

Driving factors of social media article diffusion: Empirical evidence from WeChat

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Abstract

This study constructs three logistic models to predict whether an article on social media can achieve a high reading volume (100,000+), a high liking volume (above 1,099), and a high reading and liking volume simultaneously. Our findings are based on the analysis of 22,632 articles published by WeChat Official Accounts. The accuracy of these three models reaches 79%, 81.14%, and 84.26%, respectively. The models verify the important impact of emotions, news values, WeChat Official Account subscriber volume, page position, and publication time. They possess practical operability and reference value in predicting the communication effects of articles on social media. This study provides guiding principles for news production practice, regarding how to improve communication effects. This will help media organizations better allocate resources and achieve better communication outcomes. This study finds that the diffusion effects of news texts can be quantified and predicted, which lays a theoretical foundation for the future development of automated software for evaluating article communication effects on social media. In addition, this study has important implications for exploring how emotional arousal drives information diffusion on social media, emphasizing that emotion is a significant variable that cannot be ignored in news diffusion.

Keywords

WeChat official Account, emotional arousal, news values, reading volume, liking volume

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Introduction

The Internet and social media have massively increased information availability, enabling greater selectivity in people's article reading (Bennett and Iyengar, 2008). Individuals proactively choose rather than passively receive content in the current Internet context. Under this trend, the reading volume often represents the extent of diffusion and number of receivers of news. And the liking volume further illustrates the extent of users' recognition of news. If both indicators are high, it means that the article can not only attract users to click to read, but also win their recognition, with good communication effect. Thus, due to the increasing importance of social media in news diffusion (Reis et al., 2017), exploring the characteristics of articles on social media, focusing on the reading volume, liking volume, and both of them simultaneously, is an important topic.

Previous research has generally investigated the dynamics of article diffusion on social media from the perspective of news values, exploring users' news selection and re-transmission (García-Perdomo et al., 2018). The importance of news values in the construction of news has long been recognized (Galtung and Ruge, 1965; Gans, 1984; Pae and Seol, 2018; Semetko et al., 1991), as they shape how events become news stories (Papacharissi and Oliveira, 2012). Scholars consider news values as selection principles, professional criteria, cognitive constraints, audience preferences, and item qualities (Bednarek, 2016). Generally, articles according with newsworthy standards spread more widely.

As to the impact of emotions on news diffusion, this is a relatively recent topic as in traditional journalistic practice, one of the prerequisites of news coverage for news producers is providing an objective description of reality, which significantly reduces the room for emotional expression in news stories (Brown et al., 2020). However, the ideal of objectivity yields to the realism of journalistic practice (Kovach and Rosenstiel, 2007): With the increasingly in-depth study of emotions in psychology and communication in recent years, scholars have found that emotions are closely related to communication, and have become an increasingly important part of the dynamic of news production and consumption (Beckett and Deuze, 2016).

This paper explores the key factors that influence social media articles' reading volume, liking volume, and both reading and liking volumes simultaneously. We will explore the core driving mechanisms from the aspects of emotional arousal, news value, page position, number of subscribers, and time of publication. We construct three prediction models, which will lay a theoretical foundation for the future development of automated software to evaluate article communication effects on social media. In addition, this paper also examines the emotional factors rarely studied previously, and explores the driving role of emotions in promoting the transmission of articles.

Literature review

Social media is characterized by immediacy, interactivity, and personalization and the diffusion effects of its official account articles are influenced by a variety of factors, including emotion, news value, and editorial factors. For instance, a study has found that emotional content is more viral since it captures public attention (Berger and Milkman,

2012). Bednarek (2016) argued that news value plays an important role in the production and dissemination process. In addition, the page position, the number of subscribers and the publication time, as fundamental variables, directly determine the dissemination of the content.

