| RESEARCH ARTICLE

Discourse Analysis of "Fukushima Nuclear-contaminated Water" News Reports from the Perspective of Attitude in Appraisal Theory

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| **ABSTRACT**

The Japanese government's plan to discharge contaminated radioactive wastewater from Fukushima Daiichi Nuclear Power Plant into the sea has sparked widespread concerns both domestically and internationally. Taking the attitude system of Martin's Appraisal Theory as the theoretical framework, this study collects news reports on the Fukushima nuclear-contaminated water discharge plan from China Daily as the corpus. Through qualitative and quantitative analysis of the corpus, this study explores the distribution pattern and realization of attitudinal resources in these news reports, aiming to reveal the attitude and stance of China Daily towards the Japan's plan. The study shows that appreciation resources rank top, accounting for more than half of the attitudinal resources, followed by affect resources and judgement resources, and among them, negative resources overweigh positive resources. Besides, through the use of attitudinal resources, China Daily tends to adopt a negative and concerned attitude towards Fukushima nuclear wastewater discharge plan. This study helps to effectively understand and express attitudes and stances in discourses.

| **KEYWORDS**

Appraisal Theory; attitude system; news reports; stance

1. Introduction

On March 11, 2011, an earthquake-triggered tsunami caused reactor meltdowns in the Fukushima Daiichi nuclear power plant. Since then, radioactive substances from the plant have contaminated a massive amount of water. In April 2021, Japan announced plans to dump nuclear wastewater from its wrecked Fukushima nuclear plant into the ocean in the spring of 2023. As the date approaches, this plan triggers stronger opposition and criticism both domestically and internationally. The relevant literature review found that although researches on news discourse involve various topics, there are only a few on the Fukushima wastewater.

Appraisal Theory (AT for short) deals with the negotiation and exchange of various attitudes in the discourse. As the core of Appraisal Theory, the attitude system is a useful linguistic tool to investigate attitudes behind news discourse. (Zhang, 2022). In view of the above, this study adopts the attitude system of Appraisal Theory as the theoretical framework and collects news reports on the Fukushima nuclear-contaminated water discharge plan from China Daily as the corpus to conduct discourse analysis, with the aim of exploring how attitudinal resources are distributed and realized, as well as what kinds of attitude and stance of China Daily are reflected in these news reports. In line with the aims, this study seeks to answer the following questions: （1）What is the distribution of attitudinal resources in these news reports? （2）What is the realization of attitudinal resources in these news reports? （3）What kind of attitude and stance of China Daily are reflected by attitudinal resources? Qualitative and quantitative methods are employed to answer these questions in this study.

2. Literature Review

James R. Martin (2000) systematically explained English Appraisal System in his thesis Beyond Exchange: Appraisal System in English Text. Martin and White (2005) explicated the framework of Appraisal Theory (AT) in Evaluation in the English Language: Appraisal System, which represents the official establishment of AT.

Since the proposal of AT, it has been applied as a useful tool to carry out linguistic studies. The application of this theory was reviewed from the aspect of foreign language teaching, translation and discourse analysis. Ruth and Valladares (2015) applied AT to investigate how teachers responded to the national English program so as to modify the present educational reform. McKinley (2018) adopted the integration of the appraisal framework with Clark and Ivanic's framework to find out the writing strategy for constructing the writer's identity in Japanese University English writing. Si and Pang (2018) found that AT was of great significance to both translation theory and practices as AT is a tool to contrast the appraisal meaning in the source text with that in the target text.

There were comparatively abundant studies that applied AT to conduct the discourse analysis. The empirical studies could be categorized as media news discourse, academic writing, advertisements, law texts, political speeches and historical textbooks. As for news discourses, there are many studies exploring the authorial stance or national image in the news reports. Wang (2004) conducted a comparative study between the Chinese and Australian press's attitudes to China's earthquake. Liu and Sun (2008) analyzed China's image construction under the influence of the editorial note in China Daily.

Through the literature review, it is found that although researches on news discourse involve multiple topics, there are only a few on the Fukushima wastewater, which is all ecological discourse analysis from the perspective of transitivity. In view of this, this study adopts the attitude system of Appraisal Theory as the theoretical framework and collects news reports on the Fukushima nuclear-contaminated water discharge plan from China Daily as the corpus to conduct discourse analysis, with the aim of exploring how attitudinal resources are distributed and realized, as well as what kinds of attitude and stance of China Daily are reflected in these news reports.
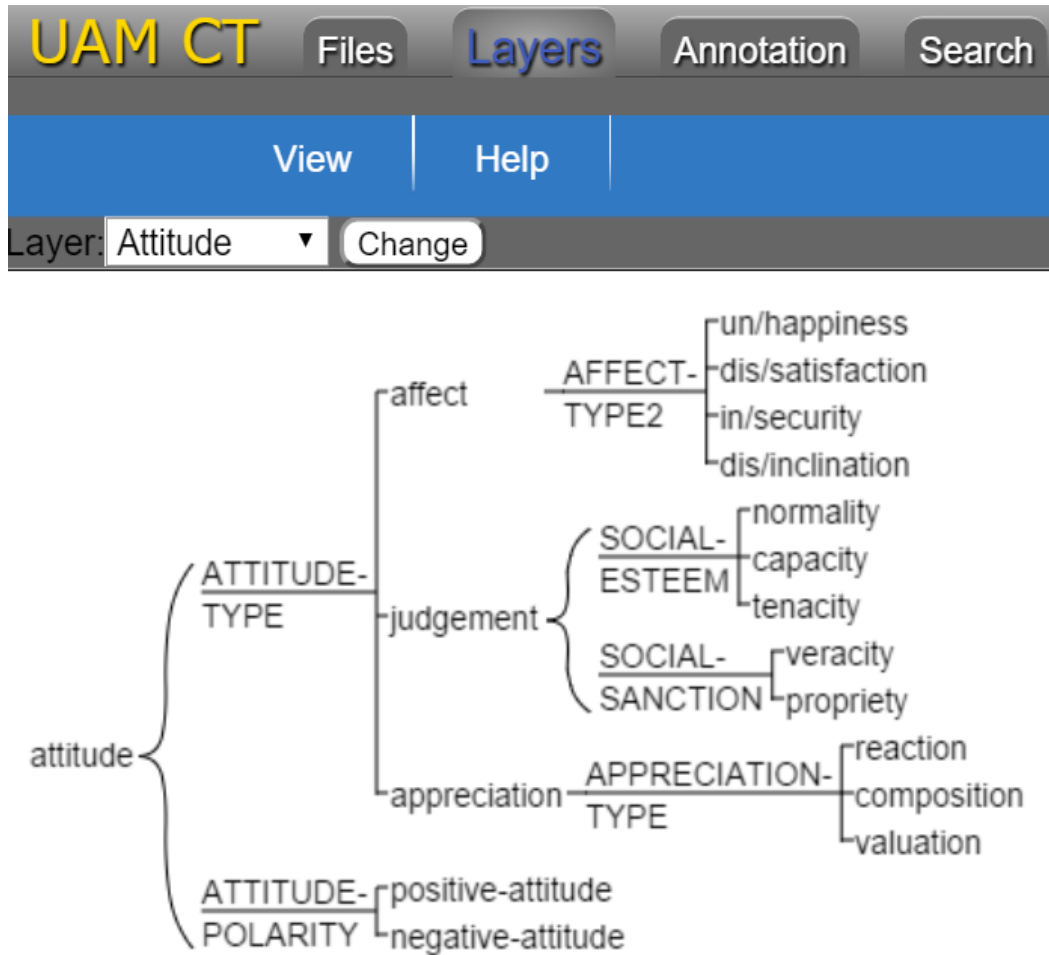
3. Theoretical Framework

3.1 Appraisal Theory

Appraisal Theory (AT) is supplementary to the interpersonal function of Halliday's SFG. AT extends the interpersonal meaning at the lexicon-grammar level with a complete evaluative framework. AT aims to analyze the author's attitude, viewpoint, stance and strategy to keep an aligned readership between the author and the reader. Martin and Rose (2003) state that "Appraisal is concerned with evaluation—the kinds of attitudes that are negotiated in a text, the strength of the feelings involved and the ways in which values are sourced and readers aligned". As an extension of SFG, AT deals with how the author applies appraisal resources to negotiate with the readers to realize the interpersonal function. AT is also categorized into three sub-systems, including Attitude, Engagement and Graduation. Among the three sub-systems, the attitude system is the core. Attitude means the values that are used as a standard to carry out the assessment of participants and processes by reference either to the speakers' emotional responses or to their shared values (White, 2003). Engagement concerns the source of different voices in respect of who is responsible for the value positions or stances. As for Graduation, it concerns the strength of one's feelings or views, thereby scaling the degree of the appraising volume. In a word, Appraisal Theory provides researchers with a reliable framework to do discourse analysis.

3.2 Attitude System

The attitude system is the core of Appraisal Theory. Crystal (1990) shows Language as a human activity that stands for the attitude of its user. Attitude is a system that consists of three semantic regions: emotion, ethics and aesthetics. It maps the appraiser's feelings construed in the text. Attitude has to do with evaluating things, people, character and the way of their feelings (Martin and Rose, 2003). These evaluations can be made implicitly/explicitly through lexical strategies or other language tactics, such as pragmatic strategy, syntactical strategy and cognitive strategy. As is indicated, Martin and White hold that Attitude can be used to describe the feelings from its subsystems, namely, affect, judgement and appreciation. The main subcategory is affect. However, the attitudinal resources can show unique features in the corpus. Generally speaking, attitudinal resources usually involve three main characters: implicitness/explicitness, polarity, and gradation. Based on Martin's Appraisal Theory (Martin and White, 2005), the theoretical framework of this study is shown in Figure 3.1.

Figure 3.1 The theoretical framework

4. Methodology
In this chapter, research questions, research corpus and research procedures are manifested in detail.

4.1 Research Questions
Taking the attitude system of Martin's Appraisal Theory as the theoretical framework, this study focuses on attitudinal resources in news discourses reporting the Fukushima nuclear-contaminated water discharge plan from China Daily, with the aim of exploring how attitudinal resources are applied and what kinds of attitudes and stance of China Daily are reflected in these news reports. In line with the aims, this study seeks to answer the following questions:

（1） What is the distribution of attitudinal resources in these news reports?
（2） What is the realization of attitudinal resources in these news reports?
（3） What kind of attitude and stance of China Daily are reflected by attitudinal resources?

4.2 Research Corpus
The corpus for this study is sourced from the official website of China Daily (www.chinadaily.com.cn), which is the national English-language daily newspaper of China established in 1981. It is the preferred English media for high-end individuals both domestically and internationally and is the only Chinese newspaper that effectively enters mainstream Western society with the highest rate of foreign media republishing. It is globally acclaimed as the most authoritative and credible English media outlet from China. Therefore, the news reports published by China Daily possess stronger credibility and dissemination power. Moreover, China Daily targets a global readership, making the corpus easily accessible and suitable as the source for this study. The researcher inputted the keywords "Fukushima nuclear-contaminated water" and retrieved 20 typical news reports published between January 1, 2023, and June 1, 2023, as the corpus for this study. The corpus is 9532 words in total.

4.3 Research Procedures

Qualitative and quantitative methods are employed in this study to explore the attitude and stance behind the attitudinal resources deployed by China Daily. Firstly, with the assistance of UAM Corpus Tool, this study annotates and calculates attitudinal resources of the corpus. Secondly, the study analyzes the overall attitudinal resources and high-frequency keywords of the corpus based on the statistical results of UAM Corpus Tool and WordArt.com (an online word cloud generator). Thirdly, this study analyzes the attitudinal resources in terms of affect, judgement and appreciation based on the statistical results of UAM Corpus Tool.

5. Results and Discussion

In this part, results and discussion are presented from both macro and micro levels. On the one hand, from a macro perspective, based on the use of UAM Corpus Tool to annotate and calculate the attitude resources of the corpus, this study conducted a quantitative and qualitative analysis of the overall attitude resources and high-frequency keywords of the corpus. On the other hand, from a micro perspective, according to the statistical results of the UAM Corpus Tool, quantitative and qualitative analyses were conducted on attitudinal resources from the aspects of affect, judgment, and appreciation in order to explore the attitude and stance of China Daily through the use of attitudinal resources.

5.1 The Macro Analysis of Attitudinal Resources

5.1.1 The Overall Distribution of Attitudinal Resources

The attitude system is composed of three sub-categories: affect, judgement and appreciation (Martin and White, 2005). The results of the UAM Corpus Tool show that the total number of attitudinal resources is 235. The amounts and ratios of the three sub-systems are shown in Table 5.1.

Table 5.1 The Overall Distribution of Attitudinal Resources

	Types	Positive	Negative	Number (Percentage)
Attitude Subsystems	Affect	26	57	83（35.3%)
	Judgement	10	21	31（13.2%)
	Appreciation	39	82	121（51.5%)
Number(Percentage)		75（31.9%)	160（68.1%)	235（100%)

As the table suggests, China Daily employs a great number of attitudinal resources in the collected news reports, with a total of 235 attitudinal resources in the corpus. As for Attitude sub-systems, appreciation resources rank top with occurrences of 121 and account for 51.5%, more than half of the attitudinal resources. The dominance of appreciation resources gives a hint that China Daily's evaluations are mostly focused on events or objects, reflecting objectivity as much as possible compared to affects and judgements. Affect resources rank second with 83 occurrences and a proportion of 35.3%. Judgement resources are the least dominant, with a smaller proportion of 13.2% and lower occurrences of 31. Based on the above statistical results, a general view of attitudinal resources distribution is presented, from which each subsystem is involved in the collected corpus, but they account for different proportions.

Apart from the three subsystems of attitude, the polarity of attitudinal resources cannot be ignored, as it helps demonstrate what impressions of the evaluated targets are left on the readers or listeners. As we can see from the table, negative resources outweigh positive resources, with a proportion of 68.1% and 38.9%, respectively, which shows that China Daily mainly hold a negative attitude towards the Japanese government's Fukushima nuclear-contaminated water discharge plan. The huge gap between positive and negative resources may suggest that China Daily tends to adopt a negative and condemnatory attitude towards the issue in order to demonstrate the stance of the Chinese government and people against the discharge of Fukushima nuclear wastewater into the sea. At the same time, through the use of negative resources, it hopes to arouse environmental awareness among people both domestically and internationally as well as indicate that human beings live in the same global village, and the potential harm of this plan to marine ecosystems is closely related to every individual around the world.

5.1.2 The Overall Realization of Attitudinal Resources

In addition to the overall distribution of attitudinal resources, high-frequency keywords can help promote understanding of the main topics involved in the news discourses and how attitudinal resources are realized. Figure 5.1 shows the overall high-frequency word cloud of the collected corpus, from which the main topics involved in the news reports can be quickly grabbed.

Figure 5.1 The Overall High-frequency Word Cloud

As shown in Figure 5.1, the main topic of the selected news reports is around the Japanese government's Fukushima nuclear-contaminated water discharge plan, which can be immediately captured through high-frequency keywords such as "water", "nuclear", "Japan", "sea", "plan", "discharge", "contaminate" etc. In more detail, Table 5.2 provides a list of the top 10 high-frequency words based on the part of speech, which bear positive or negative meanings and can reflect how attitudinal resources are realized.

Table 5.2 Top 10 High-frequency Words

Noun		Verb		Adj. & Adv.	
water	128	contaminate	60	nuclear	109
government	45	dump	27	Japanese	56
country	41	discharge	20	International	52
sea	34	release	15	radioactive	27
law	27	treat	14	safe	16
wastewater	22	announce	10	environmental	16
concern	18	cause	10	domestic	12
opposition	17	contain	9	global	11
environment	17	urge	8	toxic	10
community	14	prevent	7	fully	9

From Table 5.2, it can be seen that many high-frequency keywords are negative, expressing China Daily's condemnation and warning of Japan's nuclear wastewater discharge plan. Among the high-frequency keywords, this study focuses more on those with obvious positive or negative meanings. Among them, nouns include "wastewater", "concern", "and opposition", verbs include "contaminate", "dump", "discharge", "cause", "prevent", as well as adjectives and adverbs include "nuclear", "radioactive",, "safe",

"toxic". These words are all negative except for "safe", which is often used together with the negator "not" to express the insecurity of nuclear wastewater discharge. Therefore, it can be seen that through the use of negative words as negative attitudinal resources, China Daily expressed its opposition and concern about the Japanese government's Fukushima nuclear-contaminated water discharge plan and urged it to take effective measures to avoid pollution to the global marine ecosystem.

5.2 The Micro Analysis of Attitudinal Resources

Martin and White（2015）hold that attitude can be used to describe the feelings from its subsystems, namely, affect, judgement and appreciation. The following shows the distribution and analysis of attitudinal resources in these three subsystems.

5.2.1 Analysis of Affect

The main subcategory of the attitude system is affect, which can be further divided into four major sets: un/happiness, in/security, dis/satisfaction and dis/inclination. Table 5.3 shows the distribution of affect resources in the collected news reports.

Table 5.3 The Distribution of Affect Resources

Subsystems	Positive	Negative	Number (Percentage)
Un/happiness	7	7	14（16.9%）
Dis/satisfaction	5	15	20（24.1%）
Un/security	4	13	17（20.5%）
Dis/inclination	10	22	32（38.5%）
Number (Percentage)	26（31.3%）	57（68.7%）	83（100%）

With respect to the sub-systems of Affect, Table 5.3 shows that dis/inclination dominates the whole attitude system with a proportion of 38.5%, followed by dis/satisfaction (24.1%). Un/security and un/happiness take a minor percentage of 20.5% and 16.9%, respectively. With respect to the polarity, there lies a prominent difference between positive and negative affect resources in that the negative resources（68.7%）exceed nearly twice the positive resources（31.3%）. Such a high ratio of negative affect resources indicates China's negative attitude towards Japan's nuclear wastewater dump plan. Here are examples.

1）The **disappointment** and **frustration**（**unhappiness**）the Pacific countries are airing came only a few years after Japan announced the so-called Pacific Bond policy

2）The endorsement provoked **concerns（insecurity）** from local fishermen and **objections（dissatisfaction）** from Asian neighbors.

3）Despite widespread **opposition（dissatisfaction）** both at home and abroad, Japanese policymakers have shown **little willingness（disinclination）** to reconsider their ocean discharge plans.

In the above examples, bold words reflect the use of attitude resources and express the appraiser's feelings towards Japan's plan. Among these words, "disappointment" and "frustration" are unhappiness resources, "concern" is insecurity resource, and "opposition" is dissatisfaction resource. These words all express people's attitudes or feelings towards the Fukushima nuclear sewage discharge plan. Both local fishermen in Japan, Asian neighbors, Pacific countries and even the international community all expressed their concern and opposition to this incident. As for "little willingness", the word "willingness" was positive, but by being used with the negative adverb "little", the phrase "little willingness" became negative, which shows the irresponsibility of Japanese policymakers for this plan. From the perspective of polarity, the above examples are all negative affect resources, expressing the appraiser's negative attitude towards the Japanese plan. On the basis of the explanation of the affect resources, we can see the appraiser's negative affect is overt in the discourse, although this kind of resource is quite poor in the relatively objective news.

5.2.2 Analysis of Judgement

The judgement deals with the attitude towards behavior that we admire or criticize, praise or condemn (Martin and White, 2008). Among judgement resources, social esteem is aimed at "normality", "capacity", and "tenacity"; social sanction is concerned with "veracity" and "propriety". The concrete distribution of judgement resources is shown in Table 5.4.

Table 5.4 The Distribution of Judgement Resources

Subsystems	Positive	Negative	Number (Percentage)
Normality	3	6	9 （29.0%）
Capacity	1	2	3 （9.7%）
Tenacity	2	4	6 （19.4%）
Veracity	1	2	3 （9.7%）
Propriety	3	7	10 （32.2%）
Number (Percentage)	10 （32.2%）	21 （67.8%）	31 （100%）

Judgement resources occupy the least distribution, with a percentage of only 13.2% in the attitude system. As the statistical data shows, propriety resources （32.2%） rank top in the sub-categories of judgement resources, followed by normality （29.0%） and tenacity （19.4%） . The other two judgement resources occupy the least distribution, accounting for 9.7%. In terms of polarity, negative judgment resources (67.8%) are also nearly twice as many as positive judgment resources (32.2%). The following are examples.

4）The Pacific island countries will bear the brunt of it at first, making them **staunch （tenacity）** opponents against Japan on this issue.

5）Under such circumstances, it is "extremely **irresponsible （propriety）** " for Japan to approve the plan and accelerate the construction of related facilities, Mao added.

6）Japan is acting **selfishly （propriety）** by ignoring domestic and international concerns, Foreign Ministry spokesman Wang Wenbin said on Thursday.

In the above examples, the negative judgement resources are "irresponsible" and "selfishly", suggesting that the appraiser believes that the Japanese government is irresponsible and selfish towards the Fukushima nuclear wastewater discharge plan, regardless of the opposition and concerns of the people at home and abroad. In addition, the positive judgement resource is "staunch". The appraiser employs this positive word to convey the fact that the Pacific island countries are opposed to Japan's plan, and their attitude is very firm. In short, it can be easily seen that by the use of judgment resources, appraiser expresses their opposition and condemnation of Japan on this issue and shows the determination of relevant countries to firmly oppose the nuclear wastewater discharge plan.

