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| **RESEARCH ARTICLE**

A Corpus-based Study of Stance Adverbs in TED Scientific Talks

Weiqi Wang

Postgraduate student of School of English and International Studies, Beijing Foreign Studies University, Beijing, China

Corresponding Author: Weiqi Wang, **E-mail**: wangwq@bfsu.edu.cn

| **ABSTRACT**

As an important part of interpersonal communication, stance adverbs are used to express the speakers' opinions, attitudes and style of delivery. However, stance adverbs in spoken registers have not received enough attention. This study analyzed the stance adverbs in TED scientific talks, with a particular focus on the most common certainty stance adverb *really*. This research is based on a self-built corpus composed of 80 TED talks in science and technology categories from 2017 to 2022, with a total number of 161,523 words. The findings indicated that epistemic stance adverbs, particularly certainty adverbs, were the most frequently employed category. The results also revealed that speakers of TED scientific talks tended to adopt *really* in the medial position in the clause. Meanwhile, *really* was mainly used to emphasize and express factual truth. The purpose of this study is to complement the existing research on stance adverbs in the spoken registers and provide suggestions for public speaking in academic discourse.

| **KEYWORDS**

corpus, stance adverbs, TED talks, science and technology

| **ARTICLE INFORMATION**

1. Introduction

Stance is an essential component in communication. It presents the authors' feelings, attitudes and judgments (Biber *et al.*, 1999). It is most frequently expressed as adverbs (Biber & Finegan, 1988). Stance adverbs play an important role in conveying the authors' opinions. In recent years, TED talks have been a popular form of public speaking, highlighting knowledge dissemination across various topics. It has been widely used for academic research.

Most of the existing research about stance has focused on the written registers, especially academic writing (e.g. Ahmad & Mehrjooseresht, 2012; Pan, 2012; Çakır, 2016). While some studies have explored stance in the spoken registers (e.g. Biber & Staples, 2014; Perez-Paredes & Bueno-Alastuey, 2019), few of them attached attention to public speaking discourse. The purpose of the present study is to explore stance adverbs in TED scientific talks. The findings will add to the current body of knowledge on the use of stance adverbs in spoken registers and have important implications for public speaking in academic scenarios.

The remainder of this paper is structured as below. A review of the previous studies is first presented. Methods and the corpus used in this research are then elaborated. Section 4 is the report of the overall frequency distribution and analysis of the lexico-grammatical features of the most frequent stance adverb *really*. The final section draws conclusions.

2. Literature review

A large number of relevant studies have examined the stance adverbs in written and spoken registers. Since the current study is to investigate the use of stance adverbs in TED scientific talks, this section reviews the previous studies from two aspects: 1) stance and stance adverbs and 2) TED talks.

2.1. Stance and stance adverbs

Numerous studies have investigated stance and stance adverbs in various genres since stance was first put forward (Biber & Finegan, 1988). One of the most widely adopted classifications of stance is epistemic, attitudinal and style-of-speaking (Biber *et al.*, 1999). According to Biber and Finegan (1988), the stance adverb is the most important stance adverbial. It is used by authors to "express personal feelings, attitudes, value judgments, or assessments and communicate propositional content" (Biber *et al.*, 1999, p. 966).

The existing research on stance primarily explores stance adverbs in written registers (e.g. Zhao, 2009; Ahmad & Mehrjooseresht, 2012; Pan, 2012; Çakır, 2016). For one thing, many scholars investigated academic writing. For example, Myers (2010) analyzed stance-taking in blogs, with a focus on *really* and *actually*. The author explored functions of *really* and categorized them as follows: 1) boosters, 2) a skeptical response to something said earlier, 3) doubt or surprise and 4) Factually true meanings. Ahmad and Mehrjooseresht (2012) examined the frequency and distribution of stance adverbials in the abstracts of the engineering doctoral theses. The authors noticed that epistemic stance adverbials were used most frequently and that pre-verb position was widely applied. Thus, they argued that the writers used stance adverbials to indicate their certainty of the following parts.