The role of emotional arousal

People are social animal and have an instinctive need to disclose their emotions to others (Nabi, 2017). Emotions are contagious within offline social networks (Fowler and Christakis, 2008), which also applies to online environments (Kramer et al., 2014). In social psychology, Harber and Cohen (2005) advocated an emotional broadcaster theory of news sharing, which posits that people have an inner necessity to share experiences, and news stories—especially emotionally arousing ones—are passed on to others to fulfill this need. People prefer to pass on news they feel more emotionally attached to (Valenzuela et al., 2017), referred to as “emotion-led sharing” (Bright, 2016). According to appraisal theory (Lerner and Keltner, 2000; Tiedens and Linton, 2001), emotions help individuals monitor and regulate their surroundings (Knobloch and Solomon, 2003). In complex environments where stimuli compete for attention, emotional stimuli enjoy a processing advantage (Bayer et al., 2012). Increased cognitive involvement may increase the likelihood of a behavioral response to emotional stimuli in terms of information sharing (Stieglitz and Dang-Xuan, 2012). Additionally, emotions can enhance a message’s persuasive influence by motivating people to share it (Nabi, 2017).

There are two often used models of emotion: dimensional and discrete ones (Horvat et al., 2022). The dimensional emotion model has two broad affective dimensions (Nabi, 2010), arousal (high/low activation) and valence (pleasure/displeasure) while the discrete emotion model focuses on categorical emotional states, including the basic emotions (Ortony and Turner, 1990). Considering the complexity of human thought and action, the dimensional emotion model cannot fully reveal the process of human behavior. On the other hand, the discrete emotion model explains human actions more comprehensively by capturing additional elements and combining them with the dimensional perspective’s assessment of valence and intensity (Nabi, 2010).

Scholars have different standards for emotional classification. Yacoob and Davis (1994) found that at least six emotions are universally associated with distinct facial expressions: happiness, sadness, surprise, fear, anger, and disgust. Additionally, we attempt to explore the impact of advanced emotions, resonance and being moved, since they are ubiquitous and profound social emotions (Seibt et al., 2017; Wan, 2008).

In summary, emotions play a crucial role in information diffusion, particularly in online environments, where content that evokes strong emotions is more likely to be widely shared. Therefore, we hypothesize:

H1a: The extent of Emotion aroused by WeChat Official Account article positively influences the reading volume.

H1b: The extent of Emotion aroused by WeChat Official Account article positively influences the liking volume.

H1c: The extent of Emotion aroused by WeChat Official Account article positively influences the reading and liking volume simultaneously.

The role of news value

News values are the qualities that make news events newsworthy (Cotter, 2010). Currently, news values not only follow traditional standards, but also have new developments. Social media largely follows traditional news values, with some exceptions (Wadbring and Ödmark, 2016). For instance, new media has changed the core of news production and consumption since news is no longer monopolized by professional news workers, but co-produced by users and journalists (Amoroso et al., 2018). Coupled with the impact of Internet technology, news values have changed (Beckett, 2009). Some traditional news values, such as prominence, impact, and controversy, remain important while others, such as timeliness and proximity, are less so (Amoroso et al., 2018).

Studies showed that users expected to hear about events involving a deviant element. Shoemaker et al. (1991) suggested that the more deviant a world event is, the more prominently it is covered by U.S. news media. Armstrong et al. (2015) indicated that significance is an important news selection standard for users as users tend to be concerned about significant news due to its potential consequences on their lives (Bednarek, 2016). Noticing significant events early is conducive to survival and risk response. Interest means news relating to sex, human interest, animals, and unfolding dramas, or offering opportunities for humorous treatment, entertaining photographs, or witty headlines (Harcup and O'Neill, 2016). Previous studies have shown that when readers find a piece of online news interesting, they not only read it in more depth, but also search for additional, related messages (Kang et al., 2013; Heinström, 2005; Lee and So, 2001). Continuity represents the duration of a news event, and the development of news events, as well as the degree of attention aggregation, is cyclical: News may have fewer readers at the beginning, but will accumulate attention with duration, before user attention eventually fades. People tend to pay attention to news events that continue for a while (Harcup and O'Neill, 2016). Interactivity refers to the communication and engagement between articles and users, as well as among users themselves on social media platforms (Kioussis, 2002). It serves as an indicator of user participation. Examples of highly interactive content formats include quiz tests, lotteries, and H5 Interactive News on WeChat Official Account. Thus, we argue that deviance, significance, interest, continuity, and interactivity are five important news values.

