

Omnimedia Matrix Rumor Refutation: Model, Effects, and Strategies in Public Health Emergencies

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Abstract

This study evaluates the Omnimedia matrix rumor refutation model's effectiveness during public health emergencies, particularly COVID-19. The model integrates mainstream, platform, and self-media to counter misinformation comprehensively. Key findings emphasize mainstream media's role in verifying and debunking rumors, with support from platform and self-media for rapid information dissemination. Vertical coordination involves central and local media, while horizontal collaboration ensures optimized content across platforms. This model offers a structured approach to rumor refutation, enhancing information reliability and public trust, providing a valuable framework for managing misinformation in future crises .

Key Words: OmniMedia Matrix, Rumor Refutation Mechanism, Public Health Emergencies, Information Dissemination, Misinformation Control

Introduction

In recent years, with the continuous development of digital technology, the amount of rumors, misinformation, and fake news on the internet has significantly increased (Stabile, Grant, Purohit, & Harris, 2019). This situation worsened during the COVID-19 pandemic, leading to an "infodemic." An infodemic refers to the excessive spread of information (sometimes accurate and sometimes inaccurate) during an epidemic, spreading among people through digital and physical information systems, similar to the epidemic itself (WHO, 2020). This misinformation, driven by various motives, has severely impacted people's daily lives.

Meese et al. (2020) noted that this impact was widespread from the very beginning of the pandemic. COVID-19 was first reported in December 2019 and was declared a global pandemic in March of the following year (WHO, 2020). In just three months, misinformation, disinformation, hoaxes, and lies spread exponentially on social networks, with social media providing a platform for their dissemination (Zarocostas, 2020). Most of this misinformation was related to the virus's origin, etiology, treatment, and transmission mechanisms, created and spread by netizens or politicians with either intentional or unintentional motives. Orso et al. (2020) pointed out that the spread of false information jeopardized the sustainability of global healthcare systems and misled many people, putting them at greater health risks.

Previous studies have shown that rumors about the COVID-19 pandemic are diverse,

come through multiple channels, and are carefully packaged (Lin, 2020). An independent study by the British Broadcasting Corporation (BBC) indicated that false information related to the pandemic has been used for various political, racist, and sexist purposes, attempting to polarize public opinion and incite hatred (Spring, 2020). Among them, conspiracy theorists, politicians, and celebrities have fabricated various types of lies for different purposes. A study by the Reuters Institute found that senior politicians, celebrities, or other well-known public figures are the primary sources of the most influential rumors (Brennen, Felix, Howart, & Nielsen, 2020). U.S. President Trump has repeatedly fabricated related rumors intending to discredit China.

Therefore, it is crucial to establish a set of targeted, responsive countermeasures based on rumors from different sources, with different purposes and channels. On one hand, banning accounts that violate and fabricate rumors can curb the production of false information at the source, restraining its spread. On the other hand, for false information that has already impacted society, an effective debunking mechanism is more valuable. This mechanism should target the type, characteristics, audience, and impact range of the rumors, providing point-to-point targeted debunking to face the increasingly serious compound rumor production mode.

An omnimedia matrix is one of the most effective solutions to deal with such rumors.

The omnimedia matrix, through targeted information release and clarification of viewpoints, enters the network public opinion scene, playing a key role in orderly

mobilizing the masses, guiding public opinion, and promoting social integration. On one hand, whether it is institutional media, professional media, or self-media, the "gatekeeping model" of the omnimedia matrix can filter and screen information at different levels, delivering accurate pandemic-related content to the audience. The authoritative voice of official media, combined with technology applications, platform devices, and media products, helps form an agenda setting that is compatible with both hardware and software, and complementary between direct and indirect means. In facing the complex rumors of public health emergencies, the omnimedia matrix can mobilize all forces from authoritative media to self-media, conducting differentiated debunking communication for different information fields, achieving comprehensive debunking effects.

On the other hand, the omnimedia matrix provides personalized information aggregation services, collaborating with users to "reproduce" media events, while both sides construct the focus and real-time direction of public opinion. The resulting topic participation, dialogue consultation, emotional conversion, and online action directly convey netizens' latest value propositions on the event.

