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Hedges and Boosters in Academic Writing: Native vs. Non-Native Research Articles in Applied Linguistics and Engineering

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The expression of doubt and certainty is crucial in academic writing where the authors have to distinguish opinion from fact and evaluate their assertions in acceptable and persuasive ways. Hedges and boosters are two strategies used for this purpose. Despite their importance in academic writing, we know little about how they are used in different disciplines and genres and how foreign language writers present assertions in their writing. This study explores the use of hedges and boosters in the research articles of two disciplines of Electrical Engineering and Applied Linguistics. It further examines the use of hedges and boosters by native and non-native writers of English in these research articles. Based on a corpus of twenty research articles, the overall rhetorical and categorical distribution of hedges and boosters were calculated across four rhetorical sections (Abstract, Introduction, Discussion, and Conclusion) of the research articles. The analysis shows that the overall distribution of hedges and boosters in Applied Linguistics articles is higher than Electrical Engineering articles. Moreover, there are significant differences between native and non-native writers in the use of hedges and boosters. These findings may have some implications for the teaching of academic writing especially to EFL learners.

Keywords: Hedges, Boosters, Doubt and Certainty, Academic Writing, Research Articles

From the late 1980s, there has been a continuing and increasing interest in genre-based approach to specialized language teaching and in the development of professional communication skills (Swales, 2004). One of the important professional communication skills is the expression of doubt and certainty in academic writing. This is because according to Hyland (1998) the expression of doubt and certainty is central to the rhetorical and interactive character of academic writing. Its importance lies in the fact that academics gain acceptance for their research claims by balancing conviction with caution, either investing statements with the confidence of reliable knowledge, or with tentativeness to reflect uncertainty or appropriate social interactions. These expressions of doubt and certainty are known in the literature as hedges and boosters (Holmes, 1984, 1990).

Hedges and boosters are communicative strategies for increasing or reducing the force of statements. They convey both epistemic and affective meaning in academic discourse. That is, they not only carry the writer's degree of confidence in the truth of a proposition, but also an attitude to the audience. While the literature emphasizes the importance of hedging in academic contexts (Hyland, 1996a, 1996b; Salager-Meyer, 1994; Skelton, 1997), Hyland (1998) has stressed that we know little about its use, frequency, and distribution in different disciplines or genres. Hedging has received most attention in the context of casual and oral discourse (Coates, 1983; Stubbs, 1986). The neglect of the study on hedging in the past years is also reported by Crystal (1995, p. 120) who attempted to shed light on the areas in English language studies which have not received enough attention. On the other hand, the study on boosters shows their important role in creating conversational solidarity (Holmes, 1984, 1990). However, they have received little attention in academic writing.

There have not been many studies on hedging and boosting in research articles of different disciplines and across their rhetorical sections. The limited number of studies which are conducted in this area have shown that there are some variations in

the use of hedges and boosters across disciplines (Hyland, 1998; Varttala, 2001) and rhetorical sections of research articles (Salager-Meyer, 1994; Vassileva, 2001).

Academic writing becomes especially challenging when the text is to be written in a foreign language. English has become the lingua franca of academic discourse, and novices as well as established researchers must be able to express themselves in that language if they want to be fully accepted members of the international academic community. According to Swales (2004), the "Englishization" of the academic world and increasing number of non-native speakers of English require special attention to academic style. A number of studies (Holmes, 1982, 1988; Hyland & Milton, 1997; Hyland, 2000) have emphasized the importance of learning to express doubt and certainty for learners of English as a second or foreign language. Since cultural differences in argumentation strategies and rhetorical means are embodied in language use, it is essential to have some knowledge of these differences while writing in a foreign language. However, according to Hyland and Milton (1997), we do not know how second language writers present their assertions in their writing.

What are Hedges and Boosters?

Holmes (1984) identifies two basic strategies for expressing different degrees of commitment (certainty) and detachment (doubt): *boosting* and *attenuation or hedging* (Vassileva, 2001).

Lexical devices used to express strong conviction are described as boosters. Boosters, such as *clearly*, *obviously*, and *of course*, allow writers to express conviction and assert a proposition with confidence. Affectively, they also mark involvement and solidarity with an audience, stressing shared information, group membership, and direct engagement with readers (Hyland, 1998, p. 350).

Lexical devices used to signal the speaker's lack of confidence or to assert something tentatively are described as hedges such as *possible*, *might*, and *perhaps*. This may be to show doubt and indicate that information is presented as opinion rather

than fact, or it may be to convey deference, humility, and respect for colleagues' views (Hyland, 1998, p. 351).