Overall, news value, as the key criterion for determining whether an event is worth reporting, plays an important role in news production and consumption. Therefore, we hypothesize:

H2a: News value of WeChat Official Account article positively influences the reading volume.

H2b: News value of WeChat Official Account article positively influences the liking volume.

H2c: News value of WeChat Official Account article positively influences the reading and liking volume simultaneously.

The intersection of emotion and news value in digital news

With the emergence of artificial intelligence and algorithmic tools, the production, distribution, and consumption of news have undergone profound changes (Kotenidis and Veglis, 2021). In the digital news environment, algorithms have subverted the long-standing gatekeeping role of traditional news organizations, becoming the new gatekeepers of news distribution (Møller, 2023; Van Dijck and Poell, 2015). Traditional gatekeepers typically use professional news values to decide what constitutes news. In contrast, algorithms operate at a scale and speed beyond human capacity, potentially introducing new selection criteria that differ from traditional news values. The social media gatekeeping process has now become a hybrid human-AI system where editorial judgment and algorithmic logic interact (Régis et al., 2024). Some scholars point out that algorithmic distribution systems learn from vast amounts of user engagement data, relying more on quantifiable metrics such as popularity and user profiles (Voinea, 2025). Algorithms record the characteristics of news that achieve high user engagement and subsequently tend to select and recommend news based on these patterns (Mattis et al., 2024).

Emotional arousal operates within this logic of algorithmic distribution by driving user engagement. Studies have shown that the degree of emotional arousal is significantly correlated with user engagement; people are more inclined to engage with information that evokes strong emotions (Nevatia et al., 2024). Both positive emotions like joy and being moved (Yang et al., 2024) and negative ones like anger and fear (Hasell et al., 2016) can easily stimulate user engagement behaviors such as liking, commenting, and sharing. Once high user engagement is detected, the algorithm pushes the content to a broader audience, increasing its potential for viral diffusion (Wang and Huang, 2022). This phenomenon signals an “emotional turn” in journalism studies (Wahl-Jorgensen and Pantti, 2021), suggesting that the value of news reporting may lie not only in its informational content but also in more subjective emotional reactions and sharing (De Kloet et al., 2021). This study, situated within the specific context of WeChat Official Accounts, empirically tests the communication effects of emotional arousal and news value in the digital news era.

Impact of page position

There are two types of information published on WeChat Official Account: first, one message paired with one big picture; and second, multiple messages with only the first message accompanied by a relatively large picture and the rest with only small pictures. Previous research found that article location in webpages plays a key role in content diffusion. For example, Kim (2015) has found that articles placed more prominently on the front page are read more frequently. In addition, research found that pictures are generally seen first (Holmqvist and Wartenberg, 2005). Additionally, compared with

small pictures, large pictures significantly increase individuals' dwell time (Bucher and Schumacher, 2006). Therefore, we hypothesize:

H3a: Top-page position of WeChat Official Account article positively influences the reading volume.

H3b: Top-page position of WeChat Official Account article positively influences the liking volume.

H3c: Top-page position WeChat Official Account article positively influences the reading and liking volume simultaneously.

Impact of WeChat Official Account subscriber volume

Research demonstrated that the number of followers has a significant positive impact on the reposting volume and diffusion effect of social media articles. Subscriber volumes has an impact on the diffusion of news on social media (Zhang et al., 2013). Higher subscriber volume improves the opportunity of news being seen, clicked, and liked by users, as well as shared to Moments and WeChat groups. Therefore, we hypothesize:

H4a: WeChat Official Account subscriber volume positively influences article reading volume.

H4b: WeChat Official Account subscriber volume positively influences article liking volume.

H4c: WeChat Official Account subscriber volume positively influences the article reading and liking volume simultaneously.

Impact of publication time

Publication time also influences news reading, liking and both of them simultaneously. According to the WeChat Data Report (2019), before lunch and after work are both active peak periods for WeChat use while 21:00 is the active peak period for reading WeChat Official Account articles. In other words, users tend to look at, read, and share information during leisure time, when commuting, or before going to bed, but are less likely to do so during working hours. The decrease of sharing reduces the likelihood that users will encounter news. Therefore, we hypothesize:

H5a: Publication time is related to article reading volume.

H5b: Publication time is related to article liking volume.