This paper first determines the types and characteristics of rumors that were mainly disseminated on Chinese social media platforms during the COVID-19 pandemic through literature collection and secondary data analysis. Then, by investigating the debunking content of the omnimedia matrix composed of official media, platform

media, and self-media during the COVID-19 period and using LDA modeling, a cross-comparison with rumor types is conducted. As a result, the advantages and disadvantages of the omnimedia matrix debunking communication are obtained.

Complex Rumors in Public Health Emergencies

During the COVID-19 pandemic, one of the core challenges, aside from preventing the spread of the virus and treating infected patients, was combating the overwhelming amount of rumors. These rumors flooded through every channel of the internet, reaching everyone's ears. Even though governments worldwide have strived to provide accurate information and block sources of misinformation, rumors continue to emerge, leading to the coining of a new academic term: "social media infodemic" (Nguyen & Catalan-Matamoros, 2020). The World Health Organization (WHO) has repeatedly warned that the destructive power of an infodemic can be as severe as the pandemic itself.

These rumors have various sources and purposes. Domestic scholars have categorized the types of rumors in different ways. Wang and Xu (2020) divided rumors into pseudo-scientific rumors, rumors about the virus and pandemic origin, rumors deliberately exaggerating the severity of the pandemic, rumors attacking China's system, and national rumors. Chen et al. (2021) categorized them into virus transmission, virus information, epidemic prevention and control, and

international-related rumors. Ge (2023) divided them into domestic epidemic dynamics, epidemic prevention policies, pseudo-science, social moral criticism, criticism of related institutions, economic and consumption impacts, social security, and international epidemic dynamics. These classifications indicate the high coverage, variety, and diverse means of these rumors.

One of the most famous rumors was the "virus origin" rumor fabricated by Western politicians, led by then U.S. President Trump. Even a lot of scientists from different countries proved that COVID-19 virus originated from animals in nature rather than being laboratory-made (Zhou et al., 2020), they continued to claim that the virus was created in a Chinese lab (New York Times, 2020). After mainstream U.S. media like The New York Times and The Washington Post cited these claims, the rumors spread wildly on social media, even penetrating Chinese social media, disturbing the public and aiming to undermine the credibility of the Chinese government and mainstream media (Wang, He, & Zhang, 2023). The politicization of Western media (López-Pujalte & Nuño-Moral, 2020) has become a major source of rumors. On a personal level, individuals also produce and spread rumors due to fear, anxiety, emotional manipulation, and group psychology (Zhong & Zhou, 2023).

Regarding the channels of dissemination, pandemic rumors spread through every form of social media. Platforms like WeChat, Weibo, and TikTok are major channels for the spread of pandemic rumors (Wang & Liu, 2022). From a rumor construction

perspective, COVID-19 rumors exhibit characteristics of localization and pseudo-administration (Chen & Tang, 2021). They release fake information in an official tone and are often supplemented with images and data to enhance their persuasiveness. The methods of fabricating rumors are diverse.

In summary, rumors during public health emergencies exhibit characteristics of modality, fragmentation, localization, emotionality, and value. Combined with the group-based, circle-oriented, and disordered nature of their dissemination, these factors add significant complexity and uncertainty to the representation of risks. Overall, these rumors present complex features (Ge, 2023). To address such complex rumors, a structural approach is needed rather than a simple, single method. Therefore, this paper proposes a Omnimedia matrix debunking model to counter complex rumors, seeking a more organized and efficient paradigm for debunking rumors in public health emergencies.

