M3	6%
Graphs & Tables	[1] tailor information to the audience's knowledge background [3] make claims and arguments convincing & adding credibility [4] attracting the audience's attention [7] present information	M1, M3, M4, M5, M6	7%
Emoji	[2] engage the readers [5] create an emotional appeal	M5, M6	3%

Table 4. Multimodal resources employed by microbloggers.

4.2.2. Rhetorical strategies

The most outstanding rhetorical strategies employed by microbloggers are *using questions* and *using proverbs or idioms*, mainly for engaging the audience and attracting their attention on the topic discussed. Further, the use of vernacular lexis is common for tailoring information to the audience's knowledge background, as some Weibo readers may understand the professional public health knowledge better when delivered in vernacular language. In terms of the functions, as Table 5 shows, most rhetorical strategies identified are for facilitating the generalist audiences' understanding of the content and improving the reading and learning experience. These rhetorical strategies are widely spread among all moves, which possibly suggest that the use of rhetorical strategies represents the microbloggers' personal style of delivering information to the Weibo

readers, rather than serving certain particular moves. This is also evidenced by our observation during the analysis that the distribution of the use of rhetorical strategies tends to be microblogger-focused, meaning that one microblogger's posts are replete with versatile rhetorical strategies while another one's Weibo posts lack the extensive uses of rhetorical strategies in a consistent way.

Rhetorical strategies	Function	Associated Moves	% of the posts (x/72)
Question	[2] engage the readers [4] attracting the audience's attention	M1, M2, M4	21%
Vernacular lexis / buzzword	[1] tailor information to the audience's knowledge background [2] engage the readers	M1, M2, M3, M4, M5, M6	11%
Proverbs / idioms		M1, M2, M3, M4, M6	14%
Analogy to fairy tales		M1, M4	3%
Metaphor	[1] tailor information to the audience's knowledge background [2] engage the readers [5] create an emotional appeal	M5, M6	3%
Code-switching	[3] make claims and arguments convincing & adding credibility [4] attracting the audience's attention	M1, M3, M5	7%
Homophones	[1] tailor information to the audience's knowledge background [4] attracting the audience's attention	M1	1%
Relate to personal experience	[2] engage the readers [8] adding personal touch	M1, M5, M6	7%

Table 5. Rhetorical strategies.

5. Discussion

To address our two research questions that ask about the move structure and the multimodal resources and rhetorical strategies employed to realize the moves, one interesting feature we identified in our corpus is a high level of interdiscursivity, which accords with the findings in previous studies on emerging digital genres (Feng, 2019) and on public science communication (Luzón, 2019). Specifically, Luzón (2019) found that science microblogs display a blend of discursive features from different discourses, realized by a variety of rhetorical strategies for various functions. Such blending of discursive practices is also identified in our corpus. For example, the move structure identified in this study shares similarities to the structure of academic articles; however, what blends into this academic move structure is the extensive use of multimodal resources and rhetorical strategies, which are more common in non-academic genres.

Moreover, the transplantation of non-academic discourse features and functions into the academic-like move structure is possibly due to the diverse communicative purposes that the microbloggers hold. Interdiscursivity, as Feng (2019) explains, is reflected in how rhetorical moves may realize multiple communicative purposes. Such multiple communicative purposes in science microblogs can be: 1) disseminating research and making it understandable to the public, 2) evaluating previous research and claims by others, and 3) engaging the audience (Luzón, 2013). Our analysis supports the findings of these previous studies in regard to how the blending of academic and non-academic discourse features in the identified moves may serve these multiple communicative purposes. For example, **Move 3: Reporting supporting sources** carries the dual purposes of disseminating research and making it understandable to the public by employing both academic terminologies and various multimodal and rhetorical strategies (see Table 4 and Table 5) to increase its understandability to the generalist audience. This approach ensures that the content is both authoritative and accessible. Following that, **Move 4: Explaining the cited sources** and **Move 5: Expressing authorial interpretation** are imbued with the microbloggers' dual intentions of providing an evaluation of previous research and delivering information in an accessible and engaging manner, bridging the gap between specialized knowledge and the general public. Our findings display the association between the moves and the multimodal and rhetorical resources that are employed to realize the moves, which illustrates a particular configuration of interdiscursivity and reflects the hybrid nature of the Chinese science Weibo posts as a genre that carries multiple communicative purposes.

Zooming in on how the focal microblog writers employed rhetorical strategies to engage generalist readers on Weibo, among these five ways that proximity can be established (Hyland, 2010), *argument structure* and *credibility* were particularly related to the rhetorical strategies that the writers in this study adopted. *Argument structure* as one of the ways to achieve proximity in Hyland (2010), means that the authors may tailor the information to accommodate the audiences' knowledge background. An instantiation of argument structure adjustment in our corpus is that the microblog writers employed, for example, an analogy to fairy tales and buzzword or vernacular lexis to unpack academic jargons mentioned in the **Move 3: Reporting supporting sources**. Moreover, one example of building *credibility* is showing the research method in the cited research paper, which is reflected

in the optional **Step 1: Describing design of academic sources** in **Move 3: Reporting supporting sources**.