H5c: Publication time is related to the article reading and liking volume simultaneously.

This study aims to explore the driving factors of social media article diffusion. The research framework of the diffusion driving factors proposed in this study is shown in Figure 1:

Method

Procedure

In March 2019, we selected one day randomly from every month in 2018, and collected the top 3000 articles ranked by reading volume among all articles published by WeChat Official Accounts on those 12 randomly selected days respectively, yielding a total of 36,000 articles. We then conducted data cleaning with following steps: Firstly, we removed 11,128 invalid entries (deleted, unclear, or missing key elements) and 27 garbled entries. Secondly, we excluded 2,196 articles that were primarily audio, video, or images (since this study focuses on articles with mainly textual content). In addition, we removed 17 articles that contained non-Chinese language. After data cleaning, we obtained a final dataset of 22,632 valid articles.

Each article comprises headline, contents, WeChat Official Account name, publication time, page position, and WeChat Official Account subscriber volume.

We manually labeled the collected data under the indicators of eight emotions (happiness, sadness, surprise, fear, anger, disgust, resonance, and being moved) and five news values based on previous literature (deviance, significance, interest, continuity, and interactivity). Each indicator was marked from 0 to 1.

In this manual coding process, all coders were trained to reach an agreement regarding the labeling standard before beginning. When different opinions appeared, the coders chose a suitable one after discussion.

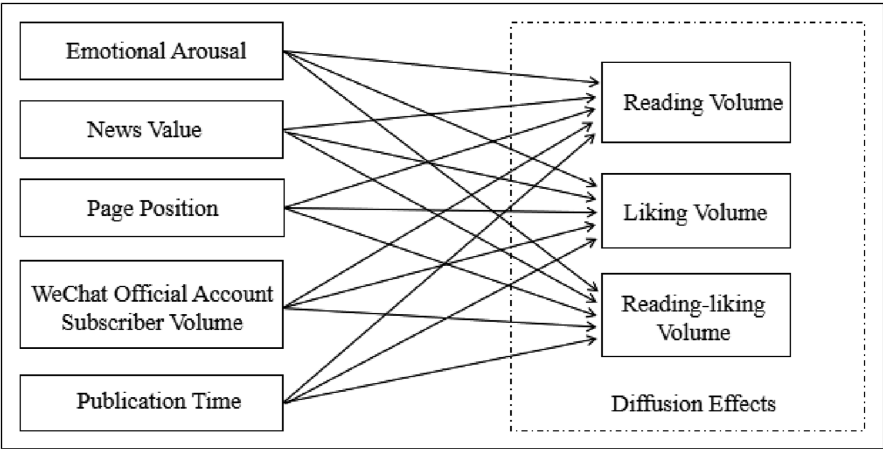


Figure 1. The research framework of diffusion driving factors.

Measures

When an article with fewer than 100,000 views, WeChat displays the exact number of views. When an article has more than 100,000 views, WeChat displays the reading volume as 100,001. Thus, we may define the reading volume of 100,001 or more as 1, and others as 0. The collected data shows that the overall average number of likes for all articles is 1,099, so we defined liking volume exceeding the average number of 1099 as 1 while others as 0. As to the simultaneous reading and liking volumes, 1 represented data with at least 100,001 views and more than 1,099 likes at the same time while the rest were marked 0.

Then, we conducted a standardization operation on our independent variables. We standardized WeChat Official Account subscriber volume from 0 to 1, where the smallest number (27) is defined as 0, the largest number (4106464) is defined as 1, and the intermediate numbers are converted in equal proportion. For page position, we defined Top-page position news as 1, and others as 0. As to publication time, we transformed it from a sequence variable into a dummy continuous variable, so as to preserve the order of time and reflect periodicity.