Functions of Hedges and Boosters

The bulk of literature on hedging/boosting treats it exclusively as modality, as attitudes toward knowledge or "an item of language which a speaker uses to explicitly qualify his/her lack of commitment to the truth of a proposition he/she utters"(Crompton, 1997, p. 281), i.e., along the 'author-knowledge' axis of text production. This approach excludes the 'author-audience' axis altogether. Holmes (1984, p. 348) suggests that "there are at least two basic reasons why a speaker might wish to modify the strength or force with which a particular speech act is expanded: firstly, to convey modal meaning… and, secondly, to express affective meaning or the speaker's attitude to the addressee".

Modal meaning involves the speaker's attitude to the content of the propositions (Holmes, 1982); therefore, epistemic modality is concerned with this type of meaning. "Affective meaning concerns the speaker's attitude to the addressee or audience in a particular social context, and involves taking account of the function and illocutionary force of utterances" (p.18). The degree of conviction or confidence with which a speaker makes an assertion, or the degree of illocutionary force with which it is asserted, is an aspect of affective meaning.

Hedges are lexical items which reduce or soften the illocutionary force of utterance. Thus they can be used to express the speaker's views tentatively or unconfidently; or they may serve to mitigate the force of negatively affective speech acts such as accusations, criticisms or disagreements; or less often, they may be found attenuating the strength of positively affective speech acts such as praising, complimenting and encouraging utterances. Lexical items such as *perhaps, probably*, *doubtfully* and *unlikely* may serve to soften the force of directive speech acts or positive utterances, as in (1) and (2):

(1) *Perhaps* you could finish now.

(2) It's good *I suppose*.

According to Holmes (1982), such forms in terms of the modal meaning express the speaker's uncertainty of the validity of what is asserted. They also may be used primarily or equally to convey affective meaning, reducing the illocutionary force of the speech act in order to reflect the speaker's attitude to the listener in the context of utterance.

Lexical items which are used to express the speaker's certainty that a proposition is true may also function to boost the illocutionary force of a variety of speech acts. Lexical items such as *believe me, certainly, definitely, really, without doubt* and *no way*, for example may be used to strengthen utterances functioning to express agreement or disagreement, reassurance or denial, as illustrated in the following examples:

(3) They *really* are delicious. Function: agreement with addressee.

(4) *Believe me* they are very much involved. Function: Denial of or disagreement.

In each case the italicized lexical item increases or strengthens the illocutionary force of the utterance and serves to express the speaker's opinion with strong conviction. Therefore, hedges and boosters express degrees of certainty and degree of conviction; in other words, they may express both modal and affective meaning.

In addition to these two functions which Holmes (1982) defines for hedges and boosters, other researchers in the literature propose some other functions. In terms of different functions of hedges, Thue Vold (2006) distinguishes between two types of hedges: *real hedges* and *strategic hedges*. According to Thue Vold (2006, p. 81), "Real hedges are used to convey real uncertainty, for example when the nature of the research findings does not allow the author to make strong claims or draw clear conclusions". In such cases, the hedges serve to give an accurate picture of the level of certainty. Lewin (2005, p. 173) has shown that authors of scientific texts see real uncertainty as the main motivation for their use of hedges. According to the authors in Lewin's study, they did not use hedges in order to be polite or modest but rather to be precise (2005, p. 169)

Hedging or expressions of uncertainty are also often associated with tentativeness, cautiousness, politeness, and a humble attitude (Salager-Meyer, 1994). Thue Vold (2006) refers to these as *strategic hedges*: "they are not necessarily used to express real uncertainty; rather, they are part of the conversations for academic writing" (p.81). Strategic hedges serve a variety of functions. They may be used within a context that expresses possible opinions or interpretations, and thus the author anticipates potential criticism.

(5) We cannot entirely exclude *the possibility* that differential loss of participants *may* have affected our results.

They may also be used as a politeness strategy, in order to cautiously criticize fellow researchers. In Brown and Levinson's (1987) terms, hedges function to express negative politeness. Myers (1989) also considers hedging as a politeness strategy in scientific articles. He suggests that academic writers employ hedges to minimize the potential threat new claims make on other researchers by soliciting acceptance and challenging their own work.

(6) On the other hand, to say that this performative is tacit *would seem* to *suggest* that the utterance does not actually contain an expression which identifies the act being performed.

They may also be used to tone down statements and claims in order for the author to be less vulnerable to criticism. Sometimes their presence may even be caused by political or ethical discussions.

Boosters function to express the speaker's intentions with confidence and strong conviction. Although they have received little attention in academic writing, boosters are seen to play an important role in creating conversational solidarity between participants (Holmes, 1984, 1990). In Brown and Levinson's (1987) terms, boosters can be seen as forms expressing positive politeness.

In science articles, Myers (1989) also regards intensifying features as positive-politeness devices, enabling writers to assume shared ground with their readers and stress common group membership. According to Hyland (1998, p. 353), "boosters allow

writers to negotiate the status of their information, helping to establish its perceived truth by strategically presenting it as consensually given".

