

## A Corpus-Based Cross-Disciplinary Analysis of Hedging Strategies in Linguistics and Engineering Doctoral Dissertation Introductions (Analisis Korpus Rentas Disiplin Mengenai Strategi “Hedging” di Bahagian Pengenalan untuk Disertasi Kedoktoran Linguistik dan Kejuruteraan)

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### ABSTRACT

*Hedging strategies are essential rhetorical tools in academic writing, enabling authors to express caution, manage interpersonal relationships, and conform to disciplinary conventions. This study examined the use of hedging strategies in the Introduction sections of doctoral dissertations (DDs) in Linguistics (Ling) and Electrical and Electronic Engineering (EEE) through a cross-disciplinary lens. Using a corpus-based, mixed-method approach, the research analyzed a specialized corpus of 50 DDs from leading US universities (2019–2023), comprising approximately 165,000 words. The analysis integrated Hyland’s (1998) poly-pragmatic model of hedging and Varttala’s (1999) lexical categorization, focusing on content-oriented and reader-oriented hedges. Corpus tools and log-likelihood tests were used to identify hedges and examine cross-disciplinary differences. Results revealed that Ling dissertations exhibited higher hedge frequency and lexical diversity, reflecting their interpretative nature, while EEE prioritized precision and objectivity. Key findings indicated that Ling employed diverse reader-oriented hedges for engagement, whereas EEE favored content-oriented hedges for technical precision. These distinctions highlight the discipline-sensitive variation in hedge frequency, functional orientation, and epistemic stance. The study contributes to a deeper understanding of disciplinary writing practices, with implications for teaching and improving scholarly communication. By tailoring hedging strategies to field-specific expectations, students and researchers can enhance clarity, credibility, and audience engagement in their academic work.*

*Keywords: hedging strategies; cross-disciplinary; doctoral dissertations; academic writing; EAP*

### ABSTRAK

*Strategi hedging merupakan alat retorik yang penting dalam penulisan akademik untuk membolehkan penulis menulis dengan berhati-hati, mengurus hubungan interpersonal, dan mematuhi konvensyen disiplin. Kajian ini meneliti penggunaan strategi hedging di bahagian Pengenalan disertasi kedoktoran bagi bidang Linguistik (Ling) dan Kejuruteraan Elektrik dan Elektronik (EEE) melalui lensa merentas disiplin. Dengan menggunakan pendekatan kaedah campuran berasaskan korpus, penyelidikan ini menganalisis sebuah korpus khusus yang terdiri daripada 50 buah disertasi kedoktoran dari universiti-universiti terkemuka di Amerika Syarikat (2019–2023), yang merangkumi kira-kira 165,000 patah perkataan. Analisis ini menggunakan model hedging poli-pragmatik Hyland (1998) dan pengkategorian leksikal Varttala (1999), dengan memberikan tumpuan kepada strategi hedging berorientasikan kandungan dan strategi hedging berorientasikan pembaca. Alat korpus dan ujian kebolehdajadian log (log-likelihood) telah digunakan untuk mengenal pasti unsur hedging dan meneliti perbezaan merentas disiplin. Hasil analisis menunjukkan bahawa disertasi Ling menunjukkan kekerapan hedging dan kepelbagaian leksikal yang lebih tinggi, yang mencerminkan sifat interpretatifnya, manakala disertasi EEE lebih mengutamakan ketepatan dan objektiviti. Dapatan utama menunjukkan bahawa Ling*

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*menggunakan pelbagai hedging berorientasikan pembaca untuk tujuan keterlibatan, manakala EEE lebih menggemari hedging berorientasikan kandungan untuk ketepatan teknikal. Perbezaan ini menonjolkan variasi yang sensitif terhadap disiplin dari segi kekerapan hedging, orientasi fungsi, dan pendirian epistemik. Kajian ini menyumbang kepada pemahaman yang lebih mendalam tentang amalan penulisan disiplin, yang membawa implikasi terhadap pengajaran dan peningkatan komunikasi ilmiah. Dengan menyesuaikan strategi hedging mengikut sesuatu bidang, pelajar dan penyelidik dapat meningkatkan kejelasan, kredibiliti, dan keterlibatan pembaca dalam penulisan akademik mereka.*

*Kata Kunci: strategi hedging; rentas disiplin; disertasi doctoral; penulisan akademik; EAP*

## INTRODUCTION

Since the mid-1960s, academic writing research has evolved from describing linguistic features of scientific English (Huddleston, 1971) to examining discipline- and genre-sensitive rhetorical practices in key academic genres such as theses, dissertations, and research articles (e.g., Abdollahzadeh, 2019; Al-Zarieni & Alkhresheh, 2024). The development of English for Specific Purposes (ESP) has further shifted attention toward discourse practices and genre-based text organization across academic and professional settings (e.g., Dudley-Evans & St John, 1998; Flowerdew, 2016). Accordingly, recent work has moved beyond cataloguing isolated linguistic features to mapping how writers deploy resources (e.g., tense/aspect, metadiscourse, and section-level organization) to meet communicative demands in particular sections and genres (Hinkel, 2004; Akoto & Afful, 2020; Deng et al., 2024; Loi & Lim, 2019; Siregar, 2023; Qiu et al., 2024; Aziz & Riaz, 2024; Taleshian et al., 2024). Among these resources, metadiscourse, especially hedging, has been widely recognized as central to managing stance and reader relations in academic argumentation (Hyland, 1998). The concept of hedges, first introduced by Lakoff (1972), has since been refined to describe stance-modulating strategies that adjust epistemic commitment (Hyland, 1998; Adrian & Fajri, 2023).

Despite the substantial body of research on hedging, the current literature still leaves important questions insufficiently addressed. First, cross-disciplinary studies often report disciplinary variation, yet relatively few have compared disciplines with sharply contrasting epistemological orientations, particularly a soft discipline such as Linguistics and a hard discipline such as Electrical and Electronic Engineering, where evidence, argumentation, and certainty are conventionally negotiated in different ways (Adrian & Fajri, 2023; Boginskaya, 2023, 2024; Deng et al., 2025; Suratno & Ayardawati, 2025; Farnia & Gerami, 2021; Hyland, 2004; Biber & Gray, 2010). Second, hedging research has predominantly focused on research articles, while doctoral dissertations remain comparatively underexplored (e.g., Abdollahzadeh, 2019; Adrian & Fajri, 2023), even though dissertations are important pedagogical training sites for advanced academic writing and stance-taking, as well as gatekeeping genres whose assessment regulates access to disciplinary membership and the doctoral award (Swales, 1990, 2004; Zainuddin et al., 2019). Third, existing findings are widely focusing on identifying hedging forms and frequencies rather than explaining how writers hedge in specific rhetorical contexts (Yu & Wen, 2022; Boginskaya, 2023). In doctoral dissertation Introductions, hedges may serve crucial rhetorical purposes such as cautiously presenting research gaps, calibrating problem significance, and limiting commitment while advancing an argument, yet these section-specific functions have rarely been examined systematically (Varga, 2020; Qiu et al., 2024).

These gaps collectively indicate a clear statement of the problem: current research still lacks systematic evidence on how dissertation writers in Linguistics and Electrical and Electronic Engineering deploy hedging in Introductions to balance reader engagement with propositional precision, and how such functional choices reflect discipline-specific rhetorical norms. This gap motivates the present study's cross-disciplinary comparison of hedging strategies in doctoral dissertation Introductions.