Core Logic and Collaborative Model of Omnimedia Matrix Rumor Debunking

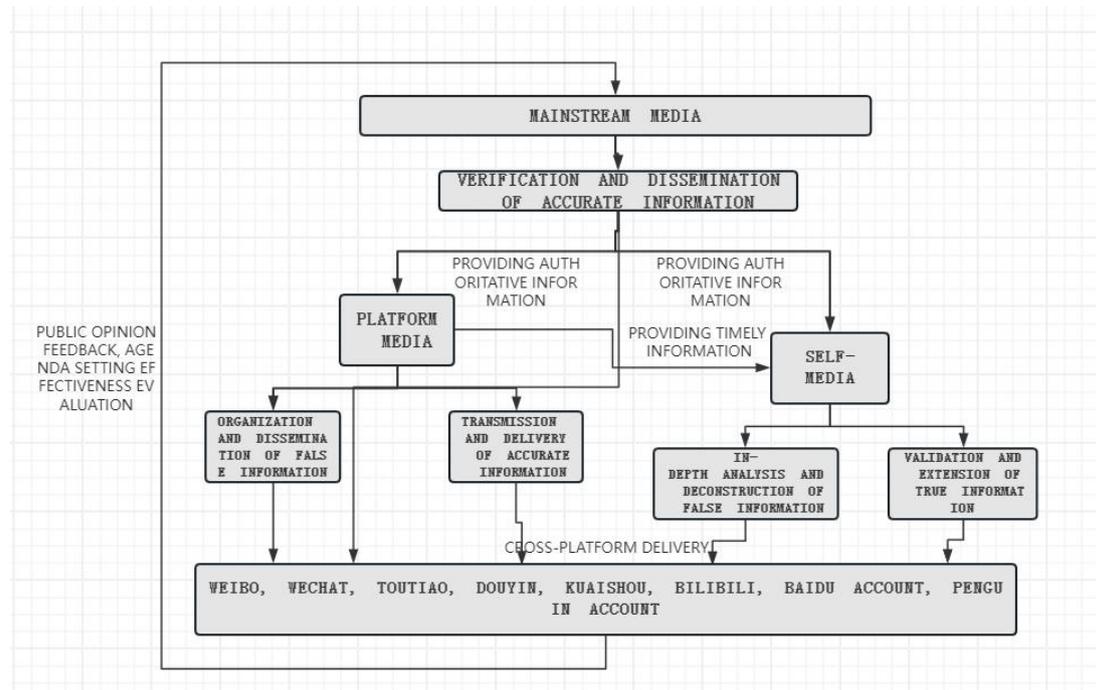
As a media form integrated with next-generation information technology, omnimedia achieves deep integration in the process of merging communication media, channels, and carriers.(Wei, Chen,2024) This integration does not completely eliminate media boundaries but reshapes them through cooperation and symbiosis, maintaining important collaborative relationships between different nodes. This study suggests

that in the face of major public health emergencies threatening the health of all citizens and the accompanying "infodemic," omnimedia must fully utilize its collaborative attributes. It should mobilize resources from mainstream media to personalized self-media at every level to counter false information in a matrix-style, comprehensive manner, thereby controlling the spread of misinformation as much as possible and limiting the scope of damage from major public health events.

First, the consistency of the core entities is crucial. The challenges of debunking rumors include identifying misinformation and confirming and disseminating accurate information. Mainstream media play an indispensable role in this process. As the core entities of information dissemination, mainstream media should not only uphold journalistic integrity and accuracy but also leverage their resources to verify information and promptly distinguish between true and false information. They should then publicly announce the results, becoming the primary source of information. Platform media and self-media follow suit, jointly constructing a top-down system of information verification and dissemination. In this system, mainstream media lead in information verification and rumor debunking, while platform media and self-media rely on the reliable information provided by mainstream media to conduct independent information dissemination and debunking activities. This mechanism not only helps quickly and accurately spread correct information but also enhances public trust in the media, effectively curbing the spread and impact of rumors.

Second, vertical mobilization and coordination are essential. In the vertical mobilization and coordination of the debunking mechanism, different types of media play unique and complementary roles. This division of labor is key to improving the efficiency and accuracy of information dissemination. Central media usually set national agendas and guide public opinion through authoritative reporting and analysis, providing official and up-to-date information to the public. Local media, being closer to local characteristics and the needs of the people, can more accurately reflect and address local rumors and misinformation, acting as the "grassroots" level. Despite facing limitations in space and time, mainstream media should strive to provide core, verified information, serving as accurate information sources for society. Commercial platforms and self-media supplement and extend the debunking system. Given their rich content, wide audience distribution, and distinct segmentation, these media can conduct more in-depth rumor deconstruction and rebuttal for specific groups. For example, by using more engaging content formats (such as videos, blogs, social media posts), they can reach a wider audience, providing detailed explanations of rumors and supporting their debunking stance with case studies. Through this top-down division of labor and coordination, various media can not only maximize their strengths but also complement each other, collectively building a multi-layered, comprehensive network for information verification and rumor debunking. This mechanism helps quickly and accurately spread correct information, enhancing public trust and participation in the media, thereby effectively suppressing the spread and

impact of rumors.