Recently, Zou and Hyland (2022) compared reviewers' stances expressed in two forms of book reviews in sociology. The corpus is composed of 30 reviews on LSE *Impact Blog* website and 30 in five sociology journals. The authors found significantly more stance features in the blog book reviews than in the journal book reviews. Specifically, every stance feature examined in this study is more frequent in the blog form than in the journal form. Accordingly, the authors suggested that reviewers on the blog website have to interact closely with a wider audience and express their judgments through a more explicit personal intervention.

For another, stance in English learners' writing attracts much attention from researchers, who mainly conducted a comparison of native speakers and English learners about their use of stance. For instance, Zhao (2009) compared the stance adverbs in the writing of Chinese English learners and native speakers. The author examined the frequency of stance adverbs in CELC and Frown/FLOB and then selected *certainly*, *unfortunately*, and *generally* for epistemic, attitudinal, style-of-speaking stances, respectively, to examine their lexico-grammatical features. The results showed that both corpora shared the same most common category, epistemic stance adverbs. Nevertheless, the stance adverbs used by Chinese English learners were less diversified than those used by native speakers. Thus, it was argued that Chinese English learners rigidly used stance adverbs.

Later, Pan (2012) compared the use of stance adverbs in mechanical papers between native speakers and Chinese English learners. It was found that Chinese writers used fewer stance adverbs and showed a colloquial tendency in terms of adverb choice and position. Accordingly, the author pointed out that Chinese writers lack knowledge about interpersonal function in academic discourse. Thus, they had problems expressing their stance appropriately.

While the written registers have been the focus of stance studies, the spoken registers have received less attention. In a study on linguistic variation in casual conversation in American English (Barbieri, 2008), lexico-grammatical differences between different age groups were explored using keyword analysis. One of the patterns examined by the author was stance adverbs. It was found that younger speakers tended to use a limited number of stance adverbs, while older speakers adopted a wider range of stance adverbs, though with lower frequency.

Perez-Paredes and Bueno-Alastuey (2019) chose the three most common certainty stance adverbs (*obviously*, *really* and *actually*) in the extended LOCNEC, and investigated them in three datasets of the LINDSEI and conducted a comparative study between native and non-native speakers on their picture description. The results demonstrated that *obviously* was the most frequently used adverb by native speakers, while non-native speakers relied heavily on *really*. Non-native speakers also showed limited use of *really* and *actually*. Accordingly, the authors argued that the diversity of stance adverbs expressed by non-native speakers was more restricted than that by native speakers. This is consistent with the finding of Zhao (2009).

More recently, a new academic genre 3MT (3 Minutes Thesis), received scholars' attention. It challenges postgraduate students to explain their research within three minutes to a general audience. Hyland and Zou (2021) examined stance-taking in 140 final 3MT presentations across disciplines from the main websites. The authors revealed that hard science students took a more explicit stance based on the reliability of the information, while soft science students relied on personal and affective approaches. Specifically, hard science students used epistemic stances most frequently. Similarly, Qiu and Jiang (2021) studied stance and

engagement in 80 top final presentations from one university in Hong Kong. The authors also noted that students in hard science expressed a more explicit stance. But different from the former study, the most common type among them was the attitude marker.

Therefore, it can be noted that previous research on stance and stance adverbs has focused on the written registers. Most of these studies compared the use of stance adverbs in academic writing between native speakers and non-native speakers. Biber (2006) pointed out that stance adverbs were more common in spoken registers than written ones. However, the stance in spoken registers has not been explored thoroughly. The examined spoken materials are primarily from daily scenarios, leaving speeches, particularly academic speeches, seldom attended.

2.2. TED talks
TED talks are an innovative genre of ideas dissemination (Mattiello, 2019) that has attracted the increasing attention of scholars in recent years. A large number of studies have investigated various aspects of this genre, including pedagogic implications (e.g. Wingrove, 2017), metadiscourse (e.g. Jiang, 2020), modality (e.g. Ding & Dong, 2022), and conducted multimodal analysis (e.g. Guan, 2021) and multidimensional analysis (e.g. Wang, 2021). For instance, Crible *et al*. (2019) explored the function, omission and translation equivalents of discourse markers (represented by *and*, *but*, *so*) in TED talks from the perspective of underspecification based on parallel corpora in five languages. The results indicated that the processes of underspecification were based on the semantics of discourse markers.