Building on metadiscourse research (Hyland, 1998, 2005) and lexical categorizations of hedging devices (Varttala, 1999), the study integrates a form-and-function perspective by examining both the distributional patterns and the rhetorical purposes of hedging in this section. In doing so, it clarifies how hedging operates not merely as “uncertainty marking,” but as a strategic resource for negotiating stance, disciplinary expectations, and writer–reader relationships in academic writing (Ghahraman et al., 2023; Zainuddin et al., 2019). To address the above gaps, the present study is guided by the following research questions:

1. What is the cross-disciplinary distribution of lexical diversity in the Introduction sections of doctoral dissertations?
2. What are the similarities and differences in the use of hedging strategies in the Introduction sections of doctoral dissertations between Linguistics (Ling) and Electrical and Electronic Engineering (EEE)?
3. How do hedging strategies fulfil their rhetorical functions in the Introduction sections of doctoral dissertations?

## PREVIOUS STUDIES ON HEDGING STRATEGIES IN ACADEMIC WRITING

Hedging strategies in academic writing have been widely examined from multiple perspectives, reflecting their role in managing stance and negotiating discipline- and genre-specific expectations. The review below highlights converging patterns and key contrasts across mono-disciplinary, cross-disciplinary, cross-cultural, and cross-generic work to clarify how hedging choices vary by context and communicative purpose.

Several studies within Applied Linguistics point to systematic variation in hedging resources that depends on rhetorical purpose, writer status, and local academic practices. Livytska (2019) found that reader-oriented hedges were common in a small corpus of 20 research articles (RAs), suggesting a preference for engagement-oriented mitigation, although the study was limited by corpus size and the absence of statistical testing. Similarly, Adrian and Fajri (2023) observed that Indonesian authors employed fewer and less varied hedges and relied heavily on modal auxiliaries, especially “can,” with comparatively limited use of other lexical categories (e.g., epistemic nouns such as “possibility” and “assumption”), indicating a narrower repertoire for subtle stance marking. By contrast, Rabab’ah et al. (2022) showed that hedging can also be shaped by interactional norms, as Saudi female students used politeness- and hesitation-linked probability markers (e.g., “perhaps,” “possibly”) to frame evaluations as open to negotiation rather than absolute.

Recent cross-disciplinary studies show that differences are not only a matter of “more vs. fewer” hedges, but also of which hedge types are preferred and what rhetorical work they perform. Boginskaya (2023) found that Engineering abstracts relied more on modal auxiliaries, whereas Applied Linguistics abstracts drew on a broader range of lexical categories, such as “probability

nouns”. Dontcheva-Navratilova (2024) found that Czech Master’s students in Linguistics, Literature, and Education used fewer hedges and more boosters than those found in published articles, suggesting insufficient socialization into academic discourse practices. Taken together, these studies suggest that cross-disciplinary variation is most plausibly accounted for by the interaction of epistemic orientation, genre expectations, and academic socialization, which jointly constrain what counts as justified commitment and appropriate caution in a given community (Becher & Trowler, 2001; Hyland, 2004, 2005; Farnia & Gerami, 2021).

Cross-cultural studies on hedging in academic writing show that cultural norms, academic traditions, and pedagogical practices shape writers’ rhetorical choices. Barbara et al. (2024) reported that Hong Kong L2 engineering writers used fewer approximative and evidential/self-mention hedge resources (e.g., about/approximately; seems/appears; we believe/from our perspective), while relying more on modal hedges (e.g., may/might/could) than a US comparison corpus. Petchkij (2023) found that targeted instruction helped both Thai and non-Thai EFL medical graduate students maintain epistemic caution more consistently, increasing their use of lexical hedges (e.g., suggest, appear) and some structural frames (e.g., It is suggested that... / it was demonstrated that...). Zainuddin et al. (2019) likewise highlighted politeness and deference to authority in Malaysian thesis defences, pointing to the role of institutional interactional expectations. Overall, cross-cultural differences are better attributed to the convergence of training opportunities, local academic conventions, and discipline-specific stance norms than to culture alone.

Cross-generic work shows that hedging also adapts to genre demands and evaluation contexts, including differences between novice and expert writing. Lenardič and Fišer (2021) indicated that modal adverb patterns vary by field and genre, with humanities-oriented thesis writing tending toward epistemic likelihood marking (e.g., probably/perhaps), while natural/technical writing more often realizes dispositional possibility (e.g., potentially). Kozubíková Šandová (2020) contrasted Linguistics research theses and research articles, illustrating evaluator-oriented strategic hedging through limitation frames such as “Although...a relatively small corpus...” and knowledge-limits like “At present I cannot account for...” and “...is difficult to say...”. Abdollahzadeh (2019) further showed that professional writers draw on a wider hedge repertoire (e.g., suggest/indicate; we believe/propose; passive voice) than graduates who rely more on modals. In sum, prior research converges on the view that hedging is systematically patterned by genre, writer status, and disciplinary expectations, which together shape how commitment, credibility, and reader alignment are managed in academic discourse.

Prior research portrays hedging as a discipline- and context-sensitive stance resource that balances epistemic caution with writer–reader relations, rather than a fixed marker of uncertainty (Hyland, 1998, 2005; Salager-Meyer, 1994). Hedge use varies across disciplines, cultures, and genres in both frequency and lexical choice, reflecting local discourse conventions, academic socialization, and the effects of instruction (Adrian & Fajri, 2023; Boginskaya, 2023; Dontcheva-Navratilova, 2024; Petchkij, 2023; Zainuddin et al., 2019). However, compared with research articles, theses and dissertations, especially doctoral dissertations, remain underexamined (Asfina et al., 2018; Dontcheva-Navratilova, 2024; Zainuddin et al., 2019).

Given the limited cross-disciplinary, dissertation-based, and function-sensitive evidence in prior hedging research, this study adopts a corpus-based mixed-method approach to examine hedging in doctoral dissertation Introductions in Linguistics and Electrical and Electronic Engineering, integrating quantitative distributional analysis with qualitative content analysis (Mayring, 2000). For operationalization, Hyland’s (1998) model is prioritized because it offers a

dedicated, fine-grained taxonomy of hedging functions (content-oriented vs. reader-oriented, with accuracy- and writer-oriented subtypes) that directly supports systematic coding of hedge instances and their rhetorical work in context, whereas Hyland's (2005) stance–engagement framework is broader and not designed as a hedge-specific coding scheme. The next section describes the corpus, analytical framework, and procedures.

## METHOD

### RESEARCH DESIGN

This study adopted a mixed-method design, integrating corpus-based quantitative analysis with qualitative content analysis to examine hedging strategies in the Introduction sections of DDs. The quantitative component focused on frequency, distribution patterns, and cross-disciplinary differences, using tools such as WordSmith 7.0 (Scott, 2016) to calculate lexical diversity and AntConc 4.3.1 (Anthony, 2024) to identify hedges. The analysis followed a composite framework combining Hyland's (1998) poly-pragmatic model of hedging with Varttala's (1999) lexical categorisation, supplemented by manual review for contextual accuracy. The software *Log-likelihood* and *Chi-square Calculator 1.0* (FLERIC, Beijing Foreign Studies University; <https://corpus.bfsu.edu.cn/TOOLS.htm>) was employed to test for significance across sub-corpora. Qualitatively, content analysis (Mayring, 2000) examined the functions of hedges within subcategories. Together, this integrated approach provided a thorough understanding of hedges' forms, functions, and variations across disciplines, offering insights into the rhetorical strategies employed in academic writing.