Empirical Studies on Hedges and Boosters

Hedges and boosters are interpersonal aspects of language use, complex textual signals by which writers personally intervene into their discourse to evaluate material and engage with readers. Their presence or absence in a text might therefore be seen as the discoursal choices of individual researchers deciding to represent themselves more or less explicitly in their writing. In academic writing, the choices individuals make are socially shaped and constrained by the possibilities made available to them by the discourse conventions of their disciplines. In all disciplines, making an appropriate level of claim for one's findings is a critical aspect of research, and writers are expected to evaluate their propositions as accurately and objectively as possible.

Salager-Meyer (1994) discusses the distribution of hedges across different rhetorical sections of medical research articles. The results indicate that the Discussion sections are the most heavily hedged sections, whereas the Method section is the least-hedged rhetorical section. He concludes that the choice of expression of tentativeness and flexibility is dictated by the general structure of the discourse, its communicative purpose, the level of claim the writers wish to make, the structure of the discourse, and by the authors' pretension to universality and generalization.

Hyland (1996a, 1996b) examines the major forms, functions, and distribution of hedges in 26 molecular biology research articles and describes its importance in this genre. In 1998, he also explores the role of doubt and certainty in 56 research articles of eight disciplines: mechanical engineering, electrical engineering, marketing, philosophy, sociology, applied linguistics, physics and microbiology. The quantitative results reveal the importance of hedges and boosters in academic writing and their wide disciplinary variability. The results suggest a general division between philosophy, marketing, linguistics, and sociology on one

hand, and physics and engineering on the other, with biology occupying the middle ground. The distinction is dramatically illustrated by the fact that over 70 percent of all hedges occurred in the humanities/social science papers and they were over twice as frequent in philosophy, marketing and linguistics, as in physics and engineering. Philosophy and marketing papers show considerable use of boosters. However, the science and engineering papers were heavily underrepresented in the number of boosters.

Varttala (2001) has compared the hedging strategies in three different disciplines: economics, medicine and technology, and found that the relative frequency of hedges was higher in the field of economics than in medicine and technology- the latter disciplines having approximately the same frequency of hedges.

Falahati (2006) examines and compares the forms and functions of hedging across two rhetorical sections (Introduction, Discussion) of research articles from three disciplines: medicine, chemistry, and psychology. The results indicate that the three disciplines show some considerable differences in the use of hedges. The psychology research articles contain the highest amount of hedges, whereas the relative overall number of hedges in medicine and chemistry research articles was about 57% less than psychology.

Hedging, Boosting, and L2 Writers

Holmes (1982) argues that learning to express and interpret epistemic modality is not an easy task for learners of English as a second language. She discusses three sources of potential difficulty: the problem of establishing the precise degree of certainty expressed by particular linguistic forms; the range of linguistic devices available for signaling this aspect of meaning; and the interaction of different types of meaning in different contexts.

Firstly, defining the precise point on the scale of certainty which is signaled by a particular linguistic device may not be at all easy for a non-native speaker. Secondly, second language learners must be able to recognize and correctly interpret a wide range of

lexical items which are used to express degrees of certainty in English including modal verbs, lexical verbs, epistemic adverbs, adjectives and nouns. The third problem derives from the fact that all linguistic forms may simultaneously convey various types of meaning. Devices used to signal different degrees of certainty concerning the validity of the information asserted may also serve to increase or decrease the illocutionary force of speech acts. And at a more abstract level such variations in the illocutionary force of speech acts signal degrees of solidarity and intimacy, deference and politeness, perhaps in all societies.

According to Hyland and Milton (1997), a major problem for second language students writing academic essays in English is to convey statements with an appropriate degree of doubt and certainty. Based on a corpus of one million words, they compare the expression of doubt and certainty in the examination scripts of 900 Chinese school learners writing in English with those of 770 British learners of similar age and educational level. The results reveal that the L2 writers differ significantly from the native students in relying on a more limited range of devices offering stronger commitment to statements, and exhibiting greater problems in conveying a precise degree of certainty. They argue that students from different cultures may have preconceptions about the formal features of culturally and rhetorically appropriate writing which may differ from those which operate in English academic settings. "Such differences can make non-native students vulnerable to the risk of violating communicative norms as their writing may appear as too direct, running the risk of being considered as either brusque or dogmatic, or as too tentative, and therefore seen as equivocal, different or naïve" (Hyland & Milton, 1997, p. 186).

Genre-based approaches to analysis of texts and exploration of the use of textual strategies such as hedges and boosters in different disciplines and between native and non-native writers have pedagogical implications for teaching academic writing and English for Specific or Academic Purposes. It is important that the content of such courses be based on empirical results from analyses of actual language use rather than on traditional

normative principles.