Lastly, horizontal comprehensive layout is vital. In the Omnimedia era, overall platform collaboration becomes a core strategy for information dissemination and debunking. First, a cross-platform matrix layout is the foundation for efficient information flow and enhanced media influence. This strategy includes horizontal integration of content across various media platforms such as Weibo, WeChat, Toutiao, TikTok, Kuaishou, Bilibili, Baidu, and Tencent. This approach ensures seamless information connection between different platforms and applications, enhancing the breadth and depth of information coverage. Within a single platform, such as WeChat, further optimization of its in-depth layout is necessary. WeChat's multi-terminal applications, including subscription accounts, personal accounts, mini-programs, service accounts, and communities, offer diverse interactive methods and service functions to meet different user needs. These functions enable more precise user

segmentation and content customization, improving the efficiency and effectiveness of information dissemination. A high-quality, precision-integrated service system is the main goal of the Omnimedia matrix layout. In this system, platform collaboration involves not only the linked dissemination of information about the same event across different platforms but also the creation of differentiated content forms according to the characteristics of different terminals. Moreover, it is crucial to leverage the interconnectedness of platforms and users, analyze target user data, and optimize content production to meet specific user needs. This "targeted delivery" model can effectively enhance content attractiveness and user engagement, strengthening the dissemination power and debunking effectiveness of information.

Verification of the Omnimedia Matrix Rumor Refutation Model

Verification Methods and Data Sources

Given that horizontal cross-platform collaboration primarily reflects breadth, with content being almost entirely identical across different platforms, this model primarily validates whether the core subject and vertical mobilization collaboration are properly coordinated to achieve the effect of a Omnimedia matrix. This study utilized web scraping to select all 4,920 pieces of information related to rumor refutation on the Weibo platform from five major media outlets—Guangming Daily, Economic Daily, People’s Daily, Xinhua News Agency, and China Daily—following the outbreak of

the COVID-19 pandemic. The selected rumor refutation platform is the China Internet Joint Rumor Refutation Platform (hereafter referred to as “CIJR”), from which 645 pieces of refutation information were obtained. For self-media platforms, three influential bloggers—Sima Nan, Guyan Muchan, and Boston Round Face—were selected, yielding 2,217 pieces of information. Subsequently, Latent Dirichlet Allocation (LDA) was used to validate the coherence dimensions of their rumor refutation themes. LDA is a probabilistic graphical model used to analyze the thematic structure of large volumes of text data. It views each document as a mixture of multiple topics and represents each topic as a collection of several words. By observing word frequencies in documents, LDA can infer topics and their distribution within documents. In this study, LDA was employed to identify key topics, aiding in further analysis and understanding of the text data. Following this, the study conducted a textual analysis to deeply evaluate the collaborative mechanisms in the dimension of content expression, aiming to establish a comprehensive model.

Macro Dimension: High Consistency of Rumor Refutation Themes

At the macro dimension, LDA modeling reveals a high consistency in rumor refutation themes across mainstream media, platform media, and self-media, effectively addressing almost all rumors. LDA modeling of mainstream media rumor refutation information indicates the following key themes: vaccine-related, international-related, prevention and control-related, treatment-related, and

punishment-related.

Vaccine-Related Rumors: These primarily addressed various false claims about vaccine production and efficacy, including rumors such as mRNA vaccines turning people into genetically modified organisms, stronger vaccine side effects indicating better efficacy, and COVID-19 vaccines having only a six-month effectiveness period.

International-Related Rumors: These mostly refuted Western media reports, especially from the US and UK, about China. They focused on malicious accusations regarding the origins of the virus, including early cover-ups, the virus originating from Chinese labs, China obstructing international investigations, and blaming other countries.

Prevention and Control-Related Rumors: These countered misinformation about China's pandemic prevention policies, including rumors about lockdowns, nucleic acid testing, etc.

Treatment-Related Rumors: These debunked various folk remedies, such as claims that canned yellow peaches, saline, tea, and vinegar could cure COVID-19, and that the veterinary drug ivermectin was a "miracle cure" for COVID-19.

Punishment-Related Information: This category involved the announcement of police

reports across various regions, detailing administrative and criminal penalties for rumor spreaders.