### THE CORPUS

The corpus consists of 50 English PhD dissertations (25 Ling; 25 EEE), with analysis limited to the Introduction section. Texts were selected via purposive, stratified random sampling: eligible dissertations (2019–2023) were first retrieved from Open Access Theses and Dissertations (OATD; <https://oatd.org/>) and ProQuest Dissertations & Theses Global (PQDT; <https://www.proquest.com/>) and screened for (a) disciplinary eligibility (Linguistics or Electrical and Electronic Engineering), (b) full-text accessibility, and (c) a clearly demarcated Introduction section suitable for consistent extraction. For operational consistency, the “Introduction” was defined as the chapter/section labelled “Introduction” (or “Chapter 1: Introduction”) and included all subordinate headings up to the next main chapter boundary (e.g., “Literature Review”/ “Chapter 2”). Using the QS World University Rankings by Subject, the eligible dissertations were then stratified by discipline and institution, and randomly selected within each stratum to balance institutional spread. The 2019–2023 window was chosen to represent current doctoral writing practices while maintaining temporal consistency. Importantly, because Introduction lengths vary across dissertations and disciplines, cross-disciplinary comparisons were conducted using normalized frequencies (per 10,000 words) to control for length differences. This approach is widely adopted in corpus-based genre and hedging studies, where comparability is typically ensured by balancing the number of texts rather than fully equalizing corpus size (e.g., Hyland, 2002; Vold, 2006; Wang & Zeng, 2021). The criteria for corpora are detailed in Table 1.

TABLE 1. Criteria for selection of the corpora

Genre/ Disciplinary	Corpus Source	Time Range	University Name	DDs Num.	Token Count
Ling	US Universities: “QS World University Rankings by Subject” ranks the global top 50 from OATD & PQDT	2019- 2023	Los Angeles (UCLA), Ohio State University, University of Hawai’i at Manoa, University of Texas at Austin (UT Austin), University of Michigan	25	104,375
EEE	US Universities: “QS World University Rankings by Subject” ranks the global top 50 from OATD & PQDT	2019- 2023	Stanford University, UCLA, UT Austin, Purdue University, University of California, San Diego (UCSD)	25	58,953
<b>Total</b>				<b>50</b>	<b>163,328</b>

For coding reliability, two coders independently coded 10 Introductions, consistent with the 10 to 25% sampling guideline recommended by O’Connor and Joffe (2020). Agreement was assessed with Cohen’s Kappa (overall  $\kappa = 0.79$ , 94.1% agreement), indicating substantial agreement (Landis & Koch, 1977), with almost perfect agreement for attribute ( $\kappa = 0.81$ ) and reliability hedges ( $\kappa = 0.80$ ). Disagreements mainly involved borderline cases—such as epistemic vs. ability readings of modals, the mapping of items such as “may result in” and “It seems that...” to the dominant Hyland category (see Appendices A and B), and compound hedges such as “may possibly”—and were resolved through joint context review (including concordance checks) and, where necessary, expert adjudication.

#### THEORETICAL FRAMEWORKS

This study is situated within the theoretical framework of English for Specific Purposes (ESP), which highlights the functional and context-sensitive nature of language use in academic and professional domains. Originating from the foundational work of Hutchinson and Waters (1987) and later refined by Dudley-Evans and St John (1998), ESP underscores the importance of aligning academic communication with the norms, rhetorical conventions, and communicative purposes of particular disciplines. By grounding the research in this perspective, the study acknowledges that hedging strategies are not merely linguistic choices but are shaped by disciplinary expectations and contextual demands, thereby providing a coherent basis for the subsequent analytical framework.

Building on the ESP perspective, this study adopts an analytical framework that integrates Hyland’s (1998) taxonomy with Varttala’s (1999) lexical categorisation. Hyland’s (1998) model provides the functional layer by distinguishing content-oriented hedges (which regulate propositional precision and epistemic commitment through accuracy-oriented and writer-oriented strategies) and reader-oriented hedges (which manage writer–reader interaction and engagement), thereby capturing the rhetorical work hedges perform in discipline-specific academic argumentation (Ekoç-Özçelik, 2023; Malášková, 2012). Varttala’s (1999) framework contributes to the lexical-realisation layer by specifying the main linguistic forms through which these functions are typically expressed (e.g., modal verbs, precision adverbs, probability adjectives, and epistemic nouns), enabling transparent corpus retrieval and systematic identification of hedging instances (Kim & Lim, 2015; Zhang et al., 2023).

The two models are linked through an operational mapping procedure: hedging expressions were first retrieved through Varttala’s lexical categories and were then coded for their dominant rhetorical functions using Hyland’s (1998) poly-pragmatic model of hedging. Because hedging forms are often multifunctional, each instance was checked in its immediate context to confirm epistemic meaning and to determine its functional category, thereby reducing misclassification based on surface form alone (Hashemi & Shirzadi, 2016; Nguyen, 2018). This context-sensitive procedure reflects corpus-based stance research, which emphasises the need for manual verification to distinguish hedging from non-hedging uses and to support reliable functional interpretation (Zhao., 2025). Figure 1 summarizes the functional categories and their typical realisations with representative examples.

Category	Sub-category	Type	Sub-type	Specific Expression	Examples
Content-oriented hedges	Accuracy-oriented hedges	Attribute hedges	Precision Adverbs	content disjuncts	partially, quite, slightly
				style disjuncts	frequently, usually, rarely
				downtoners	almost, about/around + number
		Reliability hedges	Modal verbs	may, could, can, might, should	
			Epistemic Lexical Verbs	appear, seem, tend	
			Epistemic Adjectives	probability adjectives	possible, hypothetical, probable
				indefinite degree	certain, large, moderate
				indefinite frequency	frequent, general, scarce
				approximative	gross, rough, near
			Epistemic nouns	tentative likelihood	possibility, probability
	nonfactive assertive	suggestion, argument			
	Content disjunct adverbs	tentative cognition	belief, perception		
	Limited Knowledge	probably, presumably, perhaps	It is not known whether..., We suspect...		
	Writer-oriented hedges	Epistemic Lexical Verbs (nonfactive reporting)	judgmental	argue, assume, suggest	
			evidential	indicate, report, observe	
		Impersonal expressions	passive voice	It is assumed that...	
			abstract rhetors	These findings indicate that...	
			“empty” (clausal)	It believes that...	
Thematic epistemic device		As previously discussed, the methodology might...			
Attribution to literature		Smith (2020) argues..., According to Hyland (1998) ...			
Impersonal reference to		method	The method indicates...		
	model	The model predicts that...			
	experimental conditions	Under the experimental condition, the reaction could...			
Reader-oriented hedges	Epistemic Lexical Verbs (tentative cognition verbs)	judgmental	believe, suppose, think		
		deductive	infer, discern		
	Personal attribution	We suppose..., I believe..., We consider...			
	Personal reference to (use of indefinite article)	method	A qualitative method employed allows		
		model	From these findings..., a model,		
	Assume shared goals	As is known that..., To the best of our knowledge			
	Hypotheticals conditionals	If clause, would...			
	Involve Reader	direct questions	Could such a putative interaction be of significance?		
reference to testability		From where we stand/point of view...			

FIGURE 1. Theoretical framework of the study

## DATA ANALYSIS AND PROCEDURES

### CONTENT-ORIENTED HEDGES

Content-oriented hedges operate primarily to moderate the relationship between academic propositions and empirical reality, enabling writers to present claims with appropriate caution and precision. In this framework, they are subdivided into accuracy-oriented hedges, which fine-tune the degree of precision and certainty attached to statements, and writer-oriented hedges, which reduce authorial responsibility while maintaining the propositional content (Hyland, 1996, 1998). To make the classification more accessible, the description is reorganized into a table (see Appendix A), which summarizes the subtypes, key functions, typical linguistic devices, and representative examples.

### READER-ORIENTED HEDGES

Reader-oriented hedges function as interactional resources that strengthen writer–reader engagement in academic discourse. By foregrounding dialogic negotiation, these devices invite readers to participate in interpreting claims and assessing their plausibility, thereby increasing the likelihood of claim acceptance without presenting propositions as final or incontestable (Hyland, 1998). For clarity and ease of reference, this classification is presented in a table in Appendix B.