This study aims at contributing to the stock of empirical evidence that can be used for such pedagogical purposes. It investigates the use of hedges and boosters in four rhetorical sections (Abstract, Introduction, Discussion, and Conclusion) of Electrical Engineering (henceforth EE) and Applied Linguistics (henceforth AL) research articles. It further examines the use of these devices by native and non-native Iranian writers of English in research articles of these two disciplines. To achieve these purposes, this study addresses the following research questions:

1. What are the differences between EE and AL research articles in the use of hedges and boosters across their different rhetorical sections?
2. What are the differences between native and non-native writers of English in the use of hedges and boosters across different rhetorical sections of EE articles?
3. What are the differences between native and non-native writers of English in the use of hedges and boosters across different rhetorical sections of AL articles?

Method

Data and Data Selection Criteria

The data for this study consists of twenty research articles: ten articles belonging to Electrical Engineering and ten articles belonging to Applied Linguistics. These two disciplines were selected as representatives of the two broad disciplines of Engineering and Social Sciences. Among ten articles in each discipline, five articles belong to native writers and five articles belong to non-native writers. The articles were published in leading Iranian international and journals during the last decade (see Appendix 1), most of them during the recent five years. They were written by both British and American authors, but potential differences between American and British English will not be considered here.

This study focused on four rhetorical sections of research articles, namely Abstract, Introduction, Discussion, and Conclusion since in these sections writers mainly establish the significance of the study and make generalizations regarding the major findings. For the purpose of the study, all footnotes, quotations, bibliographies, linguistic examples, tables and figures which appeared in the research articles were deleted from the data.

The researchers selected articles from each discipline based on five criteria: having experimental design, having Abstract, Introduction, Discussion, and Conclusion, date of research article publication, gender of the author, and the number of authors.

The first criterion was having experimental design. Since research articles in EE had experimental design, to have homogeneous data we had to select research articles having experimental design in AL, too. The second criterion was having the Abstract, Introduction, Discussion, and Conclusion sections. Because this study was focusing on these four sections, it was important to have them among the rhetorical sections of research articles. The next criterion was the date of research article publication. The research articles were all limited to those published within the last ten years. Another criterion was the gender of the author. To avoid gender differences in the use of hedges and boosters, research articles were limited to those written by male writers. Finally, we tried to choose research articles with single authors. However, in EE research articles most articles had more than one writer.

Once the research articles were selected, they were analyzed in terms of the frequency of the hedges and boosters. The methods and procedures used for analyzing the data are discussed in the next section.

Procedures of Data Analysis

One of the main objectives of this study is to examine the occurrence of hedges and boosters across the two disciplines of EE and AL and four rhetorical sections of research articles: Abstract,

Introduction, Discussion, and Conclusion. Another aim is to identify the differences between native and non-native writers in the use of hedges and boosters across these two disciplines and four rhetorical sections of research articles. In order to meet these goals, four rhetorical sections of twenty research articles consisting of 34,541 words were analyzed. To determine the frequency of lexical expressions of doubt and certainty, a list of such items was compiled from Quirk et al. (1985), Holmes (1988), Hyland (1996a, 1998), Hyland and Milton (1997), and Varttala (2001) (see Appendix 2).

In this study, Holmes' (1988) classification of the lexical devices expressing hedges and boosters was used. She classifies the lexical devices used to express doubt and certainty into five grammatical classes: modal verbs, lexical verbs, adverbs, adjectives, and nouns. Because there were some other hedges and boosters in the form of a clause in the data collected for the purpose of the present study, the researcher included another category named "clausal elements" in the analysis of data.

The articles were then examined to determine the frequency of hedges and boosters. However, it should be mentioned that it is very difficult to determine all the hedges and boosters used by an author in a research article. Because according to Hyland (1996b, p. 437) "the choice of a particular device does not always permit a single, unequivocal pragmatic interpretation". As a result, assigning specific meanings exclusively to particular forms is not possible. Not only is it impossible to relate particular forms exclusively to specific functions, but also the expression of simultaneous meanings introduces the problem of indeterminacy in specifying cases. A single linguistic form such as could, for example, can express ability and permission as well as possibility. On the other hand, the same epistemic meaning can be signaled in many different ways. Such an ambiguity leads to the difficulty of identifying which of the linguistic forms are hedges or boosters and which are not. Therefore, hedges and boosters should be analyzed in context.

After determining the frequency of hedges and boosters in four rhetorical sections of the research articles and classifying

them into six categories of analysis, the total words used in each section were also counted. Since the size of the research articles in each discipline and across four rhetorical sections varied, the researcher decided to calculate the frequency of hedges and boosters per 1,000 words. Therefore, in order to show the distribution of hedges and boosters across two disciplines and four rhetorical sections of research articles, the frequency of occurrence of hedges and boosters was calculated per 1,000 words in each rhetorical section of these two disciplines.