Platform media and self-media showed high thematic consistency with mainstream media, with their refutation themes also clustering into the four categories of vaccine-related, international-related, prevention and control-related, and treatment-related, but lacking information on the punishment of rumor spreaders. The proportions of each theme differed slightly, with self-media platforms having a significantly higher focus on international-related themes.

Comparing the refutation themes with the earlier mentioned rumor themes reveals that the refutation themes align well with the categories of virus transmission, virus information, pandemic prevention, and international-related topics. This indicates comprehensive coverage by all media levels in addressing rumor information categories. The high thematic consistency also demonstrates the effectiveness of the matrix model's dissemination path, as platform media and self-media coordinate their releases based on the information provided by mainstream media.

Micro dimension: Comprehensive collaboration where everyone performs their duties

At a macro level, Chinese media has exhibited systematic feedback. The primary form

of **mainstream media** is the provision of information, with minimal value judgments. For instance, in the most common category of "rumor debunking related to punishments," the content mainly revolves around the reasons for punishment, the severity of punishment, and reminders to the public, without involving value judgments.

For example: based on the report of Xinhua News Agency: On the 26th, the "Coronavirus Pneumonia" Prevention and Control Command in Hangzhou released a notification stating that rumors such as "60,000 people from Wuhan will come to Hangzhou from abroad," "Hangzhou will be locked down starting at noon on the 26th," and "the government will arrange planes to spray disinfectant" are all false information. The public security department has lawfully dealt with seven individuals, including Xiao Moumou, who spread the false information, and ordered them to delete it. The Command reminded the public that the prevention and control of the novel coronavirus pneumonia concerns the safety and health of the people, and society is highly concerned about it. To avoid being misled by false information, citizens are advised to pay attention to official information, and not to believe or spread rumors.

At the same time, mainstream media also functions as a disseminator of correct information, which in turn helps to debunk rumors to some extent. Zhong Nanshan, a leading Chinese expert in fighting the pandemic, has had his assessments and findings

frequently reprinted by mainstream media, providing scientific evidence for debunking rumors.

Platform media primarily plays a dual role in summarizing rumors and spreading the truth. Their presentation is characterized by being short, frequent, and fast.

Rumor: After being infected with COVID-19, you should take multiple medications to recover quickly.

Fact-checking: Wrong! This approach can be life-threatening. Each medication has strict usage and dosage requirements, and taking multiple medications on your own can easily lead to repeated medication, overdosing, and harm to health. Patients undergoing home treatment are advised to follow the medication guidelines provided by the National Health Commission, and not to self-medicate with multiple drugs.

Due to the interactive nature of platform media, the public can report rumors on the platform, and the rumor-debunking platform can verify and respond promptly, updating several pieces of information almost daily to ensure timely monitoring and feedback.

The most notable debunking efforts come from **self-media**. Due to the unique characteristics of self-media, their debunking methods are not limited to the

information provision of mainstream and platform media but also involve emotional conveyance and resonance. Their debunking techniques are more diverse. Since self-media platforms mainly use video explanations, their explanatory frameworks are broader. Self-media personalities can often provide multi-faceted verification, offering deeper insights into the debunking content to help audiences understand the origins and intentions behind the rumors.

For example, in the content related to the rumors against Dr. Zhang Wenhong published by Boston Round Face, the similarities between the methods of rumor-making were systematically analyzed:

The online attacks against Dr. Zhang were organized and premeditated, resembling the attacks on Academician Zhong Nanshan and his family. Combining recent messages from the Central Commission for Discipline Inspection, it is evident that reactionary forces have shifted their focus to technical personnel like Dr. Zhang after finding that fabricating rumors about pandemic control to undermine government legitimacy was futile. Ultimately, their goal is to disrupt social order, erode trust in government and epidemic prevention policies, and make people unwilling to adhere to epidemic control measures, becoming slack and even resentful of the "normalized epidemic prevention" policies. Their tactics are swift and malicious. We hope that the Central Commission for Discipline Inspection maintains high pressure and that the Cyberspace Administration responds promptly. Everyone should be vigilant about

strange remarks online.

An interesting discovery is that self-media often use the method of "bringing the battle to the opponent's space" in their debunking efforts, especially in international affairs. Regarding the U.S. government's accusations against China, self-media often use comparisons of U.S. policies, data, and real-life scenarios to demonstrate the U.S.'s own shortcomings in handling control measures, thereby undermining the authority of the U.S. government's criticisms of China. This form of expression is widespread in every piece of international content on self-media platforms.