### PROCEDURES OF DATA ANALYSIS

The data analysis combined software-based retrieval with manual checking to ensure accuracy in identifying and categorizing hedging strategies. To address Research Question 1, WordSmith was used to calculate the standardized type–token ratio (STTR). For Research Question 2, AntConc was used to retrieve candidate hedges through KWIC and Collocate searches based on the predefined lexical categories, after which all candidates were manually validated in context to confirm epistemic meaning and exclude non-hedging uses. Manual screening followed a codified guideline (see Appendix C) that specified decision criteria for inclusion (epistemic relevance), context-sensitive disambiguation (e.g., part-of-speech and clause-level function), and category assignment by dominant rhetorical function (Hyland, 1998). In particular, difficult-to-retrieve categories, such as “limited knowledge”, “abstract rhetors”, and “clausal subjects”, were identified through rule-governed contextual checks rather than surface-form matching; these cases were double-checked against the same coding rules to ensure consistency across coders, and disagreements were resolved through structured discussion and adjudication (Appendix C). Manual screening was applied to all retrieved candidates and was also used as the primary identification procedure for categories not reliably captured by automated searches.

To enable valid cross-disciplinary comparison, frequency counts were normalized to occurrences per 10,000 words (Hyland, 2002). This procedure controls for section-length variation by expressing frequencies relative to text size, so differences reflect distributional patterns rather than unequal word totals. The formula for normalized frequency is as follows:

$$\text{Normalized Frequency} = \left( \frac{\text{Raw Frequency}}{\text{Total Number of Observations}} \right) \times 10000$$

A log-likelihood (LL) test was performed using the *Log-likelihood and Chi-square Calculator 1.0* to examine significant differences in hedging usage across disciplines between Linguistics (Ling) and Electrical and Electronic Engineering (EEE). In line with established corpus linguistics practice, LL values greater than 3.84 indicate statistically significant differences ( $p < 0.05$ ), values above 6.63 denote highly significant differences ( $p < 0.01$ ), and values exceeding 10.83 represent extremely significant differences ( $p < 0.001$ ) (Rayson et al., 2004). To address Research Question 3, the analysis combined frequency data, distribution patterns, and LL results to interpret the functional roles of hedging strategies by adopting qualitative content analysis approach (Mayring, 2000), ensuring consistency in evaluating frequency, distribution, and statistical significance.

## RESULTS

### CROSS-DISCIPLINARY DISTRIBUTION OF LEXICAL DIVERSITY

Table 2 presents lexical diversity in the Introduction sections of DDs in Ling and EEE. Linguistics DDs exhibit a higher number of types (10,148) and total tokens (104,375) than EEE (6,403 types; 58,953 tokens). However, the Standardized Type–Token Ratio (STTR) is comparable across disciplines (Ling: 42.45; EEE: 42.67). STTR indexes lexical variation within standardized segments and is used to compare lexical diversity across corpora of different lengths (Biber et al., 1998). Accordingly, the similar STTR values indicate comparable levels of lexical variation relative to corpus size, rather than equivalent rhetorical complexity, epistemic positioning, or stylistic sophistication. These results are consistent with prior work reporting STTR values around 40–45 in academic discourse (Przybyl et al., 2022; Xu & Li, 2022).

TABLE 2. Cross-disciplinary distribution of lexical diversity

Corpora	Types	Tokens	STTR
DDs. Ling. Intro	10148	104375	42.45
DDs. EEE. Intro	6403	58953	42.67

Note: STTR = Standardised Type-Token Ratio (mean TTR per 1,000-word segment)

### CROSS-DISCIPLINARY COMPARISON OF HEDGES IN THE INTRODUCTION OF DDS

#### OVERALL COMPARISON OF HEDGES IN THE INTRODUCTION OF DDS

Table 3 compares hedging strategies in the Introduction sections of DDs across Ling and EEE. Linguistics exhibits a higher raw number of hedges (3,925) and a greater normalized frequency (NF: 376.05 per 10k words) compared to EEE (NF: 265.80). The log-likelihood (LL) value of 141.14 with a significance level of  $p < 0.001$  indicates statistically significant differences in hedge usage between the two disciplines. These results may be associated with Linguistics' more interpretive disciplinary orientation, where cautious argumentation is often valued, whereas EEE writing tends to foreground precision and technical boundedness, which may contribute to lower hedge density in this corpus. Normalized data ensures reliable comparisons across corpora of varying sizes (Rayson et al., 2004).

TABLE 3. Cross-disciplinary comparison of hedges in the sub-corpus

Corpora	RF	Tokens	NF	LL	Sig.
DDs. Ling. Intro	3925	104375	376.05		
DDs. EEE. Intro	1567	58953	265.80	141.14	0.000 ***

Note: RF = Raw Frequency; NF = Normalised Frequency (occurrence per 10,000 words); LL = Log-likelihood value; Sig. = Statistical significance (*p*-value); Significance thresholds:  $p < 0.05$  = significant (\*);  $p < 0.01$  = highly significant (\*\*);  $p < 0.001$  = extremely significant (\*\*\*)

CROSS-DISCIPLINARY COMPARISON OF CONTENT-ORIENTED AND READER-ORIENTED HEDGES

Table 4 highlights cross-disciplinary differences in hedging strategies in the Introduction sections of DDs. Linguistics features more content-oriented hedges (NF: 319.71) and reader-oriented hedges (NF: 56.34) compared to EEE (NF: 225.60 for content-oriented; NF: 40.20 for reader-oriented). LL values of 121.06 (content-oriented) and 20.10 (reader-oriented), both significant at  $p < 0.001$ , indicate highly significant differences. These patterns suggest that, in this corpus and section, Linguistics writers may tend to use hedging more extensively for both propositional qualification and reader alignment, whereas EEE writers use these resources less frequently; however, such tendencies may also reflect within-discipline variation, institutional conventions, and dissertation-specific genre practices. Normalized frequencies (NF) ensure reliable cross-disciplinary comparisons, aligning with standardized statistical practices (Hyland, 2002).

TABLE 4. Cross-disciplinary comparison of content-oriented and reader-oriented hedges

	Content-oriented hedges		LL	Sig.	Reader-oriented hedges		LL	Sig.
	RF	NF			RF	NF		
	DDs. Ling. Intro	3337			319.71	121.06		
DDs. EEE. Intro	1330	225.60			237	40.20		

CROSS-DISCIPLINARY COMPARISON OF ATTRIBUTE HEDGES IN THE INTRODUCTION OF DDS

Table 5 compares attribute hedges that comprise precision adverbs in DDs across Linguistics and EEE. Linguistics exhibits higher frequencies (NF: 96.29) across all subcategories, including indefinite degree adverbs (NF: 23.47), frequency adverbs (NF: 31.43), and approximative adverbs (NF: 41.39), compared to EEE (NF: 73.96). Significant differences are confirmed by LL values (Total: 21.87;  $p < 0.001$ ). The most pronounced variation appears in approximative adverbs (LL: 13.93;  $p < 0.001$ ), which may be consistent with greater use of approximation and flexibility in Linguistics Introductions in this dataset, whereas EEE Introductions show comparatively lower reliance on these adverbial resources. These findings highlight disciplinary distinctions in hedging strategies, aligning with standardized statistical practices for reliable cross-disciplinary analysis (Hyland, 2005; Rayson et al., 2004).