To address potential overlap among the five news-value indicators and to establish their psychometric validity, we conducted both exploratory and confirmatory factor analyses. The EFA results indicated that the data were suitable for factor analysis (KMO = 0.65; Bartlett's $p < .001$). Although parallel analysis suggested a three-factor solution, a theoretically motivated single-factor model showed mixed convergence: Significance (0.81) and Continuity (0.51) loaded acceptably, whereas Deviance (0.24), Interactivity (−0.21), and Interesting (−0.51) exhibited weak or negative loadings, with the factor explaining 26% of the variance. A subsequent single-factor CFA produced marginal model fit (CFI = 0.943; TLI = 0.885; RMSEA = 0.076), and factor loadings displayed similar heterogeneity; composite reliability exceeded recommended thresholds, though the AVE was modest. To assess discriminant validity, a two-factor CFA incorporating news values and emotion indicators was estimated. The latent correlation between the two constructs was moderate ($r = -0.56$), and the square root of the AVE for news values exceeded this value, supporting discriminant validity. Taken together, these analyses indicate partial convergent validity and acceptable discriminant validity, while also suggesting that the news-value indicators display multidimensional tendencies that warrant cautious interpretation.

Statistical analysis

We adopted a logistic regression model for data analysis. To screen out significant variables, we used the forward and backward variable selection method, and then tested the research hypotheses. Logistic regression transformed the dependent variable into a logarithmic form, which simplified prediction and helped to describe the logic behind the entire process. The specific formula was:

$$\log\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots \quad (1)$$

Transforming formula (1) gives:

$$P = \frac{e^{\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots}}{1 + e^{\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots}} \quad (2)$$

P_i is the probability that the number of reads or liking is marked as 1, β_0 represents the intercept term, β_1 represents the coefficient of variable x_1 , β_2 represents the coefficient of variable x_2 , and so on. The parameter estimation method was maximum likelihood estimation (MLE).

Findings

We constructed three statistical models through data analysis: the logistic prediction models of reading, liking, and both reading and liking volumes on social media.

Logistic model of WeChat Official Accounts Article's reading volume

The accuracy of reading volume logistic prediction model reaches 79%. In terms of emotion arousal, consistent with H1a, an emotion-evoking article is more likely to obtain high reading volume ($b = 0.08$, 95% CI [0.06, 0.09]). All news values, deviance, significance, interactivity, interest, and continuity, positively affect reading volume ($b = 0.22$, 95% CI [0.10, 0.34], $b = 0.14$, 95% CI [0.06, 0.22], $b = 0.19$, 95% CI [0.09, 0.29], $b = 0.14$, 95% CI [0.04, 0.24], and $b = 0.24$, 95% CI [0.14, 0.34], respectively). Thus, H2a is supported. Since top-page position has a positive relation with reading volume ($b = 0.57$, 95% CI [0.49, 0.65]), H3a is supported. H4a is supported by the positive correlation between reading volume and WeChat Official Account subscriber volume ($b = 7.23$, 95% CI [6.45, 8.01]). The results show that articles released at 01:00, 02:00, 06:00, 07:00, 20:00, 21:00, and 23:00 are more likely to obtain a high reading volume ($b = 1.05$, 95% CI [0.05, 2.04], $b = 1.1$, 95% CI [0.10, 2.1], $b = 0.45$, 95% CI [0.12, 0.78], $b = 0.52$, 95% CI [0.19, 0.85], $b = 0.43$, 95% CI [0.12, 0.74], $b = 0.51$, 95% CI [0.20, 0.82], and $b = 0.57$, 95% CI [0.24, 0.90], respectively), so publication time plays an important role in reading volume.

Logistic model of WeChat Official Accounts Article's liking volume

The accuracy of liking volume logistic prediction model reaches 81.14%. Regarding the impact of emotion, liking volume is positively associated with the level of emotional arousal ($b = 0.11$, 95% CI [0.09, 0.12]). Therefore, H1b is supported. Regarding news values, there is no correlation between deviance, significance, interest, and liking volume, and a negative correlation between interactivity and liking volume. H2b is partly supported, as continuity was the only news value that promoted news liking ($b = 0.22$, 95% CI [0.12, 0.32]). Page position has no significant effect on the number of news liking ($b = 0.004$, 95% CI [-0.01, 0.02]). Large WeChat Official Account subscriber number is positively related to liking volume ($b = 2.52$, 95% CI [1.76, 3.28]). Therefore, H4b is supported. News published at 02:00, 03:00, and 05:00 tend to get a high liking volume

($b = 1.62$, 95% CI [0.48, 2.76], $b = 1.41$, 95% CI [0.63, 2.20], and $b = 0.90$, 95% CI [0.47, 1.33], respectively). News published at 19:00 and 20:00 tend to have a low liking volume ($b = -0.35$, 95% CI [-0.68, -0.02] and $b = -0.35$, 95% CI [-0.66, -0.04], respectively), H5b is partly supported.

Logistic model of WeChat Official Accounts Article's reading and liking volumes simultaneously

The logistic prediction model of reading and liking volumes simultaneously had a relatively high accuracy, reaching 84.26%. Regarding emotion, H1c is supported by the positive correlation between emotional arousal and reading and liking volumes ($b = 0.09$, 95% CI [0.08, 0.11]). Other news values (deviance, significance, interest, and continuity) except interactivity, are positively related to reading and liking volumes ($b = 0.23$, 95% CI [0.13, 0.33], $b = 0.13$, 95% CI [0.05, 0.21], $b = 0.24$, 95% CI [0.16, 0.32], and $b = 0.34$, 95% CI [0.26, 0.42], respectively). Thus, H2c is partly supported. Consistent with H3c, top-page position positively affects reading and liking volumes ($b = 0.32$, 95% CI [0.24, 0.40]). Additionally, WeChat Official Account subscriber volume positively influences reading and liking volumes ($b = 7.71$, 95% CI [7.06, 8.36]). Finally, H5c is partly supported by the positive relationship between news released at 02:00, 03:00, and 05:00 and reading and liking volumes ($b = 2.28$, 95% CI [1.01, 3.55], $b = 0.88$, 95% CI [0.23, 1.53], and $b = 0.40$, 95% CI [0.03, 0.77], respectively).

Discussion

Exploring the drivers of article diffusion is crucial for the Journalism industry. Practically, these results can help communicators learn the characteristics of high-quality texts with the potential to be widely spread, thereby helping them improve news production strategies aimed at improving communication effects. Theoretically, this study advances the understanding of the role of emotions and news values in communication effects by testing the driving factors of emotions, news values and editorial factors.

High volume of reading doesn't mean high approval

In news consumption, reading and approval are two different things. A high reading volume doesn't necessarily mean good diffusion effects. Reading volume is the most direct reflection of the diffusion effect of WeChat Official Accounts articles. However, high reading volume is not a promising indicator to measure the degree of approval. Liking suggests the approval of opinions and values contained in texts, which means that news obtains a high level of social identification with high-quality texts. This phenomenon can be deeply interpreted through the lens of cognitive psychology's "dual-process models." Users' clicking and reading behaviors are often driven by fast, automatic peripheral routes, easily attracted by external cues like headlines and page position (Petty and Cacioppo, 1984; Kahneman, 2011). Moreover, we discovered that reading volume and liking volume are contradicted in some specific cases. In contrast, liking behavior reflects users' deep recognition of the opinions and values conveyed in the

article through central routes involving analysis and thought. According to affective-disposition theory, this public endorsement stems from users developing a positive affective disposition towards the content, meaning the value orientation aligns with their moral judgments and expectations (Grizzard et al., 2023; Raney, 2004; Zillmann and Cantor, 1976).

Therefore, some articles with high reading volume may spread widely on social media, but fail to arouse users' approval and have a low liking volume. Meanwhile, some articles with high liking volume may succeed in conveying opinions and values in accord with important social values, but fail to attract much users' attention due to the specific topics covered and limited emotions aroused, resulting in low reading volume. This indicates that high reading volume only represents the success of the peripheral route, ensuring initial exposure, whereas high liking volume requires the content to also conquer readers on the central route.

The significant differences in news value factors in terms of liking volume also demonstrate that a large reading volume does not necessarily mean good diffusion effects. Articles deemed important imply that its information holds value for users, alerting them to significant matters around them and providing a reference for them. Users may have read a large amount of this important information, but it does not necessarily mean that people will agree with this information and like it. Users only wish for positive outcomes for things that align with their values and that they like (Wang et al., 2024). When users read such important information via the peripheral route, if the content fails to meet their value expectations, it is difficult to stimulate recognition based on affective disposition (Raney, 2003), and thus no liking behavior is generated. In addition, content that is entertaining, deviant, and highly interactive can attract a large number of readers. However, such content may not necessarily align with the values of the users, and the superficial interactions between users and the producers are even less likely to trigger deep psychological mechanisms of approval. Only content with continuity could have the potential to sustain readers' attention. These contents often have continuity in their occurrence or in the discussions they generate. During sustained discussion, people engage deeply via the slow and deliberative central route (Evans and Stanovich, 2013), gradually unifying opinions and reaching ideological resonance, thereby building a more stable affective disposition and recognition. These types of articles easily resonate with users, leading to a genuine sense of value and approval from their hearts, and in turn, achieves true dissemination effectiveness.

News consumption has lost its sense of ritual and mainly takes place during leisure time

This study provides ample evidence for the significant changes in news consumption in the social media age. Traditionally, news consumption had a certain sense of ceremony (Qiao and Qi, 2016). However, this study finds that the peak times for news consumption are entirely during "leisure hours", such as 20:00, 21:00, and 23:00. This finding indicates a significant difference between the reading habits of social media users and those of traditional media audiences. Therefore, WeChat Official Accounts articles published during these hours tend to achieve the best diffusion effects.

Articles read at 2 am, 3 am and 5 am tend to receive the highest number of liking, which indicates the highest level of endorsement. This may be because for night owls, 2 am and 3 am are peak times for browsing on their phones while for early birds, 5 am is a peak time for them to read news. They have ample time to read articles immersively, savor the content, and thus develop a deeper sense of agreement with the article. This immersive reading experience conducive to deep agreement can be explained from a neuroscientific perspective. Research by Briggs et al. (2013) reveals that attention optimizes the signal-to-noise ratio in neural circuits by enhancing synaptic efficacy, increasing the synchrony of independent signals, and reducing redundant noise, thereby improving perceptual ability. In the quiet, low-interference environment of the early morning, the user's brain is in this ideal "high signal-to-noise ratio" state. At this time, external interfering 'noise' is effectively filtered out by the brain's attentional mechanisms, and the inner voice is also more subdued (Kross, 2021), allowing cognitive resources to be efficiently focused on the textual content, leading to deeper processing of the information and stronger recognition.

In contrast, at other times, people are often in noisier social settings, such as family dinners, social gatherings, or working late. In these situations, the attentional system needs to process a large amount of parallel information, leading to a decreased signal-to-noise ratio in neural signals. Consequently, they quickly skim through information to catch up on the news or for entertainment, without deeply engaging with the content. These findings offer important practical guidance for news organizations and practitioners, helping them to better grasp the optimal timing for news publication based on different goals and enhance the diffusion effects of their news.

Moreover, the page position on WeChat Official Accounts significantly impacts the reading volume as well as the reading and liking volumes simultaneously. We may explain this result from two aspects. On the one hand, the page position aligns with people's habit of prioritizing content when reading on mobile screens, which means articles in the top-page position attract more user attention and thus increase the likelihood of being read and liked. On the other hand, the large images used in top-page articles also capture users' attention more effectively. The positive impact of top-page position on the reading and liking volume can be attributed not only to its advantage in attracting users' attention but also to the editorial selection of articles. Editors tend to place important or easy to spread content in prominent positions. This is a continuation of traditional news editing, which remains applicable in the era of social media.

The significant impact of emotional arousal on article reading volume and liking volume

Different from traditional communication theories, the study finds that emotional arousal plays an important role in news communication. For a long time, the theory of emotional arousal has not held an important position in communication studies, and there have been relatively few integrated research outcomes combining it with traditional news communication theories. Previous research often excluded emotions from the standards of journalistic professionalism (Sui and Li, 2012). If a reporter or editor uses emotion to write or edit news, it is considered to be the greatest harm to the objectivity of news

(Stenvall, 2008). Therefore, the expression of certain emotions in news texts is also resisted (Zhao and Liu, 2020).

This study shows that emotional arousal plays a significant role in all three models. In the process of article dissemination, emotions can resonate with readers, encouraging them to share article content proactively, thereby increasing the article's reading volume. This emotional spread not only enhances the article's visibility but also triggers broader discussions, further expanding its influence. Additionally, emotions affect the depth of readers' engagement with news content and their sense of approval. The study shows that content with high emotional arousal (such as that evoking resonance or controversy) can prompt users to express their stance through liking.

This study demonstrates that emotional arousal is a driving force in WeChat Official Accounts article dissemination. Moreover, the study shows that considering emotional arousal alongside news value elements can enhance the dissemination effect of articles. This finding provides important insights for journalists and news practitioners on how to balance emotional arousal with informational value in content production.

The dissemination effect of news texts can be quantified and predicted

This study demonstrates that the three models for predicting high reading volume, high liking volume, and the reading and liking volume on WeChat Official Accounts article dissemination, have high accuracy rates. These models can provide a theoretical basis for developing software that may predict the diffusion effects of WeChat Official Accounts articles. They can achieve predictions on whether WeChat Official Accounts articles will achieve high reading volume, high liking volume, and the reading and liking volume. It holds significant importance, especially in the AI era.

Firstly, news texts can be generated automatically by AI. This study provides a theoretical basis for developing algorithms that produce news texts with better diffusion effects. It also offers valuable insights for news producers to improve their content. By integrating factors such as emotional arousal, news value, and page position, the study demonstrates how to enhance the dissemination of articles. The high reading volume model identifies key factors like emotional arousal and specific publishing times, which can be directly embedded into the editorial decision. This enables AI to predict whether news articles will achieve high reading volumes.

Secondly, the value of the high liking volume model lies in its in-depth analysis of content quality and users' value approval. By identifying text features that align with widely recognized values through text analysis models, AI can automatically screen such content and recommend it to editors for enhancement. Additionally, based on this study's findings on publishing time, AI may publish during the peak hours. During leisure hours, a mechanism prioritizing content suitable for quick reading can be applied. In contrast, during peak hours of liking, a strengthening exposure strategy of in-depth content can be used to increase user engagement and content approval.

Finally, the unique advantage of the high reading and liking volume model lies in its integration of dual dissemination goals. In the evaluation phase, AI can monitor the ratio between reading volume and liking volume in real-time. If an imbalance occurs—such as high reading but low liking volumes—it can automatically trace the cause and trigger

strategy adjustments. For instance, it can replace articles lacking sufficient emotional or news value and re-schedule their release times. This not only enhances the breadth and precision of content dissemination but also enables news organizations to scale the production of content that aligns with public values, thereby strengthening their social impact.

Limitations and future research

This study has certain limitations. Firstly, this study excluded posts primarily featuring images or videos. This study explicitly focuses on text-based articles on the WeChat platform, excluding posts that are primarily images or videos. The widespread dissemination of such content may be driven by characteristics different from those of text. Future research may explore specifically on images or videos to expand the scope.

Secondly, the models proposed in this study can be further refined. The findings of this study are only based on the WeChat public platform, and the generalizability of the conclusions needs to be further verified on other platforms with different content formats and recommendation mechanisms, such as Weibo and TikTok. Future research could attempt to validate these findings across multiple countries and different social media platforms.

Furthermore, the models proposed in this study still have room for optimization. On one hand, this study primarily examined emotional arousal as a unidimensional construct, failing to distinguish between positive and negative valence or to deeply explore the heterogeneous effects of discrete emotions such as anger, awe, and sadness on communication outcomes. Future research could adopt a discrete emotion analysis framework to improve the predictive accuracy of the models. On the other hand, this study did not include article and topic types (e.g., news, opinion, product endorsements) as predictor variables in the logistic regression model, which somewhat limited the model's discriminative power for content of different natures. As previous research has shown, the influence of positive and negative emotions on reading and sharing can vary across different topic domains (Kim, 2015). Future research could introduce article type and topic type as key predictors or control variables to reveal the dissemination mechanisms more finely.

In addition to the limitations mentioned, this study lays the theoretical foundation for future development of software that may automatically detect the diffusion effects of WeChat Official Accounts articles. Future research can build on the models proposed here, especially the high-performing reading and liking volume model, to further advance machine learning research and practice in sentiment annotation and news value judgment. By continuously optimizing the models and improving prediction accuracy, valuable software can be developed to automatically predict the diffusion effects of WeChat Official Accounts articles.

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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