To find out the difference in the category distribution of hedges and boosters between these two disciplines, the frequency of occurrence of each category of hedges and boosters per 1,000 words and their percentage were also computed in each discipline. Moreover, in order to test whether there is a significant statistical difference between these two disciplines in the distribution of hedges and boosters across four rhetorical sections of articles, the Chi-square test was used.

The same procedures of analysis were then carried out to find out the overall distribution and category distribution of hedges and boosters in research articles written by native and non-native writers in two disciplines.

Results and Discussion

We will present and discuss the results of the present research as follows:

1. Those related to the distribution of hedges and boosters in Electrical Engineering and Applied Linguistics research articles
2. Those related to the distribution of hedges and boosters in Electrical Engineering articles of native and non-native writers
3. Those related to the distribution of hedges and boosters in Applied Linguistics articles of native and non-native writers

Distribution of Hedges and Boosters in EE and AL Research Articles

Overall Distribution

In order to find out the similarities or differences between EE and AL articles in the distribution of hedges and boosters, first, the overall distribution of hedges and boosters in four rhetorical sections of the research articles in these two disciplines was calculated. The results of the analysis showed that the frequency of hedges and boosters across four rhetorical sections of AL articles (28.22 and 10.65 per 1,000 words) was higher than EE articles (22.90 and 8.72 per 1,000 words). This is consistent with the findings of Hyland (1998) on hedging and boosting in eight disciplines including EE and AL. The results of the Chi-Square tests indicated that there was not a significant difference between the two disciplines in the use of boosters, but the difference in the use of hedges was significant.

According to Varttala (2001), the differences in the overall incidence of hedges in different disciplines can be explained by considering the object and general nature of disciplines. Markkanen and Schroder (1997, cited in Falahati, 2006) have considered the different bases of argumentation in various fields as the major reason for variation in the use of hedges. According to this view, some fields like linguistics and philosophy would favor more hedging than other fields like natural sciences because argumentation in natural sciences is based on experimental data and concrete evidence.

Another source of difference can be traced to the nature of the fields. The fields of Chemistry and Electrical Engineering, for example, can be categorized under "hard" sciences in which as Varttala (2001, p. 250) states, the methods and objects of the study are "more closely related to the traditional rigorous empiricism of the natural sciences". The researchers in these fields can explain the procedures of the experiment and make conclusions with more confidence. However, "soft" sciences, such as Psychology and Applied Linguistics, are characterized as having a theoretical

foundation with tentative nature. According to Hyland (1998), in the soft fields, there is less control of variables and more diversity of research outcomes. This can partly account for the higher occurrence of hedges in AL research articles.

Rhetorical Distribution

The frequency of hedges and boosters was calculated per 1,000 words in four rhetorical sections of EE and AL articles: Abstract, Introduction, Discussion, and Conclusion. Table 1 represents the total number of words, the total frequency of hedges and boosters, and their frequency in four sections of EE research articles. It indicates that the highest incidence of hedges is in the Conclusion and Discussion sections (25.12 and 23.23 per 1,000 words) and boosters occur mostly in the Discussion section (10.22 per 1,000 words).

Table 1
Frequency of hedges and boosters across four sections of EE research articles

EE Research Articles										
Total words	**Abstract**		**Introduction**		**Discussion**		**Conclusion**		**Total**	
	1,380		5,291		7,532		1,950		16,153	
Total devices	**H**	**B**	**H**	**B**	**H**	**B**	**H**	**B**	**H**	**B**
	29	11	117	38	175	77	49	15	370	141
F per 1,000	21.01	7.97	22.11	7.18	23.23	10.22	25.12	7.69	22.90	8.72

Note: F = Frequency, H = Hedge, B = Booster

Table 2 indicates the distribution of hedges and boosters in four rhetorical sections of AL articles. According to Table 2, the Discussion section followed by Conclusion section (29.04 and 28.89 per 1,000 words) in AL articles are mostly hedged with the highest incidence of boosters in AL articles is in the Conclusion and Discussion sections (14.20 and 13.07 per 1,000 words).