TABLE 5. Cross-disciplinary comparison of precision adverbs in the Introduction of DDs

	DDs. Ling. Intro		DDs. EEE. Intro		LL	Sig.
	RF	NF	RF	NF		
Indefinite degree adverbs	245	23.47	108	18.32	4.75	0.029*
Indefinite frequency adverbs	328	31.43	152	25.78	4.16	0.041*
Approximative adverbs	432	41.39	176	29.85	13.93	0.000***
Total	1005	96.29	436	73.96	21.87	0.000***

CROSS-DISCIPLINARY COMPARISON OF RELIABILITY HEDGES IN THE INTRODUCTION OF DDS

For reliability hedges, Table 6 highlights significant differences between Linguistics and EEE in DDs. Linguistics shows a markedly higher total frequency (NF: 150.23) compared to EEE (NF: 100.25), with an LL value of 74.28 ( $p < 0.001$ ). Notable distinctions are found in modal verbs (LL: 12.30), tentative linking verbs (LL: 13.67), and epistemic adjectives (LL: 40.22), all with  $p < 0.001$ , reflecting their prevalent use in Linguistics. Specifically, epistemic adjectives (NF: 52.69) and epistemic nouns (NF: 47.23) dominate in Linguistics, adhering to its emphasis on theoretical description, whereas EEE exhibits a more concise and assertive approach. In contrast, limited knowledge hedges show no significant difference (LL: 0.89;  $p = 0.345$ ).

TABLE 6. Cross-disciplinary comparison of reliability hedges in the Introduction of DDs

	DDs. Ling. Intro		DDs. EEE. Intro		LL	Sig.
	RF	NF	RF	NF		
Modal Verbs	391	37.46	160	27.14	12.30	0.000***
Tentative Linking Verbs	42	4.02	6	1.02	13.67	0.000***
Epistemic Adjectives	550	52.69	185	31.38	40.22	0.000***
Epistemic Nouns	493	47.23	206	34.94	13.71	0.000***
Probability Adverbs	67	6.42	24	4.07	3.91	0.048*
Limited Knowledge	25	2.40	10	0.17	0.89	0.345
Total	1568	150.23	591	100.25	74.28	0.000***

CROSS-DISCIPLINARY COMPARISON OF WRITER-ORIENTED HEDGES IN THE INTRODUCTION OF DDS

Table 7 continues this trend by illustrating significant disciplinary variation in the use of writer-oriented hedges. Linguistics again demonstrates a higher usage (NF: 73.20) compared to EEE (NF: 51.40), with an LL value of 28.43 ( $p < 0.001$ ). This difference is especially marked in two subcategories: nonfactive reporting verbs (LL: 13.36;  $p < 0.001$ ) and attribution to literature (LL: 28.83;  $p < 0.001$ ), both of which are more frequent in Linguistics. Impersonal expressions, however, display no meaningful differences (LL: 0.57;  $p = 0.452$ ). These results confirm distinct rhetorical practices between the disciplines, reinforcing the contextual adaptation of writer-oriented hedges in academic writing.

TABLE 7. Cross-disciplinary comparison of writer-oriented hedges in the Introduction of DDs

	DDs. Ling. Intro		DDs. EEE. Intro		LL	Sig.
	RF	NF	RF	NF		
Epistemic Lexical Verbs (Nonfactive reporting verbs)	290	27.78	110	18.66	13.36	0.000***
Impersonal Expressions	268	25.68	140	23.75	0.57	0.452
Thematic Epistemic Device	45	4.31	16	2.71	2.70	0.100
Attribution to Literature	130	12.46	26	4.41	28.83	0.000***
Impersonal Reference	31	2.97	11	1.87	1.88	0.171
Total	764	73.20	303	51.40	28.43	0.000***

CROSS-DISCIPLINARY COMPARISON OF READER-ORIENTED HEDGES IN THE INTRODUCTION OF DDS

Building on the contrast in content-oriented strategies, Table 8 shifts the focus to reader-oriented hedges, revealing further disciplinary divergence in rhetorical engagement. Linguistics shows a higher total frequency (NF: 56.34) compared to EEE (NF: 40.20), with a statistically significant LL value of 20.10 ( $p < 0.001$ ). Notably, epistemic lexical verbs (LL: 32.55;  $p < 0.001$ ) and hypothetical conditionals (LL: 40.11;  $p < 0.001$ ) are substantially more prevalent in Linguistics, indicating its stronger emphasis on interpretive flexibility and reader involvement. In contrast, personal attribution is more frequent in EEE (LL: 20.63;  $p < 0.001$ ). Other categories, such as personal reference (LL: 0.01) and assumption of shared goals (LL: 0.00), show no significant differences across disciplines.

TABLE 8. Cross-disciplinary comparison of reader-oriented hedges in the Introduction of DDs

	DDs. Ling. Intro		DDs. EEE. Intro		LL	Sig.
	RF	NF	RF	NF		
Epistemic Lexical Verbs (Tentative cognition verbs)	217	20.79	55	9.33	32.55	0.000***
Personal Attribution	89	8.53	98	16.62	20.63	0.000***
Personal Reference	22	2.11	12	2.04	0.01	0.922
Assume Shared Goals	36	3.45	20	3.39	0.00	0.953
Hypothetical Conditionals	96	9.20	10	1.70	40.11	0.000***
Involve Reader	128	12.26	42	7.12	10.14	0.001**
Total	588	56.34	237	40.20	20.10	0.000***

CROSS-DISCIPLINARY DISTRIBUTION OF FREQUENT HEDGES IN THE INTRODUCTION OF DDS

Table 9 demonstrates the frequent hedges in DDs across Linguistics and EEE, showing the differences in ranking and usage patterns. Both disciplines rank “passive voice” structure highest, with Ling (NF: 16.57) showing slightly lower normalized usage than EEE (NF: 16.62). Importantly, only epistemic-functioning passives were included. Specifically, passive constructions that (a) satisfied the study’s epistemic-relevance requirement (i.e., they contributed to uncertainty/qualification or stance modulation in context) and (b) served a writer-oriented mitigating function by backgrounding agency and modifying authorial responsibility, typically in impersonal frames co-occurring with epistemic lexical verbs (e.g., is assumed, is suggested, it is argued/indicated). All other passives used solely for information structuring, thematization, or conventional reporting without stance-modulating force were excluded. This operationalization aligns with Hyland’s (1998) writer-oriented hedging, where impersonalization functions as a strategy for withdrawing commitment and responsibility, and it follows the study’s explicit

decision rules (Appendix C). In Linguistics, attribution to literature ranks second (NF = 12.46), whereas in EEE, personal attribution (e.g., we suppose, I believe) ranks second (NF = 16.62). The modal “may” ranks third in both corpora, with higher normalized use in Linguistics (NF = 12.07) than in EEE (NF = 7.12). Overall, these distributional differences point to section-specific and discipline-sensitive tendencies, while remaining compatible with variation across writers, institutions, and dissertation genre practices.

TABLE 9. Cross-disciplinary distribution of frequent hedges in the Introduction of DDS

	DDs. Ling. Intro			DDs. EEE. Intro		
	Item	RF	NF	Item	RF	NF
1	passive voice	173	16.57	passive voice	98	16.62
2	attribution to literature	130	12.46	we suppose..., I believe...,	98	16.62
3	may	126	12.07	may	42	7.12
4	some	89	8.53	much/many	35	5.94
5	we suppose..., I believe...,	89	8.53	typically	28	4.75
6	If clause, would...	79	7.57	most + adj/adv	28	4.75
7	most + adj/adv	77	7.38	must	27	4.58
8	often	70	6.71	scenario	27	4.58
9	would	62	5.94	propose	27	4.58
10	abstract rhetors	62	5.94	abstract rhetors	27	4.58

