A corpus-based quantitative study on the interpersonal functions of hedges in Chinese and German academic discourse

Quan Yu a, *,1, Renbai Wen b

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Abstract

Hedges are one of the most essential ways of accomplishing interpersonal function. With its help, the speakers are able to say as much information as they could in the fewest possible words and better promote the interpersonal interaction while communicating, such as expressing politeness, providing more opportunities for further discussion, avoiding subjectivity, and boosting credibility. Therefore, hedge has become a commonly used interpersonal strategy for researchers. In this study, the corpus consists of 170 Chinese and 170 German academic articles from renowned linguistic empirical studies that were published between 2010 and 2019. Based on the theoretical research of prior studies, the interpersonal function of hedges and the similarities/differences of its pragmatic realization between Chinese and German academic written discourses are investigated from a quantitative perspective. It is concluded that the Chinese researchers are more cautious in using strong-modality-expressing-hedges. They communicate with readers indirectly and implicitly, focus on avoiding their own responsibilities, demonstrate a conservative and cautious attitude, and provide more room for further discussion, while the German researchers are considered more active in using those types of hedging strategies, which make them more direct while interacting with readers, concentrating on emphasizing the correctness of their own academic views and highlighting their positive attitude towards their own opinions.

1. Introduction

Hedging strategies, among other language expressions, are one of the most typical indicators of “fuzziness” (ambiguity) in natural language. As often-used interpersonal communication strategies (He, 1985), hedges are usually defined as a certain series of words, phrases, structures, and sentences that can make the utterance more precise or vague, or further express the author/speaker’s uncertain attitude towards their own opinions. Thus, it plays a pivotal role in interpersonal communication (Chen and Li, 1994), such as expressing politeness, opening up more opportunities for further discussion, avoiding subjectivity, and enhancing credibility. From the author/speaker’s perspective, hedges might help them convey as much information and uncertain views as possible with a few words, which might contribute to improving the efficiency and modality-expressing ability of expressions.

The interpersonal functions of hedges are considered to be different in various text genres. In medical discourse, the interpersonal functions of hedges are mainly focused on conveying uncertainty or affirmation (Prince, E.F., Frader, J., & Bosk, C., 1982), expressing modesty, objectivity (Salager-meyer, 1994) and rigorous (Jiang and Tao, 2007), reducing the oppressive feelings of discourse (as a positive politeness strategy) helping doctors and patients reach consensus (Varttala, 1999), improving the persuasiveness of claims and conclusions (Jiang and Kou, 2011); In college discourse, the interpersonal functions of hedges are mainly reflected in toning down the rhetoric of the teachers while evaluating students (Skelton, 1988), modifying the authenticity of the proposition, weakening the degree of commitment (Hyland, 1996b), expressing questioning attitudes in classroom discourse and building a harmonious conversation atmosphere between teachers and students (Friginal et al., 2017); In economic discourse, hedges are often used to express the positive attitude of economists while forecasting future economic development (Donohue, 2006) and at the same time avoid creating bad impressions on readers, such as “arbitrary” or “capricious” (Clemen, 1998); Hedges in news discourse are primarily used in reporting some sensitive and controversial topics. Their interpersonal functions are mostly manifested in improving readers’ trust, indicating that “the
authenticity of the news has not been confirmed” and avoiding disputes (Mclaren-hankin, 2008) etc.; In network discourse, hedges are considered to have a critical influence on enhancing the speaker’s emotions, strengthening the degree of opinion-expression, and enriching the oral-characteristics of the network discourse (Dawn knight, Svenja & Ronlad, 2013); In legal discourse, the interpersonal functions of hedges are mainly represented in the rigorous attitude of the judges on the one hand, or embodied in respecting the human rights and litigation rights of the participants on the other hand, constructing an objective and neutral image, mitigating the interactions between the plaintiff and the defendant (Huang, 2010).

This paper explores how the interpersonal functions of hedges seem to be in academic discourse. As the main communication medium and often used text genre within researchers, academic discourse is characterized by two significant functions: “reporting facts; constructing knowledge; transmitting information” and “expressing opinions; constructing effective interpersonal interactions between authors and readers.” (Li et al., 2017) In other words, in addition to stating facts and surveying results, the author would also use a lot of strategies to introduce and evaluate previous work, express his own academic opinions, and guide readers to accept the author’s point of view (Abdi et al., 2010; Crismore, 1982; Flowerdew, 1997; Hyland, 2005; Kopple, 1985). Hedges are exactly one of those strategies that undertake such functions. Prior researchers have generally confirmed that when academic writers employ hedges, they aim to achieve a variety of pragmatic functions that contribute particularly to expressing modality, strengthening argumentation, and presenting the conclusions’ objectivity. That means hedges could enhance the credibility of the academic conclusions, encourage readers to more easily accept the author’s academic views (Jensen, 2010), and improve interpersonal communication efficiency if they were used appropriately and reasonably by academic authors (Chen & Jun yang, 2017). Therefore, hedge is considered significant for academic authors to express interpersonal functions (Hyland, 1994, 1996b, 1998, 2005) and thus has become an important criterion for the review of academic journals (Yang, 2013).
However, the current research on the interpersonal functions of hedges in academic discourse is still insufficient. First of all, the interpersonal functions of hedges in most comparative studies of hedges in Chinese and German academic discourse have not been extensively explored. Secondly, those related comparative studies mostly focused on English-Chinese (Chen & Jun Zhang, 2017; Hu and Cao, 2011; Yang, 2013; Jiang and Tao, 2007) and English-German (Clemen, 1998; Krahnich, 2011; Kreutz and Harres, 1997; König, 2016; Markkanen and Schröder, 1997). Comparative studies on hedges in Chinese-German academic discourse are still rare. Finally, little quantitative data has been conducted to show the differences between hedges in Chinese and German discourse. The research methods also need to be further improved.

Our study was conducted to fill the gap left by a corpus-based quantitative study on the interpersonal functions of hedges in Chinese and German academic discourse. Specifically, authentic corpus and quantitative methods will be conducted in order to explore if there would

![Hedge types](https://example.com/hedge-types.png)

**Figure 3.** Frequency distribution of hedges per thousand words in Chinese - German academic discourse.

Table 1. Research perspectives of the previous hedge studies.

| Perspective          | Object                                                      | Method         |
|----------------------|-------------------------------------------------------------|----------------|
| Semantic             | definition of hedges, ontological research of hedges and semantic fuzziness research | qualitative    |
| pragmatic            | hedge functions in specific genres                           | qualitative    |
| second language teaching | hedge acquisition                                         | quantitative    |
| socio-cultural        | interpersonal functions of hedges, influences of socio-cultural elements on hedge usage. | quantitative    |

Table 2. The characteristics and research focus of the three main theoretical research perspectives on academic discourse.

|                          | macro or micro | commonality or individuality | Process or text | diachronic or synchronic |
|--------------------------|----------------|-----------------------------|-----------------|--------------------------|
| genre analysis           | Macro          | commonality and individuality | text            | synchronic               |
| multidimensional analysis | Micro          | individuality               | text            | diachronic               |
| system-functional analysis | macro and micro | individuality             | text            | diachronic               |

Table 3. Corpora description.

|                         | German Corpus | Chinese Corpus |
|-------------------------|---------------|---------------|
| Sample size             | 170 articles  | 170 articles  |
| Academic field          | Empirical studies in linguistics | Empirical studies in linguistics |
| Journal source          | Zeitschrift für Sprachwissenschaft, Zeitschrift für Dialektologie und Linguistik, Zeitschrift für Angewandte Linguistik, Zeitschrift für germanistische Linguistik, Zeitschrift für Literaturwissenschaft und Linguistik. | 世界汉语教学 (Chinese Teaching in the World), 当代修辞学 (Contemporary Rhetoric), 语言文学应用 (Applied Linguistics), 语言教学与研究 (Language Teaching and Linguistic Studies), 当代语言学 (Contemporary Linguistics), 中国语文 (Studies of the Chinese Language), 汉语学报 (Chinese Linguistics), 语言研究 (Linguistic Research), 汉语学习 (Chinese Language Learning), 语言研究 (Studies in Language and Linguistics), 方言 (Dialect), 民族语文 (Minority Languages of China), 语言研究 (Research in Ancient Chinese Language), 语言科学 (Linguistic Sciences), 语言建设 (Language Planning) |
| average sentence length | 21.73         | 27.16         |
| type-token ratio        | 12.17          | 15.11          |
be similarities and/or differences in hedges’ usage and interpersonal functions between Chinese and German academic discourse. We anticipate that the results of our study will help us fully comprehend the characteristics, usage rules, and differences (if any) of hedges in Chinese-German academic discourse from a macro perspective.

2. Theoretical framework

2.1. Definition of hedge

To justify whether or not an expression is a “hedge”, a definition is required, which could be derived from previous studies on hedge-definition.

In the 1970s, hedge was mainly considered as a “word type”. Zadeh (1972) investigated the semantic ambiguity of hedge and defined it as “an operator which acts on the fuzzy set representing the meaning of its operand” (Zadeh, L.A., 1972); linguist Lakoff (1973) defined hedges as “words whose job is to make things fuzzier or less fuzzy” (Lakoff, 1973) (p. 195); Wahlster defined hedges as “linguistic units that modify predications according to the degree or aspect of their applicability and can be interpreted as operators that reinforce or weaken the vagueness of the linguistic concept to which they are applied” (Wahlster, 1977; Yu, 2020).

In the 1980s, the grammatical forms of hedge were further expanded from words to phrases or sentences. Crismore (1982) investigated hedges as “meta-discourse” and defined hedges as “words used by writers in all professions to convey caution or confidence” (Crismore, 1982); Hübener (1983) defined hedges as “sentence strategies of saying less than one meaning” (Hübener, 1983); Channell (1983) investigated the interpersonal functions of hedges and defined hedges as “a word or phrase used by the speaker or author to express the degree of his or her promise of the truth value of the proposition” (Channell, 1983); Kopple (1985) defined hedges as a type of “validity markers, which let us register necessary doubts or sound small notes of civilized confidences” (Kopple, 1985); Zuck and Zuck (1986) conducted an empirical study on the functions of hedges in news articles and defined hedges in new discourse as “an utterance that reduces the strength of the author’s statement” (Zuck and Zuck, 1986); Brown and Levinson (1988) substantiated the belief that hedges ought to be one of the “negative politeness strategy”, which “is a particle, word, or phrase that modifies the degree of membership of a predicate or a noun phrase in a set” (Brown and Levinson, 1988).

Since the 1990s, empirical research on hedge definition in specific genres from the pragmatic perspective has made considerable progress. Büttmann (1990) implemented hedges on the basis of category theory and defined hedges as “expressions that indicate in which sense a certain sample is assigned to a certain category” (Büttmann and Lauffer, 1990); 3 years later, on the basis of prototype theory, a new hedge definition was propelled by Gippert (1993): “hedges are expressions that indicate in which sense a particular sample is assigned to a certain category” (Gippert, 1993); Yule (1996) defined hedges as “certain kinds of expressions speakers use to mark that they may be in danger of not fully adhering to the principles.” (Yule, 1996); In the same year, a milestone paper on hedge-study, “Nurturing Hedges in the ESP Curriculum”, which promoted the study of hedges in second language learning, was published by Hyland (1996a). It was concluded that hedges are a sort of interactive meta-discourse which should be proposed as “any linguistic means used...
to indicate either (a) a lack of complete commitment to the truth of an accompanying proposition or (b) a desire not to express that commitment categorically” (Hyland, 1996a); In 1997, with research on hedges in academic from a pragmatic perspective, Clemen (1997) defined hedges as “a statement or utterance that can make the hearer more easily accept the speakers’ opinion, preserve the honor of the hearer and the speaker, or avoid conflicts as much as possible” (Clemen, 1997); Markkanen and Schröder (1997) assembled series of empirical hedge research essays and published a proceeding titled “Hedging and Discourse”, in which hedges were regarded as a communication strategy. Most of those qualitative studies generally confirmed that hedges are “modifiers of the writer’s responsibility for the truth value of the propositions expressed or as modifiers of the weightiness of the information given, or the attitude of the writer to the information” (Markkanen and Schröder, 1997).

In this century, hedge definition research is more frequently conducted in several languages and multiple text genres with empirical methods from the pragmatic perspective. In 2008, research explored by Hinkel (2008), which focused on hedges in academic discourse written by non-native English speakers, was conducted. He suggested that “in general terms, hedging represents the use of linguistic devices to decrease the writer’s responsibility for the extent of and the truth value of propositions/claims, to show hesitation or uncertainty, and/or to display politeness and indirectness in order to reduce the imposition on the writer or the reader” (Hinkel, 2008); According to Larcher (2015), who applied research on the definition of hedges in the German language, hedges should be viewed as “a kind of linguistic means that could weaken the strength of the statement or mitigate the degree of assertion” (Larcher, 2015).

Diachronic considered, it can be derived that the grammatical forms of hedge have shown an obvious development from “words” to “phrases and sentences”. Investigated from the functional and pragmatic perspective, the previous studies revealed an obvious trend from “judging its truth value” to “determining its semantic category” and “considering its modal functions”. Given the circumstances that most of the previous hedge definitions included three aspects “elements modified by hedges”, “grammatical forms of hedges” and “functions of hedges”, we also intend to draw a hedge definition including those three elements. Our definition of hedge is manifested as follows:

Hedges are words, phrases, structures or sentences that are attached to utterances with precise meaning (before or after)

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frequency distribution of hedges in Chinese and German academic discourse.

Figure 6. The part of speech distribution of hedges in Chinese and German academic discourse.

"utterances with precise meaning" is not exactly the same as “utterances with precise truth value”, for example: Although the semantic meaning of “warm water”, “boiling water” and “cool water” is very “clear”, the range of their truth value (i.e., how many degrees of water should be considered as boiling water, what about warm water and cool water) is not clarified. Those concepts are regarded as “utterances with vague meaning” which ought to be the opposite concept of “utterances with precise meaning”.

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negotiation, avoiding subjectivity, enhancing credibility, etc. (Yu, 2020).

2.2. Framework of hedge analysis in Chinese and German academic discourse

To investigate the differences/similarities of hedge using in Chinese and German academic discourse, a classification of hedges in academic discourse is needed. In order to clarify the classification criteria of previous researches and construct an appropriate classification for our research, a systematic investigation of the related previous researches is certainly needed. After investigating the related previous research, it can be concluded that the most acceptable classification of hedges follows 2 main principles: “bisection” and “multisection”. The following 2 classification criteria are also followed by previous researchers: “grammatical” and “functional”.

Figure 7. The frequency (per 1000 words) and proportion of 2 subtypes (with “Ich/我” and “Wir/我们” as citation sources) of Attribution-1 in German and Chinese corpus.

Figure 8. The frequency distribution of each hedge-type in Chinese and German academic discourse from 2010 to 2019 (per thousand words).
2.2.1. Bisection principle

According to the principle of bisection, which is mainly followed by early researchers, hedge must be divided into “2 categories” with a classification criteria either from a “grammatical” (Zadeh, 1972) or a “functional” (Channell, 1983; Hyland, 1994, 1996a, 1996b, 1998; Lakoff, 1973; Prince et al., 1982) perspective. A classification from a grammatical perspective focused on the semantic characteristics of the hedge itself and explored the differences in using the two types of hedges, which could contribute to understanding the grammatical forms of hedges. However, the two types of hedges classified from a grammatical perspective do not conform to the classification principle that “there must be an exclusive opposition between categories”, but rather show a clear tendency of “progressive relationship” (Zadeh, 1972). In addition, previous classifications from a grammatical perspective were not validated in context, which may definitely hurt their persuasiveness. By contrast, a classification from a functional perspective analyzes hedges in context and thus helps to recognize the communicative function of hedges in specific genres or communicative scenarios. Among the studies on hedge classification concerning “function” as the main point, prince’s study is particularly the most widely disseminated and highly recognized research. Prince et al. (1982) studied the hedging strategies in physician-physician discourse from a functional perspective and developed the classification in terms of function and systematically divided them into two categories, namely approximators (changing the truth value of the proposition) and shields (describing the relationship between the proposition and the author/speaker, without changing the truth value), which included following four subcategories: “adaptors”, “rounders”, “Plausibility shields” and “Attribution shields”. “Adaptors” could increase the possibilities of the utterance (being true) and represent the nearly-true (but not completely true) assertions in a more decent way, in order to make them seem closer to reality. “Rounders” is usually used to limit the scope of precise concepts such as numbers, in order to make the reader’s original cognition on those precise concepts fuzzier and allow the reader to ignore whether the actual situation is completely consistent with the situation stated in the discourse. “Plausibility shields” directly express the author’s speculations or skepticism towards the topic, while “attribution shields” express the author’s attitude by citing others’ opinions indirectly. Prince’s classification from the functional perspective includes several key criteria such as proposition, truth value, and modality, and thus has been regarded as one of the most efficient
models by many researchers because of its remarkable clarity and operability. Specifically speaking, Prince’s classification uses "communicative discourse" as a corpus and investigates "the interpersonal function of hedges in a likely academic context," which is thought to be applicable to our research object "the international function of hedges in academic discourse." Therefore, it can be used as a fundamental reference for constructing our research framework.

From the above analysis, it can be concluded that classifying with the bisection principle requires us to analyze the contradictory duality features of the object from a dialectical unity perspective so that we can understand the internal contradiction of the object by analyzing it from two opposite sides, recognize the opposition and unification relationship between them, and develop a more comprehensive understanding. Applying the bisection principle to the hedge classification, it can be

Figure 10. Proportion-variations of “lexical” hedges and “non-lexical”hedges from 2010 to 2019 in Chinese and German academic discourse.

Figure 11. The part of speech distribution of hedges Chinese and German academic discourse from 2010 to 2019.
concluded that the bisection principle could remind us that we must deconstruct and dismantle the functions of a certain hedge type from two aspects, which provide us with a basic idea and feasible solution for further subdivision. However, adhering to the “bisection principle” is easily stymied by the stereotype that all objects should only be divided into two types. Therefore, on the basis of the bisection principle, some linguists have further refined the hedge classification in various genres and languages from different pragmatic theories, providing the possibility of a classification with more diverse criteria. That is the so-called “multisection principle” classification method.

2.2.2. Multisection principle

Many researches on analyzing the functions of hedges in various genres and languages from various pragmatic theories has been conducted in order to compensate for the limitations of the bisection principle classification approach and develop a more detailed and comprehensive classification. In the classification based on the multisection principle. Just as the classification with the bisection principle, the classification with the multisection principle also involves 2 criteria: grammatical and functional. In contrast to the bisection principle method from a grammatical perspective, the multisection approach from a grammatical perspective entails a broader range of grammatical forms when classifying hedges, such as modal verbs, modal adverbs, modal particles, cognitive modal notional words, fuzzy expressions, hypothetical utterances, hearsay, objections/concession/restrictive conjunctions, non-subjective sentences, complements, rhetorical questions, and many other grammatical forms (Clemen, 1997, 1998), which provides a broader grammatical forms of hedges from “words” (bisection principle) to “words, phrases, expressions and utterances” (multisection principle).

As a result, it appears that the classification based on a multisection principle approach could be a helpful reference for hedge-identification in this research project. Salager-Meyer’s research is one of the most representative studies based on the multisection principle approach. Salager-Meyer (1994) regarded hedges as a means of expressing politeness, whose functions are deeply affected by many pragmatic factors, such as discourse style and the expression habits of readers and authors.

Figure 12. The frequency (per 1000 words) of 2 subtyps (with “Ich/我” and “Wir/我们” as citation sources) of Attribution-1 from 2010 to 2019 in German and Chinese corpus.

Figure 13. The proportion of 2 subtyps (with “Ich/我” and “Wir/我们” as citation sources) of Attribution-1 from 2010 to 2019 in German and Chinese corpus.
He proposed a new classification of hedges related to politeness theory and divided hedges into 5 categories: a) shields: modal auxiliary verbs that express possibilities (e.g., may), modal adverbs expressing possibilities (e.g., probably) and notional verbs expressing modality (e.g., suggest). b) approximators: fuzziness expressing linguistic devices such as roughly, somewhat, often. c) personal-involvers: personal questioning and directly involving expressing linguistic devices, e.g., we believe. d) emotionally charged intensifiers: linguistic devices which could express the authors’ evaluation attitude towards propositions, e.g., particularly encouraging. e) strings of hedges: hedging sentences e.g., It would seem likely that, It may suggest that. This classification is more detailed, but its criteria are inconsistent (e.g. the criterion for the last type “strings of hedges” is clearly “grammatical”, while the other 4 types are classified from a “functional” perspective). Furthermore, there is some overlap between the types (e.g., type d should theoretically belong to type b), which contradicts the principle that “subtypes/categories should be distinguished definitely from each other without any overlap.”

The multisection principle method provides us with a concept for analyzing hedge functions in specific contexts, which greatly compensates for the limitations of the bisection principle classification approach. However, we discovered that in a multisection classification of hedges (e.g., the classification of Salager-Meyer), some types are categorized by “grammatical forms”, while others are classified by “communicative functions,” creating a problem of “inconsistent classification criterion” that must be solved.

2.2.3. Summary

In terms of classification criteria, previous research on classifying hedges generally proceeds from two criteria: “grammatical” and “functional”, with a trend from the former to the latter. In order to build a proper model for this research, we must also follow this general study tendency, namely, “classifying hedges by their functions”.

In terms of classification methods, the bisection method represented by Prince’s classification has the advantage of “fully decomposing the function of a certain hedge-type from two aspects”, but with this method, a further subdivision of hedge which is highly needed when analyzing the functions of hedges in specific genres seems to be impossible; the multisection method represented by Salager-Meyer’s classification has the advantages of “analyzing hedge functions in specific contexts” and “refining the classification of hedges in specific contexts”. However, the problem of “inconsistent classification criterion” prevents this approach from being used as a model for this study alone. It can be seen that the advantages and disadvantages of the bisection method and multisection approach complement each other. Only by combining these two approaches together (bisection as foundation, and multisection as extension), an accurate and feasible theoretical framework for our research could be constructed.

In conclusion, we intend to comprehensively construct a theoretical framework adapted for analyzing the interpersonal functions of hedges based on the theories of Prince and Salager-Meyer, which includes 2 fundamental categories, 4 categories, and 10 subcategories (see Figure 1 for details) (see Figures 2 and 3).

3. Methodology

The quantitative and qualitative methods are the two most commonly used research methods in linguistic studies. Qualitative research focuses more on the complexity of the language and is thus usually considered to be comprehensive and detail-oriented, while quantitative research which is based on numerous data collections and statistical analyses, is regarded as precise and accurate. Researchers in hedge studies have adopted a variety of approaches that are tailored to their own objectives and perspectives.

Hedge studies from the semantic perspective mostly focus on the semantic ambiguity of hedges, with most study approaches being qualitative. Zadeh (1972) investigated the changing degree of hedge’s semantic fuzzy range using fuzzy using fuzzy logic theory; Lakoff (1973) expands the linguistic form of hedges from lexicon to phrases by employing examples; Wachtel (1977) and Channell (1983) analyze number approximators in authentic corpora and explain the functions of hedges in influencing the truth value of the utterances; Using a qualitative method, Wu (1999) discusses and defines the concept and lexical meaning of hedges in more than 10 languages, pointing out that hedges can be classified according to their positions in sentences, the lexical category of the words being modified or the semantic structure of hedges; Mihatsch (2010) examines rounders and adaptors in French, Italian, Polish, Spanish, German, and English. The results show that adaptors can be transformed into rounders and rounders cannot be transformed into adaptors. In addition to the above studies, linguists such as Shi (1988), Wen and Kuang (1996), Li (1996), Miao (1999), Chen (1993) have also discussed hedges from the semantic perspective. In summary, the semantic fuzziness of hedges is the primary concern of the hedge study from a semantic perspective, and the methodologies used are largely logical reasoning, qualitative research and truth value testing.

Hedge studies from a pragmatic perspective primarily address how hedges in various discourses (academic discourse, legal discourse, political discourse) reflect a certain pragmatic theory (speech act, politeness principle, face theory, adaptation theory), and the research methods are mainly qualitative descriptive (qualitative). Researchers who have studied hedges according to speech act theory usually consider a hedge to be a modifier of a particular speech act (Shoshana and Elite, 1984) that could modify the strength of speech acts (Lakoff, 1973). For this reason, hedge is often named with “performative hedges” (Lakoff, 1973) or “hedged performative” (Fraser, 1980) in these pragmatical researches; Hedge studies from the perspective of the cooperative principle mainly answer the question of how hedge helps speakers to follow the cooperation principle in communication, such studies usually use qualitative analysis to analyze how hedge fulfills the basic requirements of the cooperative principles in a specific communication (Fetzer, 2010); Hedge studies based on politeness principle and face theory focus on how hedge expresses politeness and save the face in communication (Brown and Levinson, 1988). These researchers regard hedge as a strategy to express politeness (Zhou and Qian, 2008), and comply with the politeness principle (Ying and Zhou, 2009); Hedge studies according to adaptation theory mainly contribute to the question how hedge users dynamically adjust themselves and adapt to the demands of listeners/readers in order
to achieve communicative purposes more efficiently. Cui and Miao describe the characteristics of hedges in attorney trial advocacy (taking the lawyer’s trial defense statement in Simpson’s case as corpus) using a qualitative research method guided by adaption theory (Cui and Miao, 2009). In conclusion, hedge studies from a pragmatic perspective are directed at hedges in specific contexts, employing a qualitative method with a combination of various pragmatic theories to investigate hedge functions.

Hedge studies from a second language teaching perspective are trying to answer the question of how the acquisition ability of hedges affects second language learners’ language proficiency. Using a variety of experimental and comparative methods, hedges in foreign language acquisition, foreign language teaching, and foreign language textbooks are explored. Through quantitative analysis of experimental and comparative data, the researchers found that there is a significant difference between second language learners and native English speakers when using hedges in written discourse (Hinkel, 2008). Furthermore, correctly acquiring hedges could improve the students’ reading ability (Crismore & Vande kopple, 1988). Therefore, the variety and number of hedges in foreign language textbooks should be increased (Hyland, 1996b), and teachers should pay much attention to hedges when doing foreign language teaching. In conclusion, hedge studies from the second language teaching perspective, which is regarded to be a subfield of applied linguistics, primarily take hedge acquisition as the research object and follow mainly a quantitative paradigm (such as classification, statistics, and comparison).

Hedge studies from a socio-cultural perspective tend to answer the question of how the social elements (such as language, gender, social status, and occupation) affect the use of hedges. In these research, quantitative methods are the preferred choice. Wu (2012) employed quantitative methods to investigate the differences in hedge usage among 50 participants (male and female) in a chat room; Taking 248 argumentative essays written by Chinese English major students as corpora, Zhu and Xia (Zhu and Xia, 2011) compared the hedges quantitatively in argumentative essays written by Chinese English majors’ students with the hedges used by native English speakers in the same text type, as well as analyzed and studied the correlation relationship between the hedges used by Chinese English majors’ students and their written communicative competence (Zhu and Xia, 2011); Duan (2014) investigated the hedges quantitatively and qualitatively in spoken English among Chinese college students by considering the effects of 3 factors on hedge acquisition: gender, language level of the learners’ and semantic transparency. To sum up, hedge studies from a socio-cultural perspective have been conducted on the similarities and differences of hedges used by people

![Figure 15. The frequency of each type of hedges (per 1000 words) in I, M, RD sections in Chinese and German academic discourse.](image)

![Figure 16. The frequency of hedges per 1,000 words in the I, M, and RD sections in German and Chinese academic discourse from 2010 to 2019 each year.](image)
Figure 17. The frequency of each type of hedges (per 1000 words) in I, M, RD sections in German and Chinese academic discourse from 2010 to 2019.
with different socio-cultural labels (languages, gender, social status, and occupation) and the interpersonal functions of hedges in communication. Quantitative research methodologies were used in the majority of these studies.

It can be stated from the above discussion that semantic and pragmatic hedge research, which mainly regarded the definition of hedges, ontological research of hedges, semantic fuzziness research, and hedge functions in specific genres as the research objects, are mostly conducted in a qualitative method, while studies from a second language teaching perspective, which are mainly investigated quantitatively, are concerned more with how hedge acquisition ability affects the language ability of the second language learners, and how the social elements (such as language, gender, social status, and occupation) affect the use of hedges, and what the interpersonal functions of hedges seem to be. Given the circumstances that our research questions does not concern the definition of hedges, ontological research of hedges, semantic fuzziness research and hedge functions in specific genres, but rather “a comparative study of a same linguistic phenomenon in different languages but in the same genre”, which seems to be resembled to the researches from socio-cultural perspective, it can be inferred that our research requires a quantitative analysis to analyze the interpersonal functions of hedges in Chinese and German academic discourse by taking a considerable amount of academic articles as authentic corpus.

3.1. Perspectives of our quantitative research

From the discussion above, we can infer that quantitative research is more appropriate for our study. However, “from which perspective should we choose to conduct our quantitative research?" is definitely the second most important consideration. In order to achieve comprehensive and systematic results, we must answer the question of “from which perspective should we quantitatively analyze the corpus?” First of all, it is certainly necessary to know the frequency and distribution of different types of hedges in both Chinese and German corpora in general. Additionally, it has been demonstrated that 3 relevant theories can also provide more workable references for our quantitative research: “genre
analysis” represented by Swales (1990), “multidimensional analysis” represented by Biber (1988), and “system-functional analysis” by Halliday.

After analyzing the theoretical emphasis and application scope of those above academic discourse research theories from the dimensions of “macro or micro”, “commonality or individuality”, “process or text”, and “diachronic or synchronic”, we concluded that, measured by the “macro or micro” dimension, genre analysis places a greater emphasis on the macro structure of academic discourse, such as analyzing the whole discourse structure of theses and dissertations, or investigating certain parts (for example, abstract or introduction) of the academic discourse. The multidimensional analysis is more concerned with the micro-level, such as language features. According to the multidimensional analysis, the “interactivity of a particular discourse” could generally be measured by 67 linguistic characteristics summarized in 7 dimensions (“involved versus informational production”, “narrative versus non-narrative discourse”, “situation-dependent versus elaborated reference”, “overt expression of persuasion”, “abstract versus non-abstract style”, “on-line information elaboration” and “academic hedging”). Every dimension has 2 values, either regarded as “positive” or “negative” (except dimension 7 which only has one “positive feature”). When the “positive” features are used more frequently in text A than in text B, it can be concluded that text A is more “interactive” than text B. The sub-classification of “adaptors” and “attributions” in the theoretical framework could also be considered a result of this dichotomous idea.1 The system-functional analysis not only pays attention to the micro-level, for example, observing the mood and the modality of the utterance, which could reveal the status/position/attitude/motivation of the speakers’ but also highlights the macro-structural analysis in order to reveal the functions of the whole discourse.

On the dimension of “commonality or individuality”, it is concluded that genre research on academic discourses has gradually expanded from focusing on the commonality of different academic genres to investigating the individual characteristics of academic articles of different disciplines. The multidimensional analysis mainly discusses the individual differences between academic discourses from the 7 designated dimensions. Just as in the multidimensional analysis, the system-functional analysis also focuses on the individual differences between different genres of academic discourse.

In terms of “concerning more process or text”, it is detected that these 3 all take “text” itself as their main research object. On the issue of answering the question “diachronic or synchronic”, it is widely accepted that the genre analysis is deeply rooted in synchronicity, while the other 2 analyses focus more on the diachronic development of academic discourse. In short, the characteristics of the former mentioned 3 main theoretical research perspectives are summarized in Table 2: (see Tables 3 and 4)

To construct a quantitative framework for this research, it is necessary to observe the corpus from these 3 perspectives, namely “genre analysis”, “multidimensional analysis”, and “system-functional analysis”. Besides those 3 perspectives, an “overall distribution” is also needed, which (as mentioned at the very beginning of section 3.1) contributes to calculating the frequency and distribution of different types of hedges in both Chinese and German corpora in general. In this way, a quantitative analysis framework for analyzing the interpersonal functions of hedges in Chinese-German academic discourse is successfully constructed as follows (in Results & Discussion, we will follow this quantitative analysis framework to demonstrate our quantitative study):

3.2. Corpora

3.2.1. Corpora collection

To assure the comparability of the corpus, we followed the following criteria when collecting the corpus:

1. Academic field: linguistic research (applied linguistic research).
2. Journal source: influential journals of German and Chinese linguistic.

German Journals: Zeitschrift für Sprachwissenschaft, Zeitschrift für Dialektologie und Linguistik, Zeitschrift für Angewandte Linguistik, Zeitschrift für germanistische Linguistik, Zeitschrift für Literaturwissenschaft und Linguistik.

Chinese Journals: 世界汉语教学 (Chinese Teaching in the World), 当代修辞学 (Contemporary Rhetoric), 语言文学应用 (Applied Linguistics), 语言教学与研究 (Language Teaching and Linguistic Studies), 当代语言学 (Contemporary Linguistics), 中国语文 (Studies of the Chinese Language), 汉语学报 (Chinese Linguistics), 语言研究 (Linguistic Research), 汉语学习 (Chinese Language Learning), 语言学研究 (Studies in Language and Linguistics), 方言 (Dialect), 民族语文 (Minority Languages of China), 古汉语研究 (Research in Ancient Chinese Language), 语言科学 (Linguistic Sciences), 语文建设 (Language Planning).

3. Time scope: academic articles from 2010 to 2019.
4. Sample size: 170 German academic articles and 170 Chinese academic articles.
5. Sampling method: “Simple random sampling” (see appendix 1).

In addition to the above measurements, 2 extra metrics should also be added to our quantitative research, namely “type-token ratio” and “average sentence length”, which could possibly contribute to revealing the lexical richness in order to describe the corpus more comprehensively. Based on the corpus collection criteria above, the basic characteristics of the corpora we have selected are described as follows:

3.2.2. Corpora cleaning

Only the cleaned corpus can ensure the accuracy of computer recognition, manual annotation, and quantitative data analysis. In our research, the corpora were processed as follows: Convert PDF format to TXT (UTF-8) format, unite full-width characters and half-width characters, unite punctuation, delete figures and tables, delete acknowledgment, delete headers and footers, delete references, delete notes, delete example sentences. In order to complete the corpus cleaning efficiently, both manual and computer methods were employed. Specifically speaking, the deletion of acknowledgment, headers and footers, references and example sentences will be done manually, while converting PDF format to TXT (UTF-8) format, uniting full-width characters and half-width characters, uniting punctuation, and deleting figures and tables can be done by matlab programming.

3.3. Hedge extraction

Corpus tagging is a process of identifying a target language phenomenon. It converts the “raw corpus” into a “tagged corpus”, providing language researchers with a wealth of useful information while also facilitating the quantitative calculation processing, which is an essential step in language research. The first step of tagging is to determine the tag type. In order to make the whole quantitative processing simpler and more convenient, we chose the XML tagging type known as a paired tag when the tag consists of an opening tag (<p>) and a closing tag (<p>) as its companion tag.

After specifying the tag type, we need to standardize the manual hedge-annotation principles. Because of the numerous grammatical variations and the rich diversity of pragmatic meanings, recognizing hedges becomes an unavoidable and difficult problem for every linguist.
who wants to identify them. On the basis of previous research, we followed the following 2 steps.

Step 1, two native language speakers with a linguistic background are selected as annotators. After explaining the concept and the framework (classification) of our research, they are asked to annotate the hedges according to their own understanding. During the whole annotation process, the two annotators are not allowed to communicate with each other. After the whole annotation was completed, the two annotators compared their results. An expression will be determined as a hedge when it has been given the same code by both of the two annotators. If the original meaning and modality strength of the newly generated sentence have not changed after the replacement, it can be concluded that the word “may” in the original sentences is a hedge, otherwise not. With this method, we can tell that “may” in “He may be a good father” is a hedge, while “may” in “May I come in?” is not; “Phrase adding test” suggests us adding a phrase “but I’m not sure” to a proposition that contains a fuzzy expression. If the newly generated utterance is considered to be natural and appropriate, the former fuzzy expression could be determined as a hedge, otherwise not. With this method, we can tell that the word “suggest” in “I suggest that this might be the fact.” is a hedge, while “suggest” in “I suggest you a good dictionary.” is not.

4. Results and discussion

4.1. Overall distribution

4.1.1. Synchronic dimension

1. Question: What is the frequency distribution per thousand words for each hedge in Chinese and German academic discourse? Are there any significant differences between the Chinese corpus and the German corpus?

Discussion and conclusion: in terms of the overall numbers, the frequency of hedges per thousand words in German academic discourse (i.e. 6.44 [Adaptor-1] + 4.57 [Adaptor-2] + 0.67 [Rounder-1] + 0.80 [Rounder-2] + 9.14 [Attribution-1] + 63.56 [Plausibility-1] + 10.41 [Plausibility-2] + 23.29 [Plausibility-3] + 22.23 [Attribution-1] + 1.23 [Attribution-2] = 133.20) is significantly higher than that in Chinese academic discourse (2.01 [Adaptor-1] + 4.08 [Adaptor-2] + 2.59 [Rounder-1] + 0.25 [Rounder-2] + 0 [Rounder-3] + 21.59 [Plausibility-1] + 13.64 [Plausibility-2] + 7.62 [Plausibility-3] + 9.14 [Attribution-1] - 0.66 [Attribution-2] = 61.58), which implies that the German researchers are more inclined to use more hedges while writing academic articles either to “modify the range of the truth value” or “change the strength of the expression”, while Chinese academic writers prefer relatively fewer hedges in academic writing to guarantee the certainty of their opinions to a certain extent. The most frequently used hedges in both Chinese and German academic discourse are in Plausibility-1, from which it can be inferred that the authors of Chinese and German researchers all prefer to use hedges as a strategy of “expressing the strength of the utterance” rather than “modifying the range of the truth value”.

Figure 20. The frequency of plausibility and attribution (including their subtypes) per 1,000 words in Chinese and German academic discourse.

Figure 21. Co-occurrence pattern of plausibility and attribution.

If the original meaning and modality strength of the newly generated sentence have not changed after the replacement, it can be concluded that the word “may” in the original sentences is a hedge, otherwise not. With this method, we can tell that “may” in “He may be a good father” is a hedge, while “may” in “May I come in?” is not; “Phrase adding test” suggests us adding a phrase “but I’m not sure” to a proposition that contains a fuzzy expression. If the newly generated utterance is considered to be natural and appropriate, the former fuzzy expression could be determined as a hedge, otherwise not. With this method, we can tell that the word “suggest” in “I suggest that this might be the fact.” is a hedge, while “suggest” in “I suggest you a good dictionary.” is not.

7 Since most empirical linguistic research articles present the results and discussion together and a section, this paper will also follow this pattern.
2. Question: What is the frequency of hedges with two kinds of interpersonal functions at the same time⁴ in Chinese and German academic discourses? How many hedge combinations occur? Which kinds of combinations are considered the most common? Is there a distinction between Chinese and German?

Discussion and conclusion: In regard to the overall number, the hedge-combinations in German academic discourses (16 combinations) provide an even greater variety of forms than those in Chinese academic discourse (9 combinations), while the absolute number of hedge combinations in Chinese academic discourse (437 + 45 + 19 + 18 + 9 + 4 + 4 + 4 + 2 = 542) is larger than that in German academic discourse (35 + 33 + 22 + 19 + 10 + 7 + 6 + 5 + 4 + 2 + 2 + 1 + 1 + 1 + 1 = 135); In terms of each combination, it is concluded that the combination of Attribution-2 and Plausibility-1 are used most frequently in German academic articles, and the combination of Attribution-1 and Plausibility-2 appears most frequently in Chinese academic discourse, which indicates that the Chinese researchers prefer to choose the hedge with a medium modality (namely Plausibility-2) to maintain the strength of the modality and highlight the objectivity of their opinion. On the other hand, the German researchers are willing to use the hedge with the weakest modality (namely Plausibility-1) to emphasize their own opinions even without combining them with any citing sources (Attribution-2). This demonstrates to a certain extent that the German researchers are more “domineering oriented” in expressing their own views than the Chinese researchers.

3. Question: What is the proportion of “lexical” and “non-lexical” hedges in Chinese and German academic discourse? Is there a distinction between Chinese and German?

Discussion and conclusion: From Figure 5, we can see that in both German and Chinese corpora, “non-lexical” hedges are all the overwhelming majority, with a percentage of 87% and 69%, while the percentage of “lexical” hedges only occupy 13% and 31%. This indicates that both the Chinese and German researchers all prefer to use phrases and sentences as hedge strategies rather than words. It can also be inferred that “hedges are more easily identified by their pragmatic meanings within the context than by their lexical meanings.” The difference in the proportion of “lexical” and “non-lexical” hedges in the German and Chinese corpora shows that Chinese researchers prefer to use more “lexical” and fewer “non-lexical” hedges compared to German researchers, which to a certain extent indicates that the Chinese lexicon is more capable of expressing hedging modality than the German words.

4. Question: What is the part of speech distribution of hedges in Chinese and German academic discourse? Is there a distinction between Chinese and German?

Discussion and conclusion: From Figure 6, we can observe that the most often used hedges in German academic discourse are nouns, while the Chinese researchers prefer to use verbs, which further supports the statement of some Chinese linguists that “Chinese is a verbly language” (Liu, 2010).

5. Question: What is the frequency (per 1000 words) of Attribution-1, which takes “Ich” and “Wir” as citation sources, in German academic discourse? What is the proportion of each subtype in Attribution-1 of German academic discourse? What about the frequency and the proportion of these two subtypes (with “我们” and “我们” as citation sources) of Attribution-1 in the Chinese corpus?

Discussion and conclusion: The left part of Figure 7 shows that the number of the Attribution-1 with the Chinese first-person singular pronoun “我” (0.0013) as citation source in the Chinese corpus is much lower than that of the Attribution-1 with the Chinese first-person plural pronoun “我们” (0.4761), while the situation in the German corpus is exactly the opposite (“Ich” as citation source 0.0867, “Wir” as citation source 0.0098), which demonstrates that Chinese researchers usually prefer collectivism-oriented expression when advocating their own views, in order to enhance the authority and credibility of their

⁴ In the corpus, “a hedge with two kinds of interpersonal functions at the same time” is usually represented as a linguistic unit tagged with two labels, e.g. `<Adaptor-1><Plausibility-1>sehr</Plausibility-1></Adaptor-1>`, which means that “sehr” can be classified as both Adaptor-1 and Plausibility-1.

⁵ How do computer programs retrieve the “lexical” hedges? The searching principle is to let the computer program count the frequency of those hedges which only consist of one character and annotated also with one paired tag(for example `<Adaptor-1>sehr</Adaptor-1>`). In addition, it should be noted that since the annotation of the Futur II(in German corpus) is also done by interposing a paired XML tag with one verb in Futur II form(e.g. `<Plausibility-1>wäre</Plausibility-1>`), it is necessary to remove these examples manually when calculating the number of German “lexical” hedges. It is also important to be aware that the Chinese corpus needs to be segmented before computer processing.

⁶ The number of non-lexical hedges(e.g. `<Plausibility-1>in gewisser Malen</Plausibility-1>`) is obtained by subtracting the number of lexical hedges from the total number of hedges in the corpus.

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Figure 22. The frequency variations of plausibility and attribution (including their subtypes) per 1,000 words in Chinese and German academic discourse from 2010 to 2019.
arguments. On the contrary, German researchers prefer to use the first-person singular pronoun “Ich” as a citation source in order to emphasize and highlight their own views. Combined with the right part of Figure 7, it can be also concluded that Attribution-1 in the Chinese corpus with the citation sources of “我” and “我们” accounts for 52% of the total number, while Attribution-1 in the German corpus with the citation sources of “Ich” and “Wir” takes up 5% of the total number. These significant differences tell us that the German researchers are more likely to cite the names of the cited scholars than the citation source directly, so as to clarify the objectivity of their own ideas (the citation source of Attribution-1 includes only 3 types: “Ich”, “我们”, and cite the name of the cited scholars directly).

4.1.2. Diachronic dimension

1. Question: How does the frequency distribution of each type of hedge in Chinese and German academic discourse change from 2010 to 2019? Do Chinese and German differ significantly from one another?

Discussion and conclusion: the variation trends of each hedge type in Chinese and German academic discourse from 2010 to 2019 were subjected to significance tests (non-parametric testing for two independent samples), and the results ((Adaptor-2 [P > 0.05], Rounder-3 [P > 0.05], Plausibility-1 [P > 0.05] and Plausibility-3 [P > 0.05])) revealed no significant differences; Whereas, significant differences are found in the variation trends from 2010 to 2019 of 3 hedge-types (Adaptor-2 [0.01 < P*<0.05], Plausibility-2 [0.01 < P*<0.05], Attribution-2 [0.01 < P*<0.05]); The differences between Adaptor-1 (p**<0.01), Rounder-1 (p**<0.01) and Attribution-1 (p**<0.01) are considered highly significant. This illustrates that from 2010 to 2019, there is no significant difference in using the following 4 types of hedging strategies, namely vagueness increasing adaptors (Adaptor-2), range rounders (Rounder-3), weak possibility/habituation/responsibility/inclination plausibility (Plausibility-1), and strong possibility/habituation/responsibility/inclination plausibility (Plausibility-3), between Chinese and German researchers, while a more pronounced difference emerges in the using other 3 types of hedging strategies, namely vagueness reducing adaptors (Adaptor-1), quantity rounders (Rounder-1), attribution shields with citation (Attribution-1). By observing the changes of the last 3 types of hedging strategies from 2010 to 2019 in both Chinese and German academic discourse, we further discovered: vagueness reducing adaptors (Adaptor-1), quantity rounders (Rounder-1) and attribution shields with citation (Attribution-1) hedges in Chinese academic discourse fluctuate more dramatically from 2010 to 2019 than those in German academic discourse, and the German scholars demonstrate a more stable and consistent decreasing inclination to use these 3 types of hedges while writing academic articles. Therefore, it can be inferred that from 2010 to 2019, Chinese researchers held very different views on using these 3 types of hedges while writing academic articles, which means that, these 3 types have not yet been definitively accepted as “standard academic expressions” by both Chinese and German researchers. The only difference may be that a controversy still exists among Chinese scholars on “whether these 3 types of hedging strategies should be used in academic discourse,” while German researchers have basically reached an agreement with a negative answer.

2. Question: what is the frequency of hedges with two kinds of interpersonal functions at the same time German academic discourses from 2010 to 2019, which hedge-combination are considered the most common one in each year? what is the frequency of hedges with two kinds of interpersonal functions at the same time Chinese academic discourse from 2010 to 2019? Do Chinese and German differ significantly from one another?

Figure 23. Co-occurrence pattern of plausibility and attribution from 2010 to 2019.
discourses from 2010 to 2019, which hedge-combination are considered the most common one in each year? Are there any differences between Chinese and German?

Discussion and conclusion: from Figure 9, we can find that the diversity of hedge-combinations in Chinese and German academic discourse shows a general trend of “from decreasing to increasing”, i.e., decreasing from 2010 to 2014/2015 and increasing from 2014/2015 to 2019, with 2015 as the turning point; Among the hedge-combinations in Chinese academic discourse from 2010 to 2019, the combination of “Attribution-1” is always the most common one, while in the hedge-combinations in German academic discourse from 2010 to 2019, the most commonly used hedge-combinations are obviously more diversified.

3. Question: What is the proportion of “lexical” and “non-lexical” hedges in Chinese and German academic discourse each year from 2010 to 2019? Are there any significant differences between the variations of Chinese “lexical” hedges from 2010 to 2019 and the variations of German “lexical” hedges from 2010 to 2019? What about “non-lexical” hedges?

Discussion and conclusion: No significant difference is found when comparing the proportion-variations of “lexical” hedges from 2010 to 2019 in Chinese academic discourse to the proportion-variations of “lexical” hedges from 2010 to 2019 in German discourse. The same result is obtained using the same test between the proportion-variations of “non-lexical” hedges in academic discourse from 2010 to 2019 and German discourse from 2010 to 2019 (P > 0.05). This reveals that from 2010 to 2019, neither Chinese academic discourse writers nor German academic discourse writers notably changed their preference in using “lexical” hedges or “non-lexical” hedges.

4. Question: What is the part of speech distribution of hedges in Chinese and German academic discourse from 2010 to 2019 each year? Are there any differences between Chinese and German?

Discussion and conclusion: from Figure 11, we can observe that the most common used hedge-form in German academic discourse from 2010 to 2019 is the noun, while the verb is the most frequently used grammar form of hedges in Chinese academic discourse, which further supports the statement that “Chinese is a very language (Liu, 2010)”. The figures also show that the noun is the most common used hedge compared to other nine types in introduction, method and result/discussion of Chinese and German academic discourse, which could make us draw the inference that both the Chinese and German researchers all prefer to use more “weak modality expressing-strategies” in describing facts and stating opinions, so as to emphasize their conservativeness and caution.

4.2. Quantitative research based on the IMRD model

4.2.1. Synchronic dimension

1. Question: What is the frequency of hedges per 1,000 words in the I, M, and RD sections in Chinese and German academic discourse?

Discussion and conclusion: From Figure 14 illustrates that hedges are most frequently used in the “Result & Discussion” section and most rarely used in the “Method” section. Given the circumstances that researchers express their views commonly in the “Result & Discussion” section and describe the experiment in the “Method” section, it can be inferred that hedging strategy is mostly used to express one’s academic opinions and takes on the interpersonal function of “modifying the strength of the utterance in academic discourse”.

2. Question: What is the frequency of each type of hedges (per 1000 words) in I, M, RD sections in Chinese and German academic discourse?

Discussion and conclusion: After performing a significance test on the frequency variations of hedges in Introduction, Method and Result & Discussion from 2010 to 2019 between Chinese and German academic discourse, it can be concluded that the frequency variations of hedges from 2010 to 2019 in the Introduction section of Chinese and German academic discourse demonstrate a significant difference (p < 0.01). The same results are also obtained in the other 2 sections, with a p-value less than 0.01. This implies that from 2010 to 2019, the Chinese and German researchers not only differ in “describing the facts”, but also varied in “elaborating opinions.”

2. Questions: What is the frequency of each type of hedges (per 1000 words) in I, M, RD sections in Chinese academic discourse from 2010 to 2019? What is the frequency of each type of hedges (per 1000 words) in I, M, RD sections in Chinese academic discourse from 2010 to 2019?

Discussion and conclusion: After conducting significance tests on the frequency variations of every hedge-types in Introduction, Method and Result & Discussion from 2010 to 2019 between Chinese and German academic discourse, it is concluded that an obvious significant difference (p < 0.01) is found in the variations of following 4 hedge-types in the Introduction section from 2010 to 2019 between Chinese and German academic discourse: Attribution-1, Plausibility-1, Plausibility-3, Rounder-1. Hedge-types with significant difference (0.01 < p < 0.05) are: Adaptor-1 and Attribution-2. Hedge-types without significant difference (p > 0.05) are: Adaptor-2, Plausibility-2 and Rounder-2. The figure also shows clearly that during the past 10 years, the German researchers prefer to use more Attribution-1, Plausibility-1, Plausibility-3, Adaptor-1 and Attribution-2 in the Introduction section than Chinese researchers, while the latter prefer to use more Rounder-1 in the same section than the former. According to this, it can be inferred that during the past 10 years, the Chinese scholars use more approximators in the Introduction section which contribute more to modifying numbers in order to “make the utterance much closer to be true”, while the German researchers prefer to use more shields in
the same section to modifying the modality strength in order to “mitigate the affirmative tone”.

In the Method section, an obvious significant difference (p**<0.01) is found in the variations of the following 5 hedge-types from 2010 to 2019 between Chinese and German academic discourse: Adaptor-1, Attribution-1, Plausibility-1, Plausibility-3 and Rounder-1. Hedge-type with a significant difference (0.01 < p<0.05) is Attribution-2. Hedge-types without significant differences (p > 0.05) are: Adaptor-2, Plausibility-2, and Rounder-2. The figure also shows clearly that during the past 10 years, German researchers preferred to use more Adaptor-1, Attribution-1, Attribution-2, Plausibility-1, and Plausibility-3 in the Method section than Chinese researchers, while the latter preferred to use more Rounder-1 in the same section than the former. According to this, it can be inferred that during the past 10 years, Chinese scholars used more approximators in the Method section, which contributed more to modifying numbers in order to “make the utterance much closer to being true,” while German researchers preferred to use more shields in the same section to modify the modality strength in order to “mitigate the affirmative tone.”

In the Result & Discussion section, an obvious significant difference (p**<0.01) is found in the variations of the following 4 hedge-types from 2010 to 2019 between Chinese and German academic discourse: Plausibility-1, Plausibility-2, Plausibility-3 and Rounder-1. Hedge-type with a significant difference (0.01 < p<0.05) is Adaptor-1. Hedge-types without significant differences (p > 0.05) are: Adaptor-2, Attribution-1, Attribution-2, and Rounder-2. The figure also shows clearly that during the past 10 years, German researchers preferred to use more Plausibility-1, Plausibility-2, Plausibility-3, and Adaptor-1 in the Result & Discussion section than Chinese researchers, while the latter preferred to use more Rounder-1 in the same section than the former. According to this, it can be inferred that during the past 10 years, Chinese scholars used more approximators in the Result & Discussion section, which contributed more to modifying numbers in order to “make the utterance much closer to being true,” while German researchers preferred to use more shields in the same section to modify the modality strength in order to “mitigate the affirmative tone.”

4.3. Quantitative research based on multidimensional method

Since it has been mentioned in section 3.1 (page 16) that the multidimensional analysis method is closely related to the sub-classification of “adaptors” and “attributions”, quantitative research conducted in this section will only involve these 2 hedge-types and their subtypes.

4.3.1. Synchronic dimension

Question: What is the frequency of adaptor and attribution per 1,000 words and their co-occurrence pattern in Chinese and German academic discourse?

Discussion and conclusion: from the 2 figures in Figure 18, we can notice that adaptor and attribution are used more frequently in the German corpus (adaptor: 11.09, attribution: 23.46) than in the Chinese corpus (adaptor: 6.09, attribution: 9.81). According to multidimensional analysis, which provides a computational technique by calculating the frequency of 67 linguistic characteristics summarized in 7 dimensions in written genres, the “interactivity of a particular discourse” can generally be measured. In order to know “whether the Chinese and German academic discourse is a kind of discourse with strong interactivity or not”, we consider the “vagueness increasing adaptors (adaptor-2)” and “attribution shields without citation (attribution-2)” as “positive academic hedging”, while the “vagueness reducing adaptors (adaptor-1)” and “attribution shields with citation (attribution-1)” will be regarded as “negative academic hedging”. According to the principle of multidimensional analysis - “the more positive values, the stronger the interactivity” - and the fact shown in Figure 18 that both in German and Chinese corpus, the number of hedge with negative value “Adaptor-1 (Chinese: 2.01 German: 6.44) + Attribution-1 (Chinese: 9.14 German:22.22)” is much larger than the number of hedge-combinations with positive value “Adaptor-2 (Chinese: 4.07 German: 4.56) + Attribution-2 (Chinese: 0.66 German: 1.23),” it can be inferred that “the interactivity of both Chinese and German academic discourses is all considered weak.”

4.3.2. Diachronic dimension

Question: What is the frequency of adaptor and attribution per 1,000 words and in Chinese and German academic discourse from 2010 to 2019?

Discussion and conclusion: It can be observed in Figure 19 that the frequency of adaptors in Chinese academic discourse each year from 2010 to 2019 is less than that in German academic discourse during the same period. In addition, we can also see that the variation of adaptors in German academic discourse from 2010 to 2019 fluctuates more significantly (p**<0.01) than that in Chinese academic discourse during the same 10 years, which could possibly be attributed to adaptor-1 because of the significant differences of adaptor-1 from 2010 to 2019 between Chinese and German academic discourse (p**<0.01) and no significant differences of adaptor-2 from 2010 to 2019 between Chinese and German academic discourse (p > 0.05). These facts indicate that the German academic writers from 2010 to 2019 each year showed greater diversity and individualization in choosing adaptors as a hedging strategy than the Chinese researchers, mainly because they preferred to use more adaptor-1 than the Chinese researchers so as to make the modified propositions more precise and enhance the persuasiveness of their own academic views.

As for attribution from 2010 to 2019, we found that the variation of attribution in German academic discourse during this period fluctuated significantly more dramatically (p**<0.01) than that in Chinese academic discourse, which could possibly be attributed to attribution-1 because of the significant differences of attribution-1 from 2010 to 2019 between Chinese and German academic discourse (p**<0.01) and no significant differences of adaptor-2 from 2010 to 2019 between Chinese and German academic discourse (p > 0.05). These facts indicate that the German academic writers from 2010 to 2019 each year showed more diversity and individualization in choosing attributions as a hedging strategy than the Chinese researchers, mainly because they prefer to use more attribution-1 than the Chinese researchers so as to demonstrate and support the objectivity of their own academic views and strengthen the persuasiveness of the proposition.

4.4. Quantitative research based on systemic-functional linguistic

Since it has been mentioned in the theoretical framework that the classification of “plausibility” is based on the concept of “modal value” from systemic-functional linguistics, the quantitative research conducted in this section must include this hedge-type. In addition, since it has already been proved in Figures 4 and 5 that “attribution” is the most frequently used hedge-type combined with “plausibility”, “attribution” must also be further observed in this section, which may contribute to revealing the interpersonal functions of these 2 kinds of hedges by investigating the interconnections and interactions between “speaker” (the same with citation source in attribution) and the mood (declarative, interrogative, exclamative, and imperative in the sense of systemic functional linguistics), the frequency of attribution and its co-occurrence with plausibility should also be discussed in this section (see Figures 8, 16, and 17, and 23).

4.4.1. Synchronic dimension

Question: What is the frequency of plausibility (Plausibility-1 + Plausibility-2 + Plausibility-3) and attribution (Attribution-1 + Attribution-2) per 1,000 words and their co-occurrence pattern in Chinese and German academic discourse?

Discussion and conclusion: based on the concept of modal value of systemic functional linguistics, plausibility was classified into the following 3 subtypes: weak possibility/habituation/responsibility/
inclusion (plausibility-1), medium possibility/habituation/responsibility/inclination (plausibility-2), strong possibility/habituation/responsibility/inclination (plausibility-3). As Figure 20 shows, the weak possibility/habituation/responsibility/inclination (plausibility-1) is the most frequently used shields both in German (63.56) and Chinese (21.59) academic discourse, which indicates that both Chinese and German researchers all prefer to use more “conservative and cautious oriented” models in order to avoid being arbitrary and impolite.

Discussion and conclusion: from the co-occurrence pattern of plausibility and attribution, we can see that the hedge-combination of “attribution-1+plausibility-2” (0.57) is used most frequently in Chinese academic discourse, while in German academic discourse, the most frequent combination is “attribution-2 + plausibility-1” (0.031). In addition, it is also shown in Figure 21 that the hedge-combination “attribution-2 + plausibility-1” is used much more frequently in German academic discourse (0.031) than in Chinese academic discourse (0.005). Since we have been able to determine in the analysis of the authentic corpus that the hedge-combination “attribution-1+plausibility-2” is related more to the imperative mood of systemic functional linguistics, while the hedge-combinations “attribution-2 + plausibility-1” correspond more to the interrogative mood of systemic functional linguistics, it can be inferred that the Chinese researchers prefer to use more “hedge-combinations with strong modality expressing ability” to enhance the imperative mood of the utterance, while the German scholars prefer “hedge-combinations with weak modality expressing ability” to stress the interrogative mood, which further confirms the conclusion conducted in Figure 10 “the Chinese researchers usually prefer collectivism-oriented expression when advocating their own views, in order to enhance the authority and credibility of their arguments”.

4.4.2. Diachronic dimension

Question: What is the frequency of plausibility (Plausibility-1 + Plausibility-2 + Plausibility-3) and attribution (Attribution-1 + Attribution-2) per 1,000 words and their co-occurrence pattern in Chinese and German academic discourse from 2010 to 2019?

Discussion and conclusion: in Figure 22, the frequency variations of plausibility and attribution from 2010 to 2019 in Chinese and German academic discourse are illustrated. By conducting a significance test on these 2 types of hedge within the last 10 years between Chinese and German academic discourse, we are able to assert that an obvious significance is found between the variations of plausibility in Chinese academic discourse from 2010 to 2019 and the variations of plausibility in German academic discourse during the same time period (p*<0.01). So with the attribution, which indicates that from 2010 to 2019, the Chinese used plausibility and attribution very differently from the German researchers.

Discussion and conclusion: by observing and calculating the co-occurrence pattern of the 3 subtypes of plausibility and the 2 subtypes of attribution, we found that the following 4 hedge-combinations used in Chinese and German academic discourse from 2010 to 2019 is considered to have great significant differences (p*<0.01), namely “attribution-1 + plausibility-1”, “attribution-1 + plausibility-2”, “attribution-2 + plausibility-2” and “attribution-2 + plausibility-3”. The one who shows a significant difference (0.01 < p*<0.05) is “attribution-2+plausibility-1”. Hedge-combination without significant difference is proved to be “attribution-1 + plausibility-3”. This explains the difference in selecting these 5 hedge-combinations between Chinese and German academic researchers during the last 10 years, namely “attribution shields with citation + weak possibility/habituation/responsibility/inclination plausibility”, “attribution shields with citation + medium possibility/habituation/responsibility/inclination plausibility”, “attribution shields with citation + strong possibility/habituation/responsibility/inclination plausibility” and “attribution shields without citation + weak possibility/habituation/responsibility/inclination plausibility”. In addition, it can be also observed in Figure 29 that among these 5 hedge-combinations, there are 3 of them (“attribution shields with citation + weak possibility/habituation/responsibility/inclination plausibility”, “attribution shields with citation + medium possibility/habituation/responsibility/inclination plausibility”, “attribution shields without citation + medium possibility/habituation/responsibility/inclination plausibility”) in which Chinese researchers are used more frequently than German researchers, and 2 of them (“attribution shields without citation + weak possibility/habituation/responsibility/inclination plausibility”, “attribution shields with citation + strong possibility/habituation/responsibility/inclination plausibility”) in which the German researchers are used more frequently than Chinese scholars. We can infer that from 2010 to 2019, the Chinese academic writers prefer to use more “plausibility with medium modality value” when demonstrating their views, regardless of whether the citation source is explicitly stated or not, so as to ensure the strength of their own arguments. The German researchers, on the other hand, used more “plausibility with weak modality value” (especially after 2015) when combined with “attribution shields without citation” in order to emphasize their cautious attitude.

5. Discussion and conclusion: by observing and calculating the co-occurrence pattern of plausibility and attribution, we can see that the hedge-combination of “attribution-1+plausibility-2” (0.57) is used most frequently in Chinese academic discourse, while in German academic discourse, the most frequent combination is “attribution-2 + plausibility-1” (0.031). In addition, it is also shown in Figure 21 that the hedge-combination “attribution-2 + plausibility-1” is used much more frequently in German academic discourse (0.031) than in Chinese academic discourse (0.005). Since we have been able to determine in the analysis of the authentic corpus that the hedge-combination “attribution-1+plausibility-2” is related more to the imperative mood of systemic functional linguistics, while the hedge-combinations “attribution-2 + plausibility-1” correspond more to the interrogative mood of systemic functional linguistics, it can be inferred that the Chinese researchers prefer to use more “hedge-combinations with strong modality expressing ability” to enhance the imperative mood of the utterance, while the German scholars prefer “hedge-combinations with weak modality expressing ability” to stress the interrogative mood, which further confirms the conclusion conducted in Figure 10 “the Chinese researchers usually prefer collectivism-oriented expression when advocating their own views, in order to enhance the authority and credibility of their arguments”.

5. Fazit

On the basis of using MatLab as programming tools, performing significance tests and analyzing the corpus from 3 basic theories adapted to academic discourse analysis (IMRD, multidimensional analysis, and systemic function method), quantitative research from both diachronic and synchronic dimensions on the overall distribution of hedges in Chinese and German academic discourse, their distribution in Introduction/Method/Result & Discussion sections, and their multidimensional and systemic functional co-occurrence was conducted. The following conclusions were reached:

5.1. Similarities of hedge-using in Chinese and German academic discourse

(1) The Chinese and German researchers prefer to use more hedge while “modifying the strength of the discourse” than “describing facts”.

(2) The Chinese and German academic researchers tend to use more “non-lexical hedges (phrases and sentences)” rather than “lexical hedges (words)”. 

(3) The diversity of hedge-combinations in Chinese and German academic discourse, which perform 2 interpersonal functions at the same time, shows a general trend of “from decreasing to increasing”, i.e., decreasing from 2010 to 2014/2015 and increasing from 2014/2015 to 2019, with 2015 as the turning point.

(4) From 2010 to 2019, Chinese and German researchers show no significant differences in choosing “lexical” and “non-lexical” hedges while writing academic articles.

(5) Both the Chinese and German researchers prefer to use more hedges in the Result & Discussion section - a part of academic articles, which mainly aims to “express one’s opinion”-, in order to “modify the strength of the utterance”.

(6) Both the Chinese and German researchers prefer “weak/medium modal expressions” in order to emphasize their conservatism and caution and ensure the strength of their expressions.

(7) The differences in choosing hedging strategies between Chinese and German academic writers from 2010 to 2019 exist not only in “facts-describing sections (introduction + Method)”, but also in the “opinion-presenting section (Result & Discussion)”.

5.2. Differences of hedge-using in Chinese and German academic discourse

(1) Generally speaking, German researchers prefer to use more hedging strategies in their academic writing to leave more room for further discussion, whereas Chinese researchers use fewer
hedge strategies in academic articles than German researchers to ensure the affirmation strength of the utterance.

(2) The Chinese researchers prefer to choose the hedge with a medium modality (namely Plausibility-2) to maintain the strength of the modality and highlight the objectivity of their opinion. On the other hand, the German researchers are willing to use the hedge with the weakest modality (namely Plausibility-1) to emphasize their own opinions even without combining them with any citing sources (Attribution-2). This demonstrates to a certain extent that the German researchers are more “domineering oriented” in expressing their own views than the Chinese researchers.

(3) In terms of grammatical form, the hedging strategies in German academic discourse are mostly nouns, while the Chinese researchers prefer to use verbs, which further supports the statement of some Chinese linguists that “Chinese is a verb-based language”.

(4) Chinese researchers often use the collectivist self-reference “we” to enhance the authority and credibility of the argument, while German researchers usually use “Ich” when demonstrating their own views.

(5) The German academic researchers prefer to use more “attribution shields with citation (Attribution-1)” hedges than that the Chinese academic researchers, so as to demonstrate and support the objectivity of their own academic views and strengthen the persuasiveness of the utterance.

(6) The Chinese researchers prefer to use more “hedge-combinations with strong modality expressing ability” to enhance the imperative mood of the utterance, while the German scholars prefer “hedge-combinations with weak modality expressing ability” to stress the interrogative mood.

(7) From 2010 to 2019, Chinese academic writers prefer to use more “plausibility with medium modality value” when demonstrating their views, regardless of whether the citation source is explicitly stated or not, so as to ensure the strength of their own arguments. The German researchers, on the other hand, used more “plausibility with weak modality value” (especially after 2015) when combined with “attribution shields without citation” in order to emphasize their cautious attitude.

(8) During the past 10 years from 2010 to 2019, Chinese scholars used more approximators in the Result&Discussion section, which contributed more to modifying numbers in order to “make the utterance much closer to being true,” while German researchers preferred to use more shields in the same section to modify the modality strength in order to “mitigate the affirmative tone.”

5.3. Conclusions

5.3.1. Summary

(1) From the similarities of hedge-using in Chinese and German academic discourse, it can be inferred that:

Firstly, the Chinese and German hedging strategies in academic discourse differ significantly in their grammatical forms. Hedges in German academic articles are modal verbs, sein......zu...... and sich lassen structure, expressive notional verbs, expressive noun structures, modal adverbs, adjectives, prepositional phrases, expressive expressions, Konjunktiv II, passive, modal particle, while hedges in Chinese academic articles are predicate verb structure, modal verbs, and adjective/adverb; Secondly, it can be inferred from the differences of hedge-using in Chinese and German academic discourse mentioned in section 5.2 that Chinese and German researchers have different preferences in using hedges as an “interpersonal interaction promoting strategy” while writing academic discourse. Generally speaking, it can be concluded that Chinese researchers emphasize the objectivity of the article and tend to choose fewer interpersonal expressions, such as using those objective-expressing strategies, seldom mentioning themselves directly in the text, always trying to promote research results by conveying the impression of “scientificity and objectivity” to readers, and trying to dilute one’s own existence, which could generally be evaluated as “with weak awareness of interpersonal interaction.” In other words, Chinese researchers are more cautious in using hedges. They communicate with readers indirectly and implicitly, focusing on avoiding their own responsibilities, demonstrate a conservative and cautious attitude, leave more room for further discussion; German researchers tend to use more hedges as interpersonal strategies, such as using a large number of modality-expressing strategies that emphasize their own opinions, mentioning themselves, choosing more modality expressing hedges to introduce research results more directly to readers. Thus, the German researchers can be regarded as “with a strong sense of interpersonal interaction”, which means that the German researchers considered being more active in using hedging strategies, which make them more direct while interacting with readers, concentrating on emphasizing the correctness of their own academic views and highlighting their positive attitude towards their own opinions.

5.3.2. Research implications

Chinese linguist Mr. Lv Shuxiang once pointed out in his work “Outline of Chinese Grammar”: “To understand the grammar of a language, a contrastive/comparative method is the only way...only by comparison can we see the common and special characteristics of different language expressions” (Lv, S., 2014). Mr. Zhao Yuanren also once emphasized: “The so-called linguistic theory is actually a language comparison, i.e., a summary of scientific conclusions drawn from comparative studies between different languages.” (Yang, Z. & Li, R., 1990). From the findings of these renowned Chinese linguists, it is clear that the comparative method is the most efficient way of comprehending linguistic structures and principles as well as for developing linguistic theories. Thus, this method is considered crucial in linguistic studies. In this research, a quantitative-based contrastive analysis was conducted to reveal the interpersonal functions of hedging strategies and their different/similar using strategies in Chinese and German academic discourses, which has significant theoretical and practical implications.

Theoretically speaking, the following research fields are expected to be expanded by our study: Classification and functions of hedges; Studies on academic discourse; Hedge studies in different languages; Studies on the modality of Chinese and German academic discourse; Research perspectives and research methods.

Practically speaking, it is our hope that our research findings on the differences of hedge using in Chinese and German academic discourses on the basis of a quantitative method will enable us to offer some implications for developing L2 writers’ academic writing skills and enhancing their L2 competence by improving their understanding of hedging strategies in Chinese and German academic discourse. Specifically speaking, the language learners are expected to use a qualitative based comparative method of our research to identify the similarities and differences of hedges between their mother language and the language they want to learn (the second language). For language teaching, it is also
important to clarify the importance of hedges as a modality-modifying strategy. In this sense, our research may contribute to reminding language teachers of the significance of hedge-teaching in conveying a particular attitude of the writer.

5.3.3. Research prospect
Hedge studies are numerous and jumbled. There are still a lot of unknown questions left. Future researches on hedges are still to be developed. It is suggested that future hedge-research could focus on the following areas:

(1) Ontological researches such as the ideational function of hedges, the textual functions of hedges, the interface study between hedges and modality, the interface study of hedges and discourse markers, etc..

(2) Comparative linguistic studies such as hedge using between different text genres (e.g., online text, written text, spoken text, reports, etc.), hedge using between different languages, hedge using between people with different disciplinary backgrounds, hedge using between native speakers and second language learners, etc..

(3) Foreign Language teaching researches such as the teaching method of hedges, the influences of hedge using on writing quality/oral performance, etc.

(4) Interdisciplinary researches such as the cognitive mechanisms of hedges, the acquisition mechanisms of hedges, mechanisms and characteristics of hedge-using between different groups (including people with different occupations/genres and many other dimensions), a sociological study of hedges, etc..

Declarations

Author contribution statement
Quan Yu: Conceived and designed the experiments; Performed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.
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Appendix 1
A simple random sample is a randomly selected subset of a population. In this sampling method, each member of the population has an exactly equal chance of being selected. There are 4 key steps while selecting a simple random sample: First, we should start by deciding on the whole population. In this study, we have successfully acquired 305 German academic articles from the above mentioned German linguistic journals (the collected numbers of articles per year are: 2010:37, 2011:48, 2012:28, 2013:33, 2014:29, 2015:34, 2016:24, 2017:24, 2018:25, 2019:24). Therefore, 305 was set as the whole population number. In order to ensure the comparability of the German corpus and Chinese corpus in scale, it is necessary for us to limit the population number of Chinese corpus to 305. The second step is to decide how large the sample size will be. Theoretically speaking, the larger the samples, the stronger the statistical certainty. But a large sample also costs more and requires far more work. Therefore, we need to find a way to detect an appropriate sample size, in order to draw as few samples as possible while meeting the requirements of our research. There are several potential ways to decide upon the size of your sample, but one of the simplest involves using a formula with your desired confidence interval and confidence level, the estimated size of the population you are working with, and the standard deviation of whatever you want to measure in your population. The following statistical formula is used in our research: 

\[ n = P(1-P)/(C^2/Z - P(1-P))/N \]  

(samplesize, Z: Standard score corresponding to a given confidence level, the Z value is 1.96 at 95% Confidence level or 5% level of significance, p: standard deviation, since we do not know the standard deviation of the population, we should choose a number high enough to account for a variety of possibilities such as 0.5, e: expected precision of findings, N is commonly 0.05, N: whole population). According to this formula, the expected sample size of the German corpus should generally be 170 (so as the Chinese corpus sample size). Since diachronic changes are also needed to be investigated in our study, it is necessary to calculate how many academic articles should be selected from 2010 to 2019 per year. According to the formula “Numbers of articles we have collected per year/total numbers of articles = expected samples size per year/total numbers of samples”, the expected sample size per year ought to be as follows: 2010:21, 2011:27, 2012:16, 2013:18, 2014:16, 2015:19, 2016:13, 2017:13, 2018:14, 2019:13 (so as the Chinese corpus sample size per year). In the end, we will randomly select the articles by assigning every article a unique number and using a random number generator in Excel to pick a set of samples from the whole population per year.

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