Beyond the ways introduced in Hyland (2010), the findings in this study suggest that there might be additional ways in science microblogs to negotiate proximity. Although it occurs only in a small number of instances, a new way of establishing proximity identified in our study is by employing culturally situated linguistic resources to display a personal position in the text. A typical rhetorical strategy related to this is the use of homophones in one of the epidemiologists' microblog posts. Specifically, the microblogger @美国癌症医生张玉蛟教授 (American Cancer Doctor Professor Yujiao Zhang) used homophones of "Feng Cheng" (风城) to indicate "Feng Cheng" (封城, a homophone of 风城, meaning lockdown), to avoid potential risk of getting in trouble of media censorship and to allude to his opposing position on this issue, as lockdown (封城) has become a politically sensitive word in media contexts. In this example, the writer also assumed a tacit shared knowledge of the homophone used in the situated context with his public audience. The microblogger established proximity through displaying both his authority as an expert and his personal position toward the issue under discussion

Another way to achieve proximity identified in our study is through *establishing personal human identity*. Tardy (2023a) explains that epidemiologists on Twitter establish an expert identity by providing public health advice to the lay audience in an accessible way and build a human identity through telling humorous stories. Similar rhetorical strategies, as identified as one way of achieving proximity, are located in our microblog corpus. This establishment of personal human identity is not only achieved through text-based resources (e.g., relate to personal experience) but also through multimodal visuals, such as a picture of the test toolkit that the microblog writer just purchased and used at home. These rhetorical strategies helped the microbloggers to achieve proximity, demonstrating both their expert authority and personal position toward the focal issue in the microblog posts.

In terms of the various types of multimodal visuals, they comprise a central issue of how traditional genres are remediated into new digital genres, as one attribute of such emergence of new genres afforded by new media is "the combination of written texts with other semiotic resources, mainly visual resources" (Pérez-Llantada, 2021, p. 77). In our study, the move analysis was conducted mainly based on the textual part of our microblog posts, and the

associated moves of the multimodal visuals were coded based on the intertextual mentions in the texts. We associated the multimodal visuals with the moves identified because we believe that multimodal resources also carry out functions, which serve as an integral part of rhetorical moves.

Previous research has elucidated the relationship between texts and visuals through multiple speculations. For example, Porter (1986) proposes that text and image can convey parallel arguments, generate joint arguments as being intertwined with each other, or comprise contrastive arguments. Nieman (2000) maintains that visuals are to create emotional appeals. Marsh and White (2003) create a list of functions and sub-functions of visuals used with texts, such as decorate, control, and explain. Luzón (2019) similarly concludes that semiotic resources such as visuals may make claims more convincing by providing evidence for what has been said in texts, and symbolic images may help the audience's understanding of the researcher's explanation. These findings indicate the great potential of multimodal resources in remediating traditional genres to digital new genres.

One example in our analysis is that **Move 3: Reporting supporting sources**, the move that shares most resemblances to that in the traditional academic articles, turns out to be the move that is most often associated with the use of visuals, the main function of which is to increase the credibility of the arguments. Therefore, one feature in the evolution from text-based genres to digital genres lies in the shift of resources to realize a similar move in the antecedent genre and the evolved digital genre. As the general purposes of public science microblogs is to "disseminate information and valuable research," "influence others in different ways", and "create a sense of community that transcends institutional and disciplinary boundaries" (Luzón, 2013, p. 430), the various functions of the identified multimodal visuals comprise an essential realization of these general purposes of popular science dissemination.

6. Conclusion and future directions

To conclude, this study demonstrates the move structure of an emerging digital genre, Weibo posts, for disseminating scientific public health knowledge of COVID-19. Through a multimodality-enhanced genre analysis, we identified six moves and the multimodal resources and rhetorical strategies employed to realize the moves. Our findings also show how a high

level of interdiscursivity and proximity are established through the microblog writers' purposeful design of move structure and employment of multimodal resources and rhetorical strategies. A caveat of this study is that the structure and resources cannot be interpreted as generalizable to all Weibo posts composed by every epidemiologist on COVID-19 public health knowledge. As reiterated, we aim to reveal some possibilities, not provide a static template. Moreover, this study does not include an analysis of the interaction between the audience and the Weibo texts. Future research may benefit from such an inquiry by, for example, incorporating the comments left on Weibo posts to understand how the scientific knowledge is taken up by the non-expert audience. Another direction for future research could involve a comparative analysis of scientific knowledge dissemination of Weibo posts with other social media platforms to explore how different platforms influence the rhetorical move structures and rhetorical strategies employed. Additionally, investigating the longitudinal changes in the move structures of Weibo posts over the course of pandemic could provide information on how epidemiologists adapt to evolving pandemic circumstances and audience expectations.

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NOTES

[1] Twitter has been rebranded as X in July 2023. In this article, we adopt its previous name.

[2] To align with the time when the focal Weibo posts were published, these numbers were collected in March 2022.