Table 2
Frequency of hedges and boosters across four sections of AL research articles

AL Research Articles										
Total words	**Abstract**		**Introduction**		**Discussion**		**Conclusion**		**Total**	
	1,746		8,024		6,576		2,042		18,388	
Total devices	**H**	**B**	**H**	**B**	**H**	**B**	**H**	**B**	**H**	**B**
	42	14	227	67	191	86	59	29	519	196
F per 1,000	24.05	8.01	28.29	8.34	29.04	13.07	28.89	14.20	28.22	10.65

Note: F = Frequency, H = Hedge, B = Booster

As these tables show, in both EE and AL articles, the Discussion and Conclusion sections generally contained more hedges and boosters than the Introduction and Abstract sections. This is shown in Figures 1 and 2 in a more tangible way. This result is consistent with findings of Hyland (1996a) on hedging in biology research articles, Varttala's(2001) study on the distribution of hedging in three disciplines, Vassileva's (2001) research on the distribution of hedges and boosters in linguistics research articles, and Falahati's (2006) study on hedging in three disciplines.

The variation within the rhetorical sections of a research article can be explained by the different purposes served by these sections. The purpose of an Abstract is to summarize the article (Brown, 1988). Included in this summary are the problem under study, characteristics of the subjects and materials, the procedures used, the findings of the study, and the conclusions reached by the researcher. Thus, in presenting the summary of the results in the Abstract, the researcher may use some hedges or boosters as was observed in the corpus of this study.

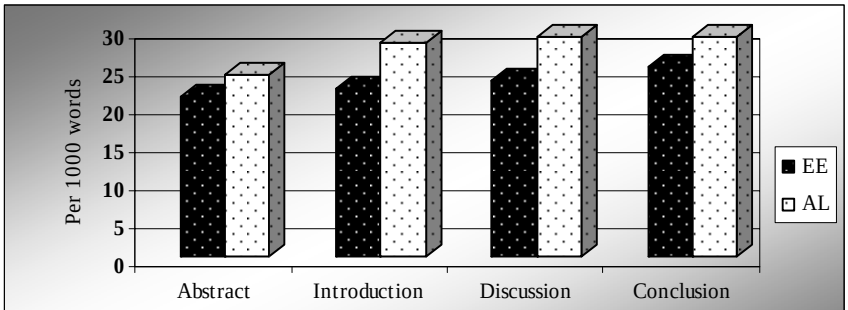

Figure 1. Distribution of Hedges Across Four Sections of EE and AL Articles

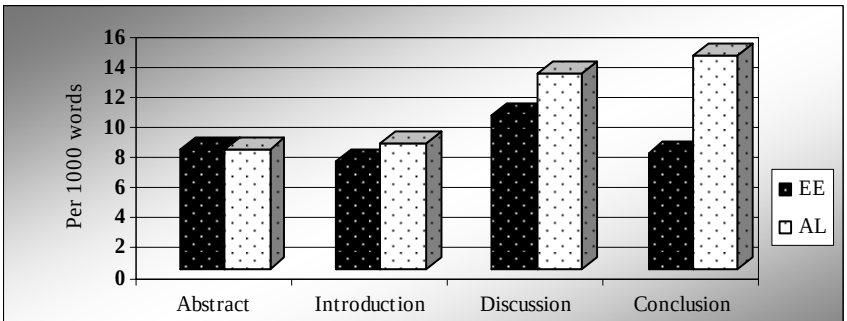

Figure 2. Distribution of Boosters Across Four Sections of EE and AL Articles

The main function of the Introduction section, according to Swales (1990), is to create a research space in which to locate the study. In order to meet this end, the writers try to "establish a territory", by reviewing the previous works and "establish a niche" by referring to the gap and shortcomings which exist in the previous works. West (1980) states that the main rhetorical function of the Introduction is to justify the reason for investigation. The writers make this justification through showing the problem or gap in previous research and emphasizing the significance of their own work. Therefore, there is little use of boosters in the Introduction. But, hedging provides researchers with a helpful strategy to make a cautious approach in introducing their views towards the other studies. Hyland (1996a) claims that in Introductions hedging largely mitigates reviews of prior

research, speculates about the importance of the study, and tentatively announces the findings. The analysis of the Introductions in this study is consistent with this view.

The Discussion section contained more hedges and boosters compared to the Introduction and Abstract sections. This is not surprising since this is the place to analyze the data, put forward claims and strengthen or mitigate them. The main rhetorical function of the Discussion is to make claims about the findings of the study, to summarize the results, state conclusions and suggestions with reference to previous research. According to Hyland (1996a, p.275), writers try to gain their academic credibility in this section by "going beyond the data to offer more general interpretations".

The Conclusion section also contained large amount of hedges and boosters in both disciplines. In the Conclusions, the authors commonly comment on the information presented in the articles, summarize the results and put forward claims about the future events. Therefore, this function of the Conclusion may be a plausible explanation for the high incidence of hedges and boosters in this section.

Categorical Distribution

In order to find out the differences or similarities in the distribution of six categories of hedges and boosters in EE and AL articles, the frequency of hedges and boosters in each category per 1,000 words and their percents were computed in these two disciplines. Table 3 shows the distribution of six categories of hedges and boosters in EE research articles. According to this Table, modal verbs (27.29%) and adverbs (25.67%) are the mostly used categories as hedges, and lexical verbs (39.71%) and adverbs (19.85%) are the mostly used categories as boosters in EE research articles.