Conclusion and Discussion

In the context of studying the Omnimedia matrix rumor refutation model, it is evident that mainstream media, platform media, and self-media each play crucial roles, forming an effective collaborative mechanism to combat false information and rumors during the pandemic. This model demonstrates how different media can complement each other in a Omnimedia environment to achieve optimal information dissemination and rumor refutation.

Mainstream media continue to play their traditional role as authoritative sources of information. Acting as a bridge between the government and the public, mainstream media are responsible for disseminating accurate information verified by official

sources and providing continuous updates on the pandemic. This stable and authoritative information source offers the public a reliable foundation of information, helping to reduce panic and misunderstandings and ensuring social stability.

Platform media leverage their technological advantages and extensive user bases to quickly respond to public demand for information about the pandemic. They use algorithms and manual review mechanisms to filter and organize circulating information, identify and label false content, and refute rumors one by one. This real-time information monitoring and feedback mechanism significantly enhances the timeliness and coverage of rumor refutation, helping balance the speed and accuracy of information dissemination.

Self-media take on the role of in-depth analysis and extended discussion within the Omnimedia matrix. Self-media creators usually have strong personal influence and professional capabilities, allowing them to deeply investigate and analyze prevalent false information, revealing the motives and dissemination mechanisms behind it. Additionally, they can supplement the information provided by mainstream and platform media through more personalized or specialized content forms, improving the public's understanding and acceptance of the truth.

Through this multi-layered and multi-faceted Omnimedia matrix rumor refutation model, various media organizations can effectively collaborate, optimizing the

information dissemination paths and rumor refutation strategies. This not only enhances the overall reliability and efficiency of information but also strengthens public trust in the media, creating a healthier and more orderly information environment. In addressing future information challenges, this model offers a framework for public information management and dissemination during crises, providing a valuable reference for dealing with similar events in the future and enabling a more comprehensive response to emergencies.

In the verification of this model, the significant contribution of self-media in rumor refutation stands out. For instance, the blogger "Boston Round Face" has made comprehensive contributions by citing authoritative sources and using diverse forms of expression. His content often combines humor and critical commentary, producing engaging and effective refutations. On the issue of COVID-19 origins, he has countered accusations and rumors from the US government by referencing experts from China, the US, and the World Health Organization. Additionally, he contrasts the pandemic response policies and data from China and the US to counter rumors in a deeper context. His work has been highly effective, with each video garnering thousands of likes, shares, and tips (a special appreciation mechanism on Bilibili), and some core content even trending, making him a powerful component of the rumor refutation matrix.

However, the public opinion guidance mechanism of the Omnimedia matrix still has

issues that need improvement. First, the media matrix's vertical expansion has not been fully utilized, resulting in limited dissemination channels. Although mainstream media have established a Omnimedia matrix, including news apps and social media platforms such as WeChat, Weibo, and Toutiao, they have not fully utilized them in this event, with fewer content releases on platforms like Bilibili, Baidu, and Tencent. Secondly, there is a lack of interactivity; mainstream, platform, and self-media primarily use one-way content dissemination as the core means of rumor refutation, lacking interaction with audiences and users. This hinders timely responses to doubts, reducing the effectiveness of rumor refutation. Mainstream media often close their comment sections, and there are no cases of direct interaction in the comment sections of platform and self-media. Finally, the construction of the release-feedback-response mechanism is insufficient. As shown in Figure 1, the final step of "public opinion feedback and agenda-setting effect evaluation" has been ineffective in countering pandemic rumors. Apart from politically related topics like the origins of COVID-19, most issues have not been followed up with repeated reports and refutations, thus failing to maximize the matrix's refutation effect.

The Omnimedia matrix rumor refutation is an effective mechanism that can only emerge under the Chinese media system. It requires a high degree of coordination and orderliness to achieve thematic consistency and categorized content expression. Proficient use of the Omnimedia rumor refutation matrix can effectively improve China's capability to govern internet misinformation. The verification model and data

in this paper demonstrate the existence of its synergistic effect, and future research can further discuss the enhancement of its synergy, drawbacks, and comparisons with other media systems.

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