5.2.3 Analysis of Appreciation

Appreciation involves "evaluations of semantics and natural phenomena, according to the ways in which they are valued or not in a given field". (Martin and White, 2008) This subcategory is thing-oriented, which is different from affect and judgement. The three sub-types of appreciation are reaction, composition and valuation. Table 5.5 shows the distribution of appreciation resources.

Table 5.5 The Distribution of Appreciation Resources

Subsystems	Positive	Negative	Number (Percentage)
Reaction	15	28	43 （35.5%）

Composition	4	13	17（14.1%）
Valuation	20	41	61（50.4%）
Number (Percentage)	39（32.2%）	82（67.8%）	121（100%）

Appreciation resources make up the largest proportion of the whole attitude system, with occurrences of 121 and percentage of 51.5%, more than half of the attitudinal resources. Specifically, it can be seen from Table 5.5 that valuation resources occupy the most, accounting for 50.4%. Reaction resources rank second, which accounts for 35.5%. The distribution of composition resources is the least, with a percentage of only 14.1%. The following are examples

7）As one of the **richest（normality）** economies, with **advanced（normality）** science and technology, and one that is **renowned（normality）** for its environmental and ecological preservation, there are **better（reaction）**, although more **costly （reaction）** ways, for Japan to deal with wastewater rather than dumping it directly into the sea.

8）By discharging the water into the ocean, Japan will turn its own **accident（reaction）** into a **global hazard（reaction）** as **nuclear radioactive（valuation）** materials will not only damage the marine ecology but also enter the human food chain through seafood.

9）Japan should adopt an **open**, **transparent, science-based and safe（composition）** approach in disposing of the water and accept **strict（composition）** supervision by the IAEA, she added.

Different appreciation resources are used in the above examples. In example (7), through the use of the positive appreciation resources "richest", "advanced", "renowned", "better", and a positive resource "costly", the appraiser implies that as a developed country with a good reputation for ecological and environmental protection, Japan should responsibly treat Fukushima nuclear wastewater with advanced technology support, even if it may be costly. In example (8), "accident", "global hazard", and "nuclear radioactive" are all negative appreciation resources, which shows that once the Fukushima nuclear wastewater is discharged, it will be a disaster not only for Japan but also for the whole world. Ecological and environmental issues are closely related to everyone in the global village. In example (9), by using positive appreciation resources "open", "transparent", "science-based", "safe", and "strict", the appraiser calls on Japan to take positive action and accept regulation from IAEA. From these three examples, it can be seen that through positive or negative appreciation resources, appraisers clearly express a negative attitude towards Japan's plan and call for Japan to deal with it positively.

6 Conclusion

Through the discourse analysis of "Fukushima Nuclear-contaminated Water" news reports from the perspective of attitude in Appraisal Theory, the findings are as follows. Firstly, as for the sub-systems of attitude, appreciation resources rank top, accounting for more than half of the whole attitudinal resources, followed by affect and judgement resources, and among them, negative resources overweigh positive resources. Secondly, the attitude resources in the collected news report are mainly achieved through words or phrases with positive or negative meanings. Thirdly, through the use of attitudinal resources, China Daily tends to adopt a negative and condemnatory attitude towards the issue in order to demonstrate the stance of the Chinese government and people against the discharge of Fukushima nuclear wastewater into the sea.

Analyzing the news reports of China Daily on Japan's Fukushima nuclear wastewater discharge plan, this study helps to effectively understand and express attitudes and stances in discourses through attitudinal resources. Inevitably, there are limitations to this study. Firstly, the size of the corpus is not large enough, which may affect the final results of the study. Therefore, it is suggested that future research expand the size of the corpus to make the results more convincing. Secondly, in the process of manual annotation of attitudinal resources, the attitudinal analysis is inevitably subjective, although the results have been checked four or five times. Thirdly, owing to the limited space, this study only adopts the attitude system of Appraisal Theory as the theoretical framework. In the future, the engagement system and graduation system can be used to conduct relevant research. Besides, two different media can be selected to conduct comparative research on this topic.

Conflicts of Interest: The authors declare no conflict of interest.
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