Stance in TED talks has also been investigated. For example, Scotto di Carlo (2015) analyzed stance in TED talks covering various topics through the speakers' strategic use of subjective adjectives. The results showed that TED speakers tended to use descriptive adjectives in order to connect with the audience. They also adopted adjectives to express the relevance of their findings.

Particularly, scientific TED talks are similar to academic lectures but aimed at a general audience, which ensures less professional discourse and more interaction skills with listeners. Thus, it is worthwhile to explore how TED speakers express their stance when disseminating scientific knowledge to the lay public. Mattiello (2019) investigated the linguistic strategies and collocational patterns adopted by the speakers of TED cancer-related talks. The results revealed that the methods used to explain science in TED talks include periphrasis, juxtaposition, metaphor and hyperbole. Accordingly, the author argued that these verbal strategies could contribute to the overall process of disseminating scientific knowledge. A comparative study of university lectures and academic TED talks explored the ways scholars express epistemic stances and build their expert image (Caliendo & Compagnone, 2014). Specifically, they analyzed the most recurrent epistemic lexical verbs and their combined clusters with first and second personal pronouns. The authors argued that TED talks worked as a pragmatic space in which scholars emphasized their affiliation and promoted their and their teams' research.

2.3. Summary
In summary, the existing studies of stance and stance adverbs have been mainly devoted to the written registers, particularly academic discourse. However, its spoken counterpart has not received enough attention, though some studies have examined its stance in the general discourse. Although some research has investigated stance in TED talks, few studies concentrated on the scientific category and stance adverbs. Thus, the aim of this study is to analyze stance adverbs in scientific TED talks. The findings may shed light on research on stance in public speaking. The research questions in this study are the following:

    1) What is the overall frequency distribution of stance adverbs in TED scientific talks?
    2) What are the lexico-grammatical features of the most frequently used stance adverb?

3. Methodology
3.1. Corpus
The present study focuses on the science and technology categories of TED talks. Different from other categories, such as entertainment and design, talks on these two themes often disseminate academic knowledge, especially scientific findings and facts, to a general audience.

A corpus named TED Scientific Corpus (TSC) was compiled in this study. To ensure the reliability of the data, all the information was obtained from TED official website (https://www.ted.com/), and only the talks from TED flagship conferences were chosen, namely the talks from tags "TED 2017", "TED 2018", and the like. The talks that last 12 to 18 minutes were selected in that this duration is more likely to ensure more comprehensive and effective content. A total of 80 talks on "science" and "technology" topics from the year 2017 to 2022 were collected. The texts were cleaned to exclude other speakers' words, including the words

from the audience, videos, and short interviews after the talk. As for the size of the corpus, it is composed of 161,523 running words.

Table 1 *Basic statistics of TSC*

Year	Word tokens	Word types
2017	44,948	5,101
2018	46,880	5,565
2019	40,339	5,341
2020	3,366	811
2021	0	0
2022	25,990	3,714
Total	161,523	20,532

3.2. Identification and taxonomy of stance adverbs

Regarding the taxonomy of stance adverbs, Biber's (2006) framework was adopted. Biber (1999) classified stance adverbs into three semantic categories, namely, epistemic, attitude and style-of-speaking. Among them, Biber (2006) further classified epistemic stance adverbs into two kinds: certainty and likelihood. The taxonomy is presented as follows:

1) **Epistemic**: expressing the speaker's or writer's judgment about the certainty, reliability, and limitations of the proposition; commenting on the source of information (e.g. *actually, obviously, apparently*)

2) **Attitude**: telling of the writer's or speaker's attitude toward the proposition (e.g. *hopefully, curiously, fortunately*)

3) **Style**: commenting on the manner of speaking (e.g. *frankly, generally, mainly*)

As shown in Table 2, Biber (2006, p. 92) listed the 51 most common stance adverbs in Longman Spoken and Written English (LGSWE) Corpus. This list was employed as the basis of the present study because it was generated from all the subcategories of LGSWE Corpus, including conversation, fiction, newspaper language, and academic prose. Thus, the items on the list can be representative and suitable for this research.