## FUNCTIONS OF HEDGING STRATEGIES IN THE INTRODUCTION SECTION OF DDS

### MODULATION OF TRUTH-VALUE, CERTAINTY, AND PRECISION

Hedges can modulate the impact of utterances, allowing writers to adjust their commitment to truthfulness, certainty, and precision (Salager-Meyer, 2011; Zarza & Tan, 2016; Zou & Hyland, 2019). For example, accuracy-oriented hedges often function as probability adjuncts of contingency, mitigating excessive certainty and thereby enhancing the precision of the propositional content (Hyland, 1998). Common expressions include precision adverbs, e.g., “almost”, “about”, “relatively”, “hardly”, “approximately”, “sort of”, “perhaps”; modal verbs, e.g., “may”, “could”; and epistemic lexical verbs, e.g., “hypothesise”, “seem”. These hedges temper assertions, fostering clarity and balance in academic discourse, as can be seen in the following examples:

- (1) A good teaching methodology that suits students’ needs **perhaps** a methodology that **could** allow students to explore their cultural and linguistic background to produce texts in their native language did not exist. (DDs. Ling, 2022)
- (2) The exact convergence to the correct grammar in artificial and deterministic grammar learning experiments has been relaxed to **probably approximately** correct, and evaluation of induction of probabilistic grammars now use of evaluation metrics used in supervised parsing to measure the similarity between syntax trees from learned grammars and trees found in human annotation. (DDs. Ling, 2020)
- (3) Finally, while claims can be made that space has been an important area of study among the Malayo Polynesian languages, the Philippines has been largely left out of this spatial renaissance. **I hypothesize** that **this seems to** be the case due to a few crucial reasons. (DDs. Ling, 2022)

Example (1) uses “perhaps” and “could” to suggest possibilities for effective teaching methodologies, highlighting the speculative nature of the claim while maintaining flexibility. In Example (2), “probably” and “approximately” express the inherent imprecision in evaluating probabilistic grammars, aligning with the academic need for cautious language when discussing complex methodologies. In Example (3), “hypothesize” and “seems” convey uncertainty regarding the reasons for the Philippines’ exclusion from spatial studies, reflecting tentative reasoning in academic inquiry. These hedging devices manage tone and reduce overgeneralization, ensuring the propositions remain open to interpretation.

#### WITHDRAWING EPISTEMIC COMMITMENT AND RESPONSIBILITY

Hedges can also reduce the writer’s commitment to their statements and mitigate full responsibility for the content by signaling a tentative or cautious assessment of the truthfulness of the presented information (Zarza & Tan, 2016; Zhao, 2023). This function can be realized through epistemic modality markers, modal auxiliaries, and impersonal references (Hyland, 2005). Examples include “fairly” and “partly” to soften impact, “usually” and “sometimes” to introduce vagueness, and “would”, “might” and “suggest” to minimize responsibility. Impersonal references like “it is unclear” further distance writers from full commitment, reinforcing hedges’ role in cautious academic discourse, as can be seen below:

- (4) With navigation codes being **at least** 1000 bits long and on the order of 50 codes required, the design space corresponds to **at least** 250,000 total possible sequences within the memory code space. (DDs. EEE, 2023)
- (5) My focus on English **might be** also **partly** practical; English is the language for which robust data are **most** readily available to me. (DDs. Ling, 2022)
- (6) **According to List (2016)**, however, **there is no broadly accepted** theoretical notion in historical linguistics that corresponds to the general conception of homology described above. (DDs. Ling, 2020)

In Example (4), “at least” is interpreted as a hedge only insofar as it functions as a lower-bound approximator that limits commitment to an exact value or extent; in such uses, it mitigates categorical claims by signalling minimum scope rather than asserting full certainty. Example (5) uses “might” and “partly” to introduce conditionality and partial explanation, reflecting the author’s cautious assessment of their practical focus on English. Example (6) includes the writer-oriented hedges “According to List (2016)” and “there is no broadly accepted”, which serve to distance the writer from absolute assertions and to acknowledge disciplinary variability in historical linguistics. These hedging strategies help authors present information cautiously, reducing the risk of potential criticism or accusations of overstatement (Zhao, 2023).

#### ADAPTATION TO AUDIENCE AND CONTEXT

Hedges in academic writing adapt to audience and context by moderating authorial commitment and encouraging thoughtful reader engagement (Hyland, 1998). They create space for discussion, balancing subjective opinions with objective data while anticipating reader reactions (Laghari, 2022). Context determines hedging effectiveness, as terms gain meaning within discourse (Nikula, 1997). For example, probability adverbs such as “arguably”, “presumably”, and impersonal expressions like “it appears that” and “there is a possibility that” help maintain careful distance

based on the specific context. Personal attributions such as “we propose”, and references to models like “a model implies”, or direct questions invite shared understanding, fostering acceptance of claims and aligning academic arguments with audience expectations. The function can be described as follows:

- (7) The performance of standard beamforming in near field LoS systems and codebook design, however, have not been studied **to the best of our knowledge**. An interesting question in this direction is **if it is possible** to design new beams that achieve a reasonable gain over the wide bandwidth. (DDs. EEE, 2020)
- (8) However, the task of unsupervised parsing is **arguably** easier than learning the whole grammar, and reported results of **these models** being only on a few languages **may not** represent their performance as a universal induction model which is able to learn grammars on languages with diverse typological and statistical features. (DDs. Ling, 2020)
- (9) **We could define such a distinction, but is there any reason to give it special status in a theory of syntax?** In fact, traditional grammar offers us many such notions. (DDs. Ling, 2022)

The examples illustrate how hedges adapt arguments to the audience and context. Example (7) uses expressions like “to the best of our knowledge” and “if it is possible” to acknowledge limitations in knowledge and invite readers to explore future research, fostering inclusivity. In Example (8), the use of “arguably” and “may not” temper claims about “unsupervised parsing”, allowing flexibility for reader interpretation. Example (9) employs “we could define” and rhetorical questions to critically engage the reader and encourage shared inquiry. These hedges effectively involve the audience and tailor the argument to the academic context, promoting an informed and respectful exchange of ideas. Thus, hedging fosters collaborative interpretation, balancing precision with openness to alternative perspectives in academic discourse.

#### PROTECTION THROUGH POLITENESS

In academic writing, hedges serve a protective function through politeness by softening assertions and demonstrating respect for readers’ perspectives, thereby avoiding overly assertive tones (Brown & Levinson, 1987; Myers, 1989). They help reduce face-threatening acts, especially when ideas may contradict readers’ beliefs. Writer-oriented hedges such as impersonal expressions, for instance, “it is assumed that” and “it could be suggested”, deflect responsibility and mitigate impact (Hyland, 1998). Reader-oriented hedges, including expressions like “we wonder” or “we wish,” signal caution and invite alternative interpretations. This rhetorical approach fosters a collegial tone, encourages constructive dialogue, and enhances acceptance within the academic community (Salager-Meyer, 1994; Vass, 2017).

- (10) The RSUs are interconnected by high-capacity point-to-point links. **It is assumed** that RSU transmissions reach all vehicles traveling along the highway. (DDs. EEE, 2020)
- (11) In our search for synchronic effects of functional load, **we wondered** whether interference effects **can be predicted** on the basis of the informativeness of a specific dimension in L1 and L2, or an artificial L2. (DDs. Ling, 2019)
- (12) Therefore, **it is possible to claim** that the learning bias towards nouns does not just come from the fact that nouns refer to things tangible and visible for babies, but that nouns and noun phrases have distinct statistical patterns that are easily picked up. (DDs. Ling, 2020)

In Example (10) above, passive voice construction “it is assumed” is used to cautiously frame the assumption about RSU transmissions, mitigating potential critique. Example (11) employs “we wondered” and “can be predicted” to express tentativeness, fostering a collaborative tone in exploring functional load effects. In Example (12), “it is possible to claim” presents the assertion about noun learning biases with care, leaving room for alternative interpretations. Hedges mitigate face-threatening acts, foster dialogue, and enhance the acceptability of academic claims through respectful and collegial discourse.