Table 3
Distribution of different categories of hedges and boosters in EE research articles

EE Research Articles						
Category	**Hedge**			**Booster**		
	F Per 1,000 W	**Percent**	**Raw number**	**F Per 1,000 W**	**Percent**	**Raw number**
Modal verbs	6.25	27.29	101	1.48	17.02	24
Lexical verbs	4.33	18.91	70	3.46	39.71	56
Adverbs	5.88	25.67	95	1.73	19.85	28
Adjectives	3.96	17.29	64	1.48	17.02	24
Nouns	1.98	8.64	32	0.55	6.38	9
Clausal elements	0.49	2.16	8	0	0	0
Total	22.90	100	370	8.72	100	141

Note: F = Frequency, W = Words

Table 4 presents the distribution of six categories of hedges and boosters in AL research articles. It shows that lexical verbs (30.82%), modal verbs (26.97%), and adverbs (26.01%) are the most frequently used hedging devices, and lexical verbs (50%) and adverbs (24.48%) are the mostly used categories as boosters in AL research articles.

The results showed a broad agreement in the use of lexical verbs, adverbs, and modal verbs as the main categories to express degrees of certainty and definiteness in both disciplines, but there were differences in the use of modal verbs and lexical verbs for expressing doubt or uncertainty between EE and AL articles. In EE articles, hedging was presented mainly through modal verbs, but AL articles mostly used lexical verbs to express hedging. Hyland (1998) also reported that in science and engineering articles a higher proportion of hedges and boosters were modal verbs. He attributed that to the preference for impersonal strategies in the hard sciences, "because modal verbs tend to downplay the person making the evaluation" (p. 371). However, lexical verbs offer a more overt and precise means of signaling the writer's commitment

to a proposition.

Table 4
Distribution of different categories of hedges and boosters in AL research articles

AL Research Articles						
Booster			**Hedge**			
Raw number	**Percent**	**F Per 1,000 W**	**Raw number**	**Percent**	**F Per 1,000 W**	**Category**
16	8.16	0.87	140	26.97	7.61	**Modal verbs**
98	50	5.32	160	30.82	8.70	**Lexical verbs**
48	24.48	2.61	135	26.01	7.34	**Adverbs**
12	6.12	0.65	48	9.24	2.61	**Adjectives**
16	8.16	0.87	28	5.39	1.52	**Nouns**
6	3.06	0.32	8	1.54	0.43	**Clausal elements**
196	100	10.65	519	100	28.22	**Total**

Note: F = Frequency, W = Words

Distribution of Hedges and Boosters in EE Articles of Native and Non-native Writers

Overall Distribution

The results of the analysis showed that the overall occurrence of hedges and boosters across four sections of the articles of native writers (28.07 and 10.54 per 1,000 words) was higher than the articles of non native writers (15.89 and 6.27 per 1,000 words) in EE. The results of the Chi-Square tests indicated that there was not a significant difference in the distribution of boosters in the EE articles of native and non-native writers, and only the difference in the use of hedges between the two groups was significant.

Previous studies showed that foreign students find the expression of commitment and detachment to propositions highly problematic, and a failure to hedge statements adequately is a common feature of even formally proficient L2 writers (e.g. Skelton, 1988; Dudley-Evans, 1992, cited in Hyland, 1996c). According to Hyland (1996c), the main reason for this is that there are clear cultural differences in the degrees of indirectness permitted in academic writing and proficiency in this pragmatic area is difficult to achieve in a foreign language. This results in what Thomas (1983) calls "cross-cultural pragmatic failure". This failure may be due to either inadequate linguistic knowledge or to faulty perceptions of culturally appropriate behavior because L2 students learn to think and write differently in their own cultures.

Rhetorical Distribution

The frequency of hedges and boosters was computed per 1,000 words in the Abstract, Introduction, Discussion, and Conclusion sections of EE articles written by native and non-native writers. Table 5 presents the total number of words, the distribution of hedges and boosters across four sections of EE articles written by native writers, and their total frequencies. The Table indicates that the highest incidence of hedges is in the Abstract and Discussion sections (31.32 and 29.67 per 1,000 words) and the highest occurrence of boosters is mostly in the Discussion and Abstract sections (11.86 and 10.02 per 1,000 words).

Table 6 shows the distribution of hedges and boosters in EE research articles of non-native writers. According to this Table, the Conclusion section (24.80 per 1,000 words) in the articles of non-native writers is mostly hedged and the highest incidence of boosters occurs in the Discussion section (8.13 per 1,000 words) of the articles of non-native writers.