Table 2 *Biber's list of stance adverbs*

Stance		Adverbs
Epistemic	Certainty	*actually, always, certainly, definitely, indeed, inevitably, in fact, never, of course, obviously,* **really***, undoubtedly, without doubt, no doubt*
	Likelihood	*apparently, evidently, kind of, in most cases/instances, perhaps, possibly, predictably, probably, roughly, sort of, maybe*
Attitude		*amazingly, astonishingly, conveniently, curiously, hopefully, even worse, fortunately, importantly, ironically, rightly, sadly, surprisingly, unfortunately*
Style		*according to, confidentially, frankly, generally, honestly, mainly, technically, truthfully, typically, reportedly, primarily, usually*

The materials were uploaded and analyzed with AntConc 3.5.9 (Windows) 2020 (Anthony, 2020). The occurrence of words from the list above in the present corpus was counted,s and adverbial phrases such as *in fact* in the list were excluded to keep adverbs only.

3.3. Method of analysis

In this research, both quantitative and qualitative analyses were carried out. For starters, the occurrence of all the adverbs in Biber's (2006) list was calculated to explore the most common category of stance adverbs on the basis of the overall distribution. Secondly, a close look was taken into the adverb *really* for two reasons. First, the most frequent adverbs in the corpus fall into the certainty

subcategory and *really* is the most common adverb across all the categories. Second, claims have been made that certainty adverbs are used for more emphatic functions (Biber, 2006), while Myers (2010) argued that they bear more complex meanings. Therefore, *really* was selected to be carefully examined in the present study.

To be more specific, the position and collocational sequence of the selected adverb *really* were investigated. According to Quirk (1985), the positions considered in this study fall into three types, namely, initial, medial and end position. But based on the actual findings, another category, "clausal", was added. In addition, the pragmatic function of *really* was analyzed through Myers's (2010) categorization (See Table 3).

Table 3 *Pragmatic use of really*

	Category	Explanation
1	Booster	Intensifying function
2	Skeptical response to something said earlier	Typically, before a comma, full stop or question mark
3	Doubt or surprise	Expressing doubt or surprise about what has been just said
4	Factually true meanings	Used as a synonym of *actually*
5	Other uses	Unclear meaning/function

4. Results and discussion

In this section, the results of this research are presented and analyzed from three aspects. First, the overall distribution of the stance adverbs in the corpus is reported. Then, the position and collocational sequence of the selected adverb *really* are discussed. Finally, the pragmatic meaning of *really* is investigated.

4.1. Overall distribution of stance adverbs

A total of 41 stance adverbs were examined in this study. Only 33 stance adverbs in Biber's (2006) list were found in TSC. The following provides the occurrences of stance adverbs.

Table 4 *Frequency of stance adverbs in each category*

Category of stance adverbs		Freq	%
Epistemic	Certainty	751	69.34%
	Likelihood	253	23.36%
Attitude		50	4.62%
Style		29	2.68%
Total		1083	100%

As can be seen in Table 4, in TSC, certainty stance adverbs are the most frequent category, accounting for 69.34%, followed by likelihood stance adverbs (23.36%). Thus, epistemic stance adverbs are the most frequently used category. This echoes the previous research, which reported that certainty stance adverbs were the most frequent in various spoken corpora (Biber, 1988, 2006). The frequency of attitude stance adverbs and style ones are quite similar. These results are consistent with previous studies (e.g. Zhao, 2009; Pan, 2012) in general. Nevertheless, in the present study, the occurrences of attitude stance adverbs were slightly higher than that of the style stance adverbs, while in the previous research, style stance adverbs were used more often. The possible explanation is that in the spoken registers, the speakers focus more on influencing the audience by conveying their own opinions. However, in the written registers, the authors might concentrate on the delivery of information.