#### ENHANCEMENT OF PERSUASIVE POWER

In academic writing, hedges can enhance persuasive power by articulating claims flexibly and mitigating potential challenges. Hyland (1994) emphasized their evaluative and diplomatic functions, enabling authors to present viewpoints while remaining open to debate. Hedges also align authors with their academic community, adding credibility through strategies such as citation (Di Marco & Mercer, 2004). Examples include precision adverbs (“greatly”, “generally”), modal verbs (“must”), and epistemic lexical verbs (“estimate”, “suggest”), which balance assertiveness with openness, thereby fostering scholarly dialogue and engagement (Hyland, 2012; Taymaz, 2021). The following examples illustrate this persuasive function:

- (13) The ideas surrounding “sounding Black” remain inconclusive, though **it is clear** that “sounding Black” **greatly** effects individuals and communities, including most blatantly, in cases of racial profiling. (DDs. Ling, 2021)
- (14) Reference [24] provides an overview of the power available using various energy harvesting techniques, but **generally speaking** the amount of consistently available power is very low (e.g. Despite this, there are several examples of commonplace products using energy harvesting. (DDs. EEE, 2020)
- (15) Shannon capacity **is calculated** by maximising mutual information  $MI = I(X; Y)$  between the channel input symbols X and output symbols Y over all **probability** distributions of X. (DDs. EEE, 2021)

Example (13) uses “it is clear” and “greatly” to acknowledge certainty while emphasizing the significant impact of “sounding Black”, balancing assertiveness with openness to further inquiry. Example (14) employs “generally speaking” to temper claims about energy harvesting, aligning the statement with available evidence. In Example (15), “is calculated” and “probability” introduce precision while leaving room for alternative approaches, reflecting academic flexibility. The hedges in these examples enhance persuasiveness and credibility by confidently asserting claims while mitigating potential challenges, thus fostering scholarly dialogue through a balance of assertiveness and openness.

#### DISCUSSION

This study examined hedging strategies in the Introduction sections of DDs across Linguistics and EEE, focusing on subcategory frequency, significant differences, and functions. Findings revealed that while Ling exhibited higher token and type counts, similar STTR values across disciplines suggest comparable lexical variation relative to corpus size, despite field-specific demands.

Linguistics also showed a higher overall normalized frequency of hedges, with content-oriented hedges dominating in both fields but significantly more frequent in Linguistics. These results align with previous studies (Hyland, 1998; Vold, 2006), and they can also be interpreted as evidence of discipline-specific doctoral socialization: writers appear to be enculturated into different norms of appropriate commitment, learning when to qualify claims and how to position themselves relative to readers and evidence. Differences in specific hedge types, such as reliability hedges (“may”, “seem”, and “possible”) and reader-oriented hedges (“we propose”, “I believe”), underscore discipline-specific rhetorical conventions, supporting the view that hedging strategies are shaped by the unique demands of disciplinary communication (e.g., Mirzapour, 2016; Takimoto, 2015). For doctoral writing pedagogy and ESP instruction, the findings suggest the value of discipline- and section-sensitive guidance that links hedge forms to their rhetorical functions in Introductions (e.g., gap-claiming, scope delimitation, and reader alignment).

The analysis of hedging functions across disciplines revealed notable patterns in their rhetorical roles in DDs. Linguistics exhibited a higher frequency of hedges associated with the modulation of truth-value, certainty, and precision, such as “may”, “approximately”, and “perhaps”, which emphasize caution and interpretative flexibility. This supports Hyland’s (1998) observation that Soft Sciences tend to mitigate overgeneralizations through hedging. In contrast, EEE employed fewer but strategically placed hedges such as “likely” and “could,” which were critical in presenting technical claims with precision. Regarding the withdrawal of epistemic commitment and responsibility, EEE often used impersonal references such as “it is assumed,” while Linguistics favored epistemic verbs like “seem” to express tentative stances. Viewed through the lens of epistemic apprenticeship, these patterns suggest that early scholars learn discipline-preferred stance routines: Linguistics writers are trained to sustain interpretive openness, whereas EEE writers are trained to bound claims tightly while maintaining technical plausibility. These findings are consistent with the previous studies (e.g., Afshar et al., 2014; Boginskaya, 2023; Mirzapour, 2016), which noted that the Humanities lean toward interpretive hedging, whereas Science or Engineering prioritize direct expression and technical accuracy. However, the function of “enhancement of persuasive power” contrasts with earlier studies (e.g., Ahmed & Maros, 2017; Karunakaran & Hong, 2025), which argued that hedges may weaken the text’s credibility of arguments and lead to negative perceptions of the source, diminishing its persuasive power. This difference may reflect genre-related effects: in dissertation Introductions, calibrated hedging can index caution and credibility in a high-stakes evaluative context rather than conversational weakness.

Theoretically, this study advances hedging research by developing and operationalizing a rule-governed composite model that integrates Hyland’s (1998) interactional orientation with Varttala’s (1999) lexico-grammatical coverage, enabling a more systematic classification of content- and reader-oriented hedges. By specifying explicit decision rules, implemented through a predefined, rule-based coding framework (see Appendix C), the analysis addresses multifunctionality and overlap, thereby strengthening construct validity and improving the interpretability of corpus-based findings, particularly where the same linguistic form performs different rhetorical functions across contexts (Hyland, 1998b; Varttala, 1999). Moreover, by focusing on a clearly defined rhetorical site (Introduction sections), the study offers a section-aware account of hedging practices, since this section typically concentrates on justification, gap establishment, and positioning, which can amplify both caution and alignment work (Becher & Trowler, 2001; Swales, 1990).

The findings on hedging strategies highlight their critical role in shaping academic communication within DDs, particularly from a cross-disciplinary perspective. Beyond signaling uncertainty, hedges function to enhance credibility, manage authorial commitment, and invite reader alignment, demonstrating their flexibility as rhetorical resources in disciplinary writing. Collectively, the results suggest that effective doctoral writing instruction should treat hedging as a teachable, context-sensitive resource, with form–function mappings tailored to disciplinary epistemologies and the rhetorical demands of Introductions.

## CONCLUSION

This study explored hedging strategies in the Introduction sections of doctoral dissertations (DDs) in Linguistics and Electrical and Electronic Engineering (EEE), examining cross-disciplinary differences in hedge distribution, preferred forms, and rhetorical functions. Using a corpus-based mixed-method approach, the analysis showed that Linguistics Introductions employ denser and more varied hedging resources, with strong use of content-oriented hedges (e.g., precision and epistemic resources) alongside reader-oriented strategies that support engagement. In contrast, EEE Introductions use fewer hedges overall but deploy them strategically to bound technical claims and manage epistemic commitment. Taken together, these patterns suggest discipline-sensitive stance routines shaped by the communicative demands of doctoral Introductions and local expectations of warranted commitment.

The study contributes to hedging research by clarifying how hedging functions as a rhetorical resource for constructing disciplinary voice and negotiating credibility in the academic genre. It further offers pedagogical implications for doctoral writing and ESP instruction by supporting form–function guidance that is discipline- and section-sensitive, helping novice scholars align hedging choices with disciplinary norms of evidence, acceptable generalization, and reader positioning.

## LIMITATIONS AND FUTURE RESEARCH

Despite its contributions, this study has several limitations that warrant further investigation. First, the corpus was restricted to 50 DDs from the United States, collected within a limited time frame. This narrow temporal and geographical scope may affect the generalizability of the findings, particularly in representing global academic practices and diachronic changes in hedging strategies. Second, the analysis was confined to the Introduction sections, excluding other key chapters such as the Methodology, Results, and Discussion, where hedging might function differently. Third, this study did not examine other academic genres such as research articles, thereby limiting the cross-generic applicability of the findings.