Table 5
Frequency of hedges and boosters in EE articles of native writers

EE Articles (Native)										
Total words	**Abstract**		**Introduction**		**Discussion**		**Conclusion**		**Total**	
	798		3,343		4,213		942		9,296	
Total devices	**H**	**B**	**H**	**B**	**H**	**B**	**H**	**B**	**H**	**B**
	25	8	87	31	125	50	24	9	261	98
F per 1,000	31.32	10.02	26.02	9.27	29.67	11.86	25.47	9.55	28.07	10.54

Note: F = Frequency, H = Hedge, B = Booster

Table 6
Frequency of hedges and boosters in EE articles of non-native writers

EE Articles (Non-Native)										
Total words	**Abstract**		**Introduction**		**Discussion**		**Conclusion**		**Total**	
	582		1,948		3,319		1,008		6,857	
Total devices	**H**	**B**	**H**	**B**	**H**	**B**	**H**	**B**	**H**	**B**
	4	3	30	7	50	27	25	6	109	43
F per 1,000	6.87	5.15	15.40	3.59	15.06	8.13	24.80	5.95	15.89	6.27

Note: F = Frequency, H = Hedge, B = Booster

Figures 3 and 4 illustrate the distribution of hedges and boosters across four sections of EE articles by native and non-native writers more clearly.

The results indicated a similarity in the rhetorical distribution of boosters in the articles of native and non-native writers. The highest incidence of boosters in the articles of both groups occurs in the Discussion section and the lowest in the Introduction. Regarding the distribution of hedges, the main finding is that the Discussion and Abstract sections in the articles of native writers contained the highest, but in the articles of non-native writers the lowest occurrence of hedges. In other words, native writers used large number of hedges and boosters in the Discussion section. However, non-native writers employed the highest number of boosters and the lowest number of hedges in the Discussion section. They put forward their claims confidently without

mitigating them.

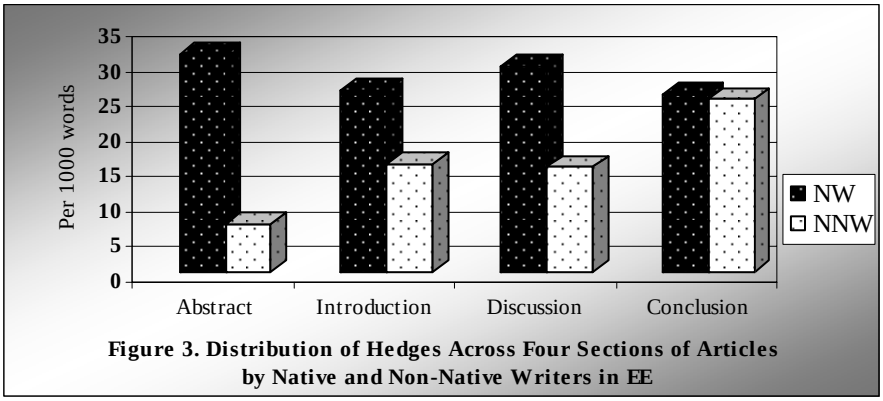

Figure 3. Distribution of Hedges Across Four Sections of Articles by Native and Non-Native Writers in EE

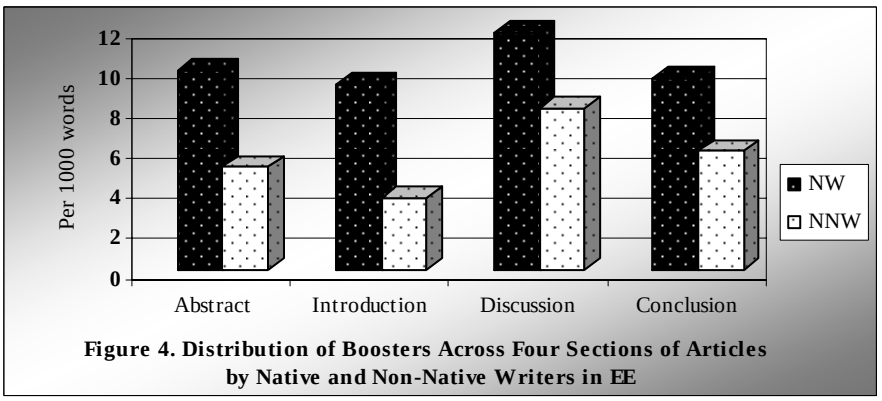

Figure 4. Distribution of Boosters Across Four Sections of Articles by Native and Non-Native Writers in EE

According to Hyland (1996c), this may be due to either inadequate linguistic knowledge or to culturally different perceptions of what constitutes appropriate linguistic behavior. Non-native writers are unfamiliar with the norms of academic writing because research or ESP courses at universities do not provide them with adequate knowