

Language Ecology in New Media: An Analysis of CCTV.com on Douyin

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Abstract

The purpose of this paper is to find the correlation between linguistic features and social engagement so that we can employ proper language to solve the ecological problem in the new media context. It collected all 2647 video messages of CCTV.com (account name, not website), the official media, on Douyin (China's domestic version of Tik Tok) from January 1, 2020, to December 28, 2020, which were analyzed and studied by SPSS 22.0 and Corpus Online. It is found that public concern for a topic was significantly influenced by public opinion ($r=0.483$, $p=0.000$) and public dissemination ($r=0.590$, $p=0.000$). Declarative ($n=1858$, $f=0.57$) and Exclamative ($n=1132$, $f=0.35$) were used most frequently by CCTV.com, while the former one ($p=0.02$) was the key point to influence public opinion, while the latter one ($p=0.001$) had a significant bearing on public concern through regression analysis. On the contrary, Imperative ($n=0$) is not favored. Interrogative ($p>0.05$), Punctuation ($p>0.05$) and Emoji ($p>0.05$) had no effect on social engagement. The results of this paper indicated that language could significantly guide users' ecological behavior and value orientation across space-time in the new media context.

Keywords: language ecology, social engagement, mood, Douyin, new media context, CCTV.com

1. Introduction

China Internet Network Information Center (CNNIC) released the 46th Statistical Report on the development of China's Internet in Beijing, on September 29, 2020. China's internet penetration rate has reached 67 percent in June 2020, and the internet population has reached 940 million, equivalent to one-fifth of the world's Internet users. The internet has become a new front for people to interact with each other. Among the various forms of internet communication, Short Video has become prominent on the internet with its concise content, large flow capacity, multi-modal and multi-symbol forms as well as intuitive and vivid interpretation perspectives. According to the 2019 Douyin (China's domestic version of Tik Tok) data report, Douyin's daily livability has already exceeded 400 million until January 5, 2020 (Ren & Xiao, 2020). The Douyin infrastructure process is reflected not only in the transition from an entertainment community to an integrated platform but also in the growing strength of society (Zhang, 2020). In the light of Douyin User Report 2020, among the top 10 mobile videos in China, Douyin leads Kuaishou, Iqiyi, Tencent Video, Youku Video, Douyin Volcano, Mango TV, Bilibili together with Wechat Video, ranked first.

Short Video, although numerous with uneven content quality, is becoming a hybrid form of digital society. Network information was mixed with the astronomical increase in the use of Short Video platforms, and how to construct an ecological new media environment has become an urgent problem to be solved. Although the new media infrastructure does not include language, the flow of information in the virtual world depends on language, which is language-based (Koch et al., 2005). This paper mainly explores the influence of language use on the communication effect, and the aim is to explore whether language features can guide and affect public engagement, including public attention, public opinion, and public dissemination. Here taking the account of CCTV.com (account name, not website) on Douyin as materials, there are four reasons for choosing CCTV.com. One is that it is the official news media in China, which represents the orientation of public values. Moreover, all the data from the users' participation is objective with a reference value, because the account is not for commercial, so what it said is convincing. Secondly, CCTV.com is famous for its wide information coverage,

reliable brand, and great influence. Thirdly, the video files are updated daily with a large number of statistics. Lastly, the textual content used to describe the video is constituted by one or two sentences which is suitable for linguistic analysis. This paper took linguistic features and linguistic skills of CCTV.com on Douyin (e.g. mood, topics, punctuation, emoji) and user engagement (e.g. public concern, public opinion, public dissemination) as data. It is hypothesized that:

H1: There was a correlation between linguistic features and public engagement.

H2: There was a correlation between linguistic skills and public engagement.

2. New Media Context

Context, the linguistic environment, refers to the conditions of language use. Huang (2002) holds that context can be divided into cultural context, situational context as well as co-text. Xiao (2009, 2015) holds that context can be categorized into illocutionary context (culture, society, geography, etc.), locutionary context (phonology, vocabulary, grammar, etc.), and cognitive context (mental representations of the interaction of linguistic and non-linguistic contextual variables in one's brain, such as schema structure, including formal schema and cultural content schema), the tripartite variables of which take effect through interaction. According to Standard Chinese, context is the environment in which language units appear, which is generally classified into co-text and situational context (Huang & Liao, 2002, p. 302). Context can be interpreted from many aspects, including symbolic ecology, natural ecology, socio-cultural ecology, and cognitive ecology (Steffensen & Fill, 2014; Zhang & Huang, 2019)

This paper takes the ecological environment of language as the context in a broad sense, including the natural, socio-cultural, symbolic, and cognitive-psychological multi-dimensions (Xiao, 2021): (1) the natural environment refers to the ecosystem of all the living or non-living things in the universe; (2) the socio-cultural environment refers to all the social environments related to human beings that arise from the human activity; (3) the cognitive environment exists in the human mind, which is the necessary channel to link language with external meaning. The relationship between the three is not independent but interactive. The natural environment is the broadest, which means the natural environment is aligned with the socio-cultural environment, and the social and cultural environment is distributed by the cognitive environment. The symbolic environment is the one that forms when symbols (including media, non-verbal language) interact with and mediate the others.

The rise of new media provides a distinctive environment for language (spoken or written), which indirectly presents a fresh platform for the interaction between man and nature, man and society, man and man. According to 360 encyclopaediae, new media is a kind of media form that emerged under the new technology supporting system, such as digital magazines, digital newspapers, digital radio, SMS, mobile TV, Internet, desktop windows, digital TV, digital movies, touch media, etc. Tan and Liu (2018, pp. 11–12) divide new media into three categories: online media, mobile media, and digital media. The new media context is a reflection of the sociocultural context, which provides greater possibilities for cultural exchanges between different countries and nations. The new media environment is the interaction of language in time and space. That is, the publication of Network Works and the reception of users have temporal-spatial heterogeneity. Bayer et al. (2020) believe that defining social media must have two essential elements: first, it must be internet-based, namely, supporting asynchronous or non-live social interaction; and second, social media should be interactive, or perceived as social, and user-generated, which is the core value of social media.

Research on media (social media) is principally based on the internet circumstance, such as media effects (Valkenburg et al., 2016), legal studies (Citron, 2009), the psychology of online ecology (Gosling & Mason, 2015; Bayer et al., 2016; Betts, 2017), medical studies (Maritz & Maritz, 2020), science studies (Toivonen et al., 2019; Pesendorfer et al., 2018), studies on the transmission path of language (Wandabwa, 2021; Au et al., 2021; Sinnenberg et al., 2018; Bryden et al., 2018) and users' preferences for different websites (Gambo & Ozad, 2021). There were also researches on certain social media platforms, such as Facebook, Twitter (Burke & Kraut, 2016; Touni et al., 2020; Chiu, 2021; Xu et al., 2020; Rains & Brunner, 2015; Stoycheff et al., 2017; Stern, 2017) and blogs, for example, Fløttum et al. (2014) study the "future" description in the climate change blog to explore people's attitudes toward the future of a sustainable society: pessimistic or optimistic.

Short Video is the product of the rapid development of new media in recent years, with novel and unique forms and wide users. Taking short videos on Douyin as an example, each of these messages contains details such as video content, comments, likes, shares, published time, scripts, and account logo (see Figure 1). The reason why Short Video is chosen for this study is the accompanied content description applies to linguistic analysis. Some people (Zhao, 2019) call it a title, but this paper believes that it should be called a script. The so-called script refers to the discourse description, which is a guide to the video content. Due to the different personal intentions

of the video publishers, especially when the video only contains images and music without subtitle interpretation, users would not know what the author is trying to convey. At this time the script will guide a theme or a tone for a video. Because of the platform’s word limit (within 55 words), the content of every description must be short and precise, and language use requires great skill to capture the attention of users quickly.



Figure 1. An instance of a short video from CCTV.com on Douyin

3. Data and Method

This paper assumes that language can guide users’ ecological behavior and their value orientation across time and space in the new media environment. To test this hypothesis, this paper employs CCTV.com, the official media, whose language (topics, mood, punctuation, Emoji) on Douyin to test whether the language has an impact on user’s engagement (public concern, public opinion, public dissemination). This study was conducted in three phases: data collection, data preprocessing and data analysis (see Figure 2).

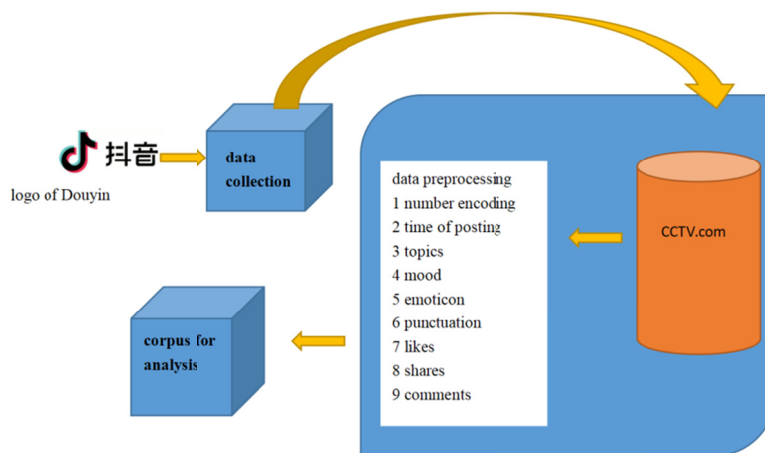


Figure 2. The architecture of building a corpus based on CCTV.com

3.1 Data Collection

Until January 5, 2020 (the date of drafting this paper), the details of this account are as follows:

Table 1. Details of CCTV.com on Douyin

Account name	Register time	Total works	Followers (million)	Total Likes (million)
CCTV.com	2019.11.9	3016	23.428	699

The data collection started in early December 2020, and the foremost way to collect the data is the Xindou network (xd.newrank.cn, a big data platform of Douyin) and the Douyin app. This paper collected all 2,647 video script messages posted by CCTV.com from 14:50 on January 1, 2020, to 17:21 on December 28, 2020 (the deadline for data collection). As the information of the video website is updated in real-time, all data in this article are subject to the deadline for data collection, including basic information such as description content, likes, shares, and comments, as well as the most popular top 100 followers' comments.

3.2 Data Preprocessing

It takes half a month to preprocess the collected information one by one, including comparing and supplementing the missing data, manually encoding the script according to the time of publication as well as dividing the variable dimensions (Table 2).

Table 2. Classification of data variables

variables	Independents				Dependents		
dimension	linguistic features				social engagement		
	topics	mood	Emoji	punctuation	public concern	public dissemination	public opinion
content	Nation; Society; Ecology; Technology; Culture; Leisure; International news;	Declarative Imperative Interrogative Exclamative	numbers of emoji	amount of punctuation marks	likes	shares	comments

This paper divided the topics into seven types: *Society* (including people's livelihood, economy, law, vocation and holidays, and other categories related to people's lives), *Nation* (including all the information related to the soldiers, the motherland, national affairs, and patriotism), *Ecology* (including the epidemic situation and other public health information, as well as floods, landslides, earthquakes, forest fires, environmental pollution, wildlife, and other ecological information), *Technology*, *Culture* (including education, literature, and literacy), *Leisure* (sports, music, film, entertainment) and *International News* (news abroad, news of China in the world and foreigners in China). Since the division of social areas is rather complex, this article does not pursue the utmost accuracy.

The criteria for determining the independent clause in each script are full stop, question mark, exclamation mark, and ellipsis dots. Because of more than one clause in each script, there may be two or even three kinds of mood in one script. The amount of punctuation is determined not only by obvious symbols such as “,”, “。”, “?” but “%”, “-” “.”, etc. Judge the mood type is always a hard nut, and different scholars have different views on it. Halliday (1994, 2000, p. 69) divides the mood into a statement (offer/give information), question (ask for information), offer (offer/give goods & service), and command (ask for goods & service). There is no exclamative mood in Systemic Functional Linguistics (SFL). From the perspective of Standard Chinese (Huang & Liao, 2002), it is generally believed that the mood of a clause should be divided into the following four categories: declarative, interrogative, imperative, and exclamative, whether from the classification standard in textbooks in the 1970s or 1980s (Wu, 2016) or the standards according to function or purpose (Huang, 1987, pp. 1–4). In this paper, the criteria for mood categories can be seen in Table 3. Some of the scripts in this paper use multiple question marks. From the semantic point of view, such clauses do not have the question meaning but deepen the meaning of the exclamation. For example, “专治各种火力不足恐惧症#厉害了我的国????” (zhuān zhì gèzhǒng huǒlì bùzú kǒngjùzhèng # lihai le wǒ de guó) at 18:28 on January 2, 2020, here it is not a question to ask whether the country is strong or not, but a great sense of pride of national strength. Therefore, the four types of mood in this paper should be labeled according to the comprehensive analysis of the definition as well as the context.

Table 3. Criteria for judging the four types of Mood

clause	definition	reference
Declarative	a declarative clause is one with a flat and slightly lowered intonation	Huang (1987, p. 5)
Interrogative	an interrogative clause is the one with question intonation	Huang (1987, p. 5)
	It refers to the yes-no question, what question, and alternative question	Zhu (1982, p. 202)
Imperative	The command, request, forbid and dissuade mood	Huang (1987, p. 35)
	The predicate of an imperative clause can only be a verb or a verbal structure with the subject "you"	Zhu (1982, p. 205)
Exclamative	in a voice with strong emotion	Huang (1987, p. 42)

3.3 Methods

The methodology used in this study was based on traditional statistical analysis by IBM SPSS Statistics 23.0. Kendall's Tau-b correlation analysis was performed to test the relationship between the two variables, with statistical significance set at $p < 0.05$.

4. Results

Data mining is classified into the statistical method, machine learning method, neural network method, and database method, among which the statistical method is the most classical including regression analysis, discriminant analysis, cluster analysis, and exploratory analysis (Hu, 2016, p. 57). The methods used in this paper are self-built corpus and statistical method (regression analysis and exploratory analysis) by using SPSS22.0, Excel as well as Corpus online.

4.1 Descriptive Analysis

The script message with the most likes and shares is about public health (*China started coronavirus vaccine research*) in Ecology topic, which appeared in January, and the mood type is exclamative. The one with the most comments is also about public health in exclamative mood (*A doctor who died of the coronavirus*). The topics vary from month to month with the first four months focusing on ecological topics in addition to March. Users' concerns changed to social culture, people's livelihood, sports, leisure, etc. from May to October and back to Ecology topics in the last two months.

The total seven topics, of which international news took the largest proportion ($n=701$, $f=0.265$), and then ecology ($n=587$, $f=0.222$), nation ($n=485$, $f=0.183$), culture ($n=141$, $f=0.053$), leisure ($n=127$, $f=0.048$), technology ($n=80$, $f=0.03$). Declarative is used most frequently ($n=1858$, $f=0.57$), followed by exclamative ($n=1132$, $f=0.35$), interrogative ($n=271$, $f=8\%$), while imperative ($n=0$) as well as emojis ($n=66$, $f=0.025$) is not favored by the news media. The average number of 3 punctuations was used by this official account.

The correlation between the three types of mood and the topics shows that the use of the declarative mood is not significant in each topic ($p>0.05$). Exclamative mood is significantly different in four subjects: Ecology ($p=0.000$), Nation ($p=0.001$), Technology ($p=0.000$), and Leisure ($p=0.049$), while interrogative mood is significant in Culture topic ($p=0.014$). In other words, CCTV.com is fond of exclamative mood when talking about the ecological environment, state affairs, army, patriotism, science, and technology. See examples (1), (2), and (3) below:

(1) “出征!军队支援湖北医疗队队员:祖国哪里有困难,作为人民子弟兵,我们就要出现在哪里!” (chūzhēng! jūnduì zhīyuán húběi yīliáoduì duìyuán: zǔguó nǎli yǒu kùnnan, zuòwéi rénmínzǐdìbīng, wǒmen jiùyào chūxiàn zài nǎli!)

March! Military Supporting Hubei Medical Team members: Where there are difficulties in the motherland, there is the People's Army!

(2) 祝贺~2020年5月5日18时00分,长征五号B运载火箭首次飞行任务取得圆满成功!

(zhùhè ~ 2020 nián 5yuè 5 rì 18 shí 00 fēn, chángzhēng wǔ hào B yùnzàihuǒjiàn shǒuci fēixíng rènwu qǔdé yuánmǎn chénggōng!)

Congratulations on the success of the first flight of the Long March-5B carrier rocket, May 5,2020,6:00 p.m!

(3) 为啥在冬天的东北,会有人提醒你千万不要去舔铁杆子? 让记者用小实验告诉你。(wèishá zài dōngtiān de dōngběi, huì yǒurén tíxǐng nǐ qiānwàn bù yào qù tiǎn tiě gānzi? ràng jìzhě yòng xiǎo shíyàn gàosu nǐ.)

Why are you reminded not to lick iron in the northeast in winter? Let me tell you through a little experiment.

4.2 Correlation Analysis

First, we verify whether Independents (posting time, topic, mood, Emojis, the amount of punctuation) can be the main variables that affect social engagement (total comments, total likes, total shares). Through the regression analysis, the model fitting degree of total likes (public concern) changed from $R^2=0.634$ to $R^2=0.636$ after adding the 7 topic contents, the total shares (public dissemination) from $R^2=0.527$ to $R^2=0.528$, total comments (public opinion) from $R^2=0.319$ to $R^2=0.320$. In a sense, the fitting degree of the three models has no significant change, showing that the topic does not contribute to the model ($R^2 > 30\%$ for all three types of social engagement indicates that regression analysis can be used in the following parts), and thus the topic dimension in the following analysis will be ignored.

The three dependent variables ($p < 0.05$) do not follow the normal distribution by the K-S test, so the next correlation analysis uses Kendall's Tau-b test, and the results are shown in Table 4. Employing the entire sample of public engagement and linguistic features, it was found that, as far as posting time, the correlation is negative and reaches significance with the number of likes ($r = -0.098^{**}$, $p = 0.000$) and the number of shares ($r = -0.190^{**}$, $p = 0.000$), but positive and significant with the number of comments ($r = 0.113^{**}$, $p = 0.000$). For declarative mood, it has a significant negative correlation with likes ($r = -0.044^{**}$, $p = 0.005$) and comments ($r = -0.090^{**}$, $p = 0.000$), but the correlation coefficient is weak. Exclamative mood is positive and significant with social engagement ($r = 0.105^{**}$, $p = 0.000$; $r = 0.033^*$, $p = 0.038$; $r = 0.238^*$, $p = 0.000$). For the number of punctuation, it is negative and significant with shares ($r = -0.034^*$, $p = 0.015$) and positive with comments ($r = 0.060^{**}$, $p = 0.000$). Interrogative mood and Emoji do not correlate with social engagement at all. Although the correlation degree of the above-mentioned sample is not great, the correlation is significant because of the large sample scale. It's interesting to find that the variables of social engagement intercorrelated significantly ($r = 0.590^{**}$, $p = 0.000$; $r = 0.483^{**}$, $p = 0.000$; $r = 0.373^{**}$, $p = 0.000$) (see Table 4).

Table 4. Intercorrelations between social engagement and linguistic features

	1	2	3	4	5	6	7	8	9
1 Likes	-	.590**	.483**	-.098**	-.044**	.105**	-.007	.031	-.018
2 Shares			.373**	-.190**	-.025	.033*	.017	.011	-.034*
3 Comments				.113**	-.090**	.238**	.013	.021	.060**
4 Month					.054**	.029	-.011	-.138**	-.035*
5 Declarative						-.580**	-.216**	-.072**	-.202**
6 Exclamative							-.113**	.096**	.192**
7 Interrogative								-.031	.107**
8 Emoji									.035*
9 Punctuation									-

Although the correlation between linguistic features and social engagement is revealed, it is impossible to prove which factors in language are significant to the result. Through the regression analysis, it was found that exclamative mood ($p = 0.001$) is one of the linguistic factors that influence the number of likes, while the declarative mood ($p = 0.02$) is significant in affecting the number of comments, and thus H1 was supported. Linguistic skills (topics, punctuation, and Emoji) did not affect user engagement in the three dimensions ($p > 0.05$). Hence, H2 was not supported. The collinearity test ($VIF < 3$) indicates that there is no multicollinearity between the independent variables (see Table 5).

Table 5. Regression analysis and collinearity diagnostic among linguistic features and social engagement

Model		Sig.	VIF	Model	Sig.	VIF	Model	Sig.	VIF
1	(constant)	.000		2	.484		3	.000	
likes	Month	.000	1.052	shares	.213	1.053	comments	.137	1.058
	Declarative	.463	1.751		.168	2.105		.02	1.748
	Exclamative	.001	1.725		.088	2.025		.232	1.731
	Interrogative	.085	1.17		.489	1.177		.569	1.171
	Emoji	.366	1.035		.505	1.034		.177	1.034
	Punctuation	.99	1.094		.355	1.122		.742	1.094

5. Discussion

From the data we collect, it was found that the most popular topic is Ecology from January to April, indicating that Chinese people are concerned about the ecological environment and public health (epidemic with 12.65 million likes) most in 2020, which is also a global topic. Of course, Chinese netizens are also responsible for paying attention to international information. The focus of netizens has shifted to domestic people's livelihood and entertainment, such as clothing, food, shelter, transportation, and spiritual relaxation since May, which means the Chinese government's fighting against the epidemic has achieved a stage of victory, and the Chinese people lived in peace and prosperity at this time. The attention of the netizens has been returned to the topic of the epidemic and ecological environment since November as sporadic confirmed cases have been diagnosed in China.

In the application of language, the news media are used to declarative mood (n=1858), despite not significantly different in each topic. The exclamative mood (n=1132), is mainly used on topics such as Ecology, Nation, Technology, and Leisure. When talking about public health such as COVID-19 and ecological problems such as natural disasters, environmental protection, and wildlife protection, the use of exclamative mood is to arouse the users' attention and vigilance. The exclamative mood is also used to express strong emotion and arouse the user's strong sense of pride and empathy in the topic of soldiers, patriotism, motherland, and the progress of national science & technology. Interrogative mood (n=271) is mainly used in Culture, such as education, literature, literacy, etc. to cause the interest and curiosity of users. The imperative mood is not favored by the news media because the discourse of the official media is characterized by reporting facts rather than subjectively ordering, requesting, or dissuading.

Although the exclamative mood is significantly related to the number of likes, comments, and shares, it is the main factor of linguistic features affecting the number of likes ($p=0.02$) through regression analysis. That is to say, it is effective to use exclamative mood in influencing public concern. The regression analysis proves that the declarative mood ($p=0.001$) is the main factor that influences the number of comments but is significantly negative according to correlation analysis. Namely, in influencing public opinion, it would have worked better if the declarative mood was not considered. However, this paper found that the correlation coefficients between linguistic features and social engagement are very weak, but because of the large sample scale (n=2647), the weak relationship appears significantly. It was found that the topic with high public concern will get more public opinion ($r=0.483^{**}$, $p=0.000$) and public dissemination ($r=0.590^{**}$, $p=0.000$) correspondently.

To validate the study, we conducted a comparative analysis. We input our data (2647 scripts, a total of 95,931 words) into Corpus Online and found that the top three words were 中国 (zhongguó) China, 疫情 (yìqíng) Epidemic, and 肺炎 (fèiyán) Pneumonia. The top three words of users' comments were 祖国 (zǔguó) motherland, 中国人 (zhōngguó rén) Chinese, and 医生 (yīshēng) doctor. Although the words do not coincide completely, they are all about China, the epidemic situation (Table 6).

Table 6. Top three keywords and frequency of occurrence in CCTV.com and those of users' comments

Model	keywords	Frequency	%	keyword	Frequency	%
CCTV.com	中国 zhōngguó China	349	0.802	Users' Comment	祖国 zǔguó motherland	6 0.5333
	疫情 yìqíng Epidemic	268	0.6161		中国人 zhōngguó rén Chinese	5 0.4444
	肺炎 fèiyán Pneumonia	211	0.4851		医生 yīshēng doctor	3 0.2667

Our research indicated that social engagement was dominated by news media, though there were individual differences in users' views of online social interaction (Clark & Green 2018). New media context, as a representative of social-ecological context, was not isolated, but connected with users' psychological cognitive context and broader social and cultural context (Xiao, 2021). According to Bayer et al. (2020), cyberspace contributed to a set of expectations, patterns, and scripts that individuals could draw upon when understanding social media. At the same time, due to the virtual nature of the internet and the different ideologies of individuals towards social media (Haimson et al., 2018), individuals could show their true selves on social media, which

demonstrated the credibility of our results. According to the theory of social comparative psychology (Festinger, 1954, p. 118), people evaluated their views and abilities by comparing them with others' thoughts and abilities respectively (Bayer et al., 2020). Therefore, when social media account posted resonant topics, especially with linguistics skills, public concern was significantly influenced by public opinion and public dissemination, as our results show.

6. Conclusion

Based on the above research, it can be concluded that the influential news media will have a significant impact on the users in the selection of moods. The linguistic features, mainly referring to the declarative mood and exclamative mood, correlated to public opinion and public concern respectively, and the two, in turn, lead to a high degree of public dissemination (see Figure 3).

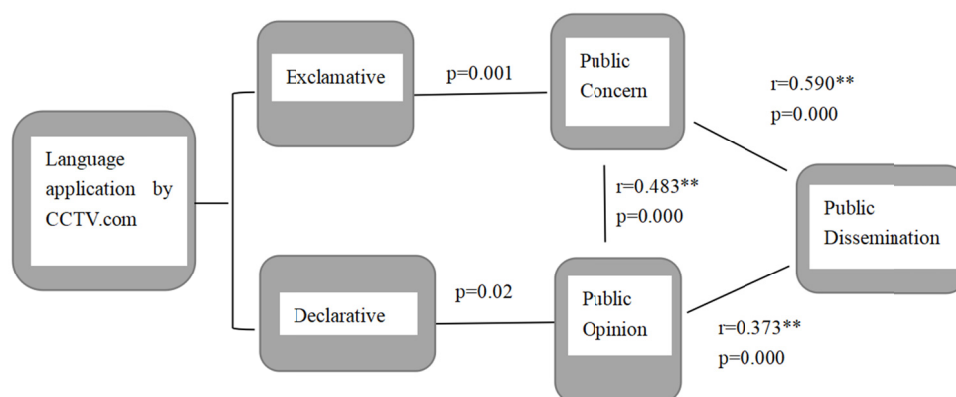


Figure 3. The relationship between linguistic features and public engagement

This paper demonstrates that the use of language can indeed affect social participation, in addition to video resources, video quality, platform rules, the time in which the video is posted, etc. It is necessary to construct a healthy ecological environment on the Internet through discourse for public opinion, users' public language behavior, and public value orientation in the future. The existence and development of language not only have ecological but social attributes. The new media environment provides a distinctive social context for language evolution. We need the government, the market supervision department, the whole society, and the Science & Technology Company to construct a good environment for the new media to establish a language niche and coordinate the language and the new media environment, and realize a harmonious development.

This study, of course, has the following limitations: (1) Although all videos have background music (BGM), the analysis did not exclude the influence of BGM and visual effects, because the selected music is not the same. It cannot be ruled out that some users pay attention to the video because of BGM. (2) This article selected only one media that cannot represent all mainstream media. Future research should include all mainstream media under CCTV in analysis to improve the reliability of the results. (3) The maximum fitting $R^2=0.634$, despite being higher than 30%, suggests that other factors would affect the user's social engagement, possibly other linguistic factors (vocabulary, lexical-grammar, semantics, etc.), the user's emotion at that time, or the user's preference, etc.

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