Stance adverbs whose frequency is over 10 in the corpus are presented below (See Table 5).

Table 5 *Top 12 stance adverbs in TSC*

Rank	Adverb	Freq	Rank	Adverb	Freq
1	really	374	7	perhaps	32
2	actually	230	8	importantly	16
3	maybe	110	9	roughly	13
4	probably	78	10	possibly	15
5	always	62	11	unfortunately	13
6	never	51	12	obviously	11

It is noticeable that of all the stance adverbs, *really* was the most common stance adverb with a frequency of 374. In the following parts, a close examination of what *really* will be reported.

4.2. Lexico-grammatical features of really

In this section, the lexico-grammatical features of stance adverbs are discussed in order to generate a full picture of the usage. The most frequent adverb *really* was selected as the representative. Specifically, position, collocational sequence and pragmatic meaning of *really* are analyzed.

4.2.1 Position and collocational sequence of really

Regarding the position of *really*, as mentioned above, four positions (See below) were considered in the present study.

1) **Initial**

e.g. *Really*, the creative jobs are the ones that are protected because AI can optimize but not create.

2) **Medial**

e.g. It's not *really* suited for scrambled eggs.

3) **End**

e.g. Like, you notice, nobody could make any sense of what was happening except me, and I didn't give a damn, *really*.

4) **Clausal**

e.g. *Really*? You can do that?

The distribution of the positions is reported in Table 6.

Table 6 *Positions of really*

Position	Freq	%
Medial	353	94.38%
Clausal	9	2.41%
Initial	8	2.14%
End	4	1.07%
Total	374	100%

Confirming previous studies (Zhao, 2009; Pan, 2012; Perez-Paredes, 2019), *really* in TSC favored the medial position, while the end position was the least common position. When used in the medial position, stance adverbs often modify a certain clause element. In most cases, *really* indicates the speakers' stance by modifying the element following it. As shown in example 1), *really* modifies the predicate *beg* to emphasize not only the action but also the whole clause. In example 2), modifying *polarized really* is used by the speaker to convey his opinions about the world.

1) So all this amazing recent progress in AI *really* begs the question: How far will it go? (2018-14)

2) We live in a *really* polarized world, and as we all know, there's a lot of very serious problems. (2022-12)

When *really* is used as an independent clause, it bears the emphatic function in this study. Compared with other positions, the clausal position brings a stronger tone. For example, example 3) and example 4) *really* assures the audience that the speaker takes seriously what was said before. It is also an interaction employed by the speaker, which can increase the proximity between the speaker and the audience.

3) "Adidas" now means "All day I dream about sex." *Really*. I didn't know if you know that. (2017-13)

4) I need to tell you this here. *Really*. And accidentally, I happened to even invent a new dance form which I didn't realize, and it became a rage. (2017-13)

When *really* appears at the initial position, it takes on the role of clause theme. The speakers make their own point of view as the starting point so as to express opinions and establish their authority (Halliday, 1994). For example, example 5) and example 6)

really lays the foundation of the following content. The speakers said *really* at the very beginning, thus restricting the audience's comprehension within the perspective that the following part of the clause is real.

5) And I love you guys. *Really*, I do. Like, the people are fantastic. (2017-13)

6) I have to make myself safe, right? *Really*, the creative jobs are the ones that are protected because AI can optimize but not create. (2018-7)

As for the end position, Pan (2012) pointed out that it is often observed in spoken discourse rather than academic discourse. However, in this study, the end position is the least common type. The fact that TED scientific talks are quite similar to academic lectures might contribute to the result.

Additionally, the collocational sequence of *really* in TSC was examined to provide more information about its lexico-grammatical features. Table 7 presents the collocational sequences with over 10 occurrences.

Table 7 *Top 4 collocational sequences of really*

Rank	Collocational sequence	Freq
1	be *really* adj.	115
2	*really* v.	109
3	not *really*	26
4	*really, really*	10

As can be noted in Table 7, the most common collocational sequence is "be *really* adj." (See Figure 1). It can be concluded that *really* is mainly used to modify its following clause elements to express the speaker's emphasis and certainty.

105	number one, complex problem-solving -- all the things a robot or a computer is really bad at. And this makes me very optimistic, very hopeful for the new wor
106	, it made its closest approach to the Earth, within about 15 million miles. This is really close by astronomical standards. Now rather than call this by its unwield
107	pathways for angsty teens to go down. If you see something that you think is really creative and thoughtful and you want to share that thing, you can share
108	market for him to scale his incredible talents across. So access to this market is really critical to us as individuals, and also to the entire system in terms of it
109	in the past, maybe what we should really be asking is whether this time is really different. The fear that automation might displace workers and potentia
110	are in development. The third exciting revolution is immunotherapy, and this is really exciting. Scientists have been able to leverage the immune system in the
111	something else. People on Socotra, some of them still live in caves, and that is really exciting, because it means if a cave is prime real estate this century, may
112	this kind of dual signaling simultaneously with a changing behavioral context is really extraordinary. It takes a lot of brain power. Now, another way to look at
113	complicated? It's so complicated, I hardly understood the experiment. So this is really high-level cognitive processing. Now, speaking of brains and evolution a
114	I move my head, even when I move around. That kind of mobile perception is really important for robots that are going to move and act out in the world. I'
115	this device that can monitor so many physiological signals for you, and what is really interesting about this device is that it does all this without any wearables
116	cost of health care in the US is due to chronic diseases. But what is really interesting about chronic diseases is that when the person, for example,
117	world based on the first few things they heard about it, because your world is really just weird. So before judging a strange future world, you should really le
118	can see the light goes everywhere. So let's see that again, blood. This is really key: blood absorbs light, flesh scatters light. This is significant, because e
119	raqi prison. There are locals who've uploaded cell phone footage of what life is really like in the caliphate under ISIS's rule. There are clerics who are sharing p
120	back out of it to see the smooth skin and the conspicuousness. So this is really marvelous, morphing skin. You can see it in more detail here. Periscope
121	rapy without active MDMA no longer had PTSD at the end of treatment. This is really pretty good for this patient population. However, when you add MDMA,
122	f "intelligence." The level of complexity of the skin with fast precision change is really quite astonishing. So what can you do with this skin? Well, let's think a
123	vorite beach? Oh, wait a minute, actually it sounds really scary. This dinosaur is really scary. But here's the catch: our semisynthetic organisms in order to survi
124	remain relevant, and, in fact, indispensable to the economy. So what is it that is really so different about today's information technology relative to what we've
125	e studying them and found how abundant they were, we thought, hmm, this is really strange. How can a single species be so abundant across so many differe
126	ball and billiard black ball. This is now possible. Let me show you. This is really the first time this is shown live in front of a public grand audience, so
127	got to be something we all own, we all cocreate. So, my final plea is really to those engineers, those scientists, those artists in the audience today. N
128	ay that the internet is a huge, irredeemable dumpster fire. Neither caricature is really true. We know the internet is just too vast and complex to be all good
129	. Lungi dance. Lungi dance. Lungi dance. Lungi. That's it. It became a rage. It really did. Like you notice, nobody could make any sense of what was happeni

Figure 1 *Concordance lines of really*

For instance, as shown in example 7), *really* is used to emphasize the adjective *extraordinary*, expressing the speaker's certainty of the characteristic of "dual signaling".

7) So, this kind of dual signaling simultaneously with a changing behavioral context is *really* extraordinary. (2019-19)

The second most frequent collocational sequence is "*really* v.". *Really* is employed to give more information about an action. In example 8), it is used to stress the verb *care*.

8) Now, as you might imagine, we had to work with a resource that toddlers *really* care about, so we used the toddler equivalent of gold, namely, Goldfish crackers. (2019-20)

Besides, the repetition of *really* was applied by TED talkers to intensify the mood. For instance, in example 9), double *really,* in addition to *does,* was used to show the speaker's great certainty. It should be noticed that this collocation is not formal in academic discourse, even though it showed a relatively high frequency in TSC. It can be explained that TED talks aim at a general audience instead of experts only. Thus, the speakers might use informal and easier language to achieve this goal. These four collocational sequences also confirm that the medial position of *really* is adopted most frequently by the speakers.

9) And this stuff *really*, *really* does affect small children. (2018-12)

4.2.2 Pragmatic function of really
In this study, the pragmatic function of *really* was investigated according to an integrated taxonomy based on Myers's (2010) categorization (See Table 8).

Table 8 *Pragmatic meaning of really*

Pragmatic Meaning	Freq	%
Booster	254	67.92%
Factually true meaning	114	30.48%
Doubt or surprise	2	0.53%
Skeptical response	1	0.27%
Other uses	3	0.80%
Total	374	100%

As illustrated in Table 8, *really* was used as a booster in most cases (67.92%), followed by the use of factually true meaning (30.48%). In example 10), *really* was used to emphasize the fact "the prominent feature will leave you confused". In example 11), *really* was employed twice, and both were used as boosters. The speaker even adopted a double emphasis, namely *really* and *did*, to stress his words were real.

10) That is one prominent feature, but it ignores some other parts and will leave you *really* confused if you're trying to understand how faces work. (2018-23)

11) And, of course, I *really* could see the image that he was describing, and I *really* did connect with the feeling that he was trying to convey, which was one of doom when you know there's no way out. (2018-15)

When used to express factually true meaning, *really* can be substituted by *actually*. In example 12), *really* was adopted to express the factual truth of what happened. In example 13), *really* was used in a negative context. When collocated with *not*, namely "not *really*", *really* carries the meaning of factual truth. In this sentence, the speaker tried to convey that, in fact, we do not know about the future.

12) But what *really* happened is, every day, they had a thousand copies, each of whom did a two-hour plumbing job, and only one of them went on to the next day. (2017-6)

13) And we don't *really* know yet what this is going to look like, but I think it's going to be great, and it's just the beginning. (2022-13)

The use of *really* to express skeptical responses, doubt or surprise is seldom found in this study, which may indicate that the speakers are inclined to express a certainty stance. The underlying reason could be that the speakers tend to establish their authority as an expert in a field (Caliendo & Compagnone, 2014). In addition, the research material is a single person's public speaking rather than two-way communication or discussion, which may contain more expression of doubt or surprise.

The result generally echoes the findings of Perez-Paredes & Bueno-Alastuey (2019). However, in the present study, the use of factually true meaning accounts for more proportion. It can be argued that different speaking tasks lead to this distinction. This research investigates public speaking with academic features rather than in a normal situation. Therefore, the precise and professional characteristic of academic speaking may result in more attention to scientific facts in order to ensure credibility.

5. Conclusion

The present study explored stance adverbs use in TED scientific talks, with a particular focus on the certainty stance adverb *really*. The overall frequency of stance adverbs indicated that the speakers of TED scientific talkers restricted their choice of stance adverbs to epistemic stance, especially certainty stance adverbs, while style stance adverbs were the least used. A close examination of *really* showed that collocated with adjectives, verbs, *really*, and *not*, *really* appeared in medial position in a clause in most instances. Regarding the pragmatic meaning of *really*, analysis based on the context revealed that it mainly carried emphatic function and expressed factual truth meaning. This is consistent with previous studies (e.g. Perez-Paredes & Bueno-Alastuey, 2019). It also reflects the features of TED scientific talks that they are rigorous and professional about scientific facts. Thus, it can be concluded that certainty adverbs play an important role in TED scientific talks, which express the speakers' certainty about the content.

These findings have important implications for knowledge dissemination in English public speaking, especially those in academic and, more specifically, scientific fields. It can be learned from the results how to improve the employment of stance adverbs so as to deliver scientific findings and facts in an appropriate and acceptable way.

Nevertheless, limitations exist in this research. It adopted a narrow perspective to explore the use of stance adverbs in TED scientific talks. Future work should compare this material with that produced in a more general situation or by English language learners to obtain more comprehensive results and provide more credible suggestions for public speaking in academic discourse.

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