To address these limitations, future research should consider expanding the dataset to include dissertations and research articles from diverse countries, time periods, and academic institutions. A more comprehensive, section-by-section analysis of full dissertations would offer deeper insights into the rhetorical functions of hedges. Additionally, incorporating cross-linguistic and cross-cultural comparisons could shed light on how hedging strategies vary across linguistic backgrounds and academic traditions, thereby enhancing our understanding of hedging as a dynamic and context-sensitive rhetorical strategy in global scholarly communication.

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APPENDIX A

Main category	Subcategory	Core function in academic writing	Common linguistic realizations	Examples (illustrative)	Rhetorical value
Content-oriented hedges	Accuracy-oriented hedges consist of (a) and (b) as follows	Mitigate the link between propositions and reality by improving precision and accounting for variability in interpretations.	Mainly precision markers and probability markers	—	Help writers present claims as measured and evidence-aligned, avoiding overstatement while maintaining clarity. (Hyland, 1996, 1998; Varttala, 1999)
	(a) Attribute hedges	Express partial alignment between observations and prototypical expectations (i.e., results may not fully match expected patterns).	Precision adverbs/approximators	<i>partially, approximately, somewhat</i>	Allow detailed reporting of deviations and uncertainty, keeping interpretations flexible without weakening descriptive accuracy.
	(b) Reliability hedges	Signal degrees of certainty and the provisional nature of findings.	Modal verbs; epistemic lexical verbs; probability adverbs	<i>may, might; appear, seem; perhaps, possibly</i>	Enable cautious interpretations, align claims with disciplinary norms, and support credibility by acknowledging uncertainty.
Content-oriented hedges	Writer-oriented hedges consist of the specific hedging as follows	Reduce the writer's personal accountability while preserving the propositional content of statements.	Epistemic lexical verbs; passive voice; impersonal expressions	<i>suggest, propose; is indicated; It is assumed that...</i>	Create distance from claims to reduce potential criticism and maintain an appropriately cautious scholarly stance. (Hyland, 1998)
	Attribution to sources	Distribute responsibility by anchoring propositions in prior research.	Explicit citation-based attribution	<i>Smith (2020) argues...</i>	Strengthen the legitimacy of claims while lowering the author's individual commitment.
	Methodological hedging	Limit generalizability by acknowledging method constraints and uncertainty in procedures.	Impersonal methodological references + modals	<i>This methodology might...</i>	Signals appropriate caution and avoids overgeneralization from specific methods or datasets.
	Limitation-oriented hedging	Explicitly acknowledge research limitations that affect claim strength.	Limitation statements and constraint markers	<i>small sample sizes; preliminary results; measurement imperfections</i>	Balances assertiveness with caution, protects credibility, and aligns with disciplinary expectations for transparency.

APPENDIX B

Main category	Subcategory	Core function in academic writing	Common linguistic realizations	Examples (illustrative)	Rhetorical value
Reader-oriented hedges	(a) Epistemic lexical verbs	Mark propositions as inferential, interpretive, or uncertain, rather than categorical.	Epistemic stance verbs	<i>believe, infer</i>	Encourages readers to evaluate the claim as plausible but not absolute, increasing interpretive space.
	(b) Personal attribution	Explicitly acknowledge the author's perspective while allowing alternative interpretations.	First-person attribution structures	<i>we suppose; my analysis</i>	Builds transparency and softens commitment, inviting readers to co-interpret findings.
	(c) Assumption of shared knowledge	Involve readers by appealing to common ground and disciplinary expectations.	Shared-knowledge markers	<i>as is known; to the best of our knowledge</i>	Creates solidarity and frames claims as grounded in shared disciplinary understanding.
	(d) Hypothetical conditionals	Present claims as conditional and highlight multiple possibilities.	Conditional clauses; modals	<i>if...; would</i>	Shows respect for the readers' judgment and avoids overgeneralization by foregrounding contingency.
	(e) Rhetorical questions	Prompt critical reflection and guide readers toward interpretive reasoning.	Interrogative forms used for stance	<i>Could such an interaction be significant?</i>	Engages readers cognitively, encouraging them to consider implications and follow the author's line of inquiry.
	(f) Testability/verification markers	Frame claims as open to checking, inviting shared evaluation and collaborative verification.	Verification-oriented stance phrases	<i>from our point of view</i>	Positions readers as co-assessors of knowledge, strengthening dialogic knowledge construction.

APPENDIX C

CODING FRAMEWORK FOR HEDGE IDENTIFICATION

Rule Type	Coding Rule	Operational Description	Illustrative Example	Rationale
Functional classification	<b>Dominant rhetorical function rule</b>	When a hedging expression plausibly fits more than one category, classification is determined by its dominant rhetorical function in context rather than by its surface linguistic form.	<i>may suggest</i> → coded as writer-oriented, as <i>suggest</i> foregrounds authorial interpretation despite the modal <i>may</i> .	Ensures function-based classification consistent with rhetorical interpretation
Functional classification	<b>Reader-oriented hedge rule</b>	A hedge is coded as reader-oriented when it anticipates, guides, or mitigates potential reader interpretation rather than qualifying propositional content or authorial commitment.	<i>It should be noted that...</i>	Operationalises reader-oriented hedging as an interactional strategy
Quantitative counting	<b>Single-coding rule</b>	Each hedging instance is counted once only and assigned to one primary category, even when multifunctional potential is present. Multi-coding is not permitted.	<i>Our analysis ... would suggest that...</i> → counted once as writer-oriented.	Prevents frequency inflation and maintains mutual exclusivity across categories
Co-occurring hedges	<b>Compound hedge rule</b>	When two or more hedging devices co-occur within the same clause to intensify epistemic caution, they are treated as one analytical unit and counted once.	<i>may possibly</i> → coded as one compound hedge (writer-oriented).	Reflects rhetorically integrated hedging rather than independent markers
Morphological variation	<b>Lemma consolidation rule</b>	Inflectional or derivational forms of a lexical hedge are grouped under the same lemma family, provided epistemic or stance-modulating meaning is retained in context.	<i>predict/predicted/predicting / prediction(s)</i>	Ensures consistency in frequency analysis and avoids artificial type inflation
Negative and antonymic forms	<b>Functional equivalence rule</b>	Adjectival hedges and their negative counterparts are included when they perform epistemic or stance-modulating functions.	<i>possible/impossible; consistent/inconsistent</i>	Maintains semantic coherence in hedge classification
Grammatical ambiguity	<b>Context-sensitive POS rule</b>	For items functioning across parts of speech, categorisation is based on actual syntactic role and clause-level function rather than lexical form alone.	<i>likely</i> (adj. vs. adv.); <i>potential</i> (adj. vs. noun)	Avoids misclassification caused by formal ambiguity
Multifunctionality	<b>Interpretive limitation acknowledgement</b>	Some hedging expressions are inherently multifunctional and cannot be categorised mechanically;	<i>It seems that; may suggest</i>	Explicitly acknowledges subjectivity while controlling it systematically

Rule Type	Coding Rule	Operational Description	Illustrative Example	Rationale
Disagreement resolution	<b>Consensus-based adjudication rule</b>	interpretation relies on contextual and rhetorical judgement constrained by explicit rules.  Disputed cases are re-examined in local and broader context, checked against theoretical definitions, discussed between raters, and resolved through expert adjudication if needed.	<i>It seems that...</i> → re-evaluated via rater discussion and expert review.	Minimises interpretive bias and strengthens inter-rater reliability
Inclusion criterion	<b>Epistemic relevance requirement</b>	A form is coded as a hedge only if it expresses epistemic uncertainty, approximation, or stance modulation in context. Non-epistemic uses are excluded.	<i>about 50%</i> → included; <i>about the method</i> → excluded.	Distinguishes hedging from non-epistemic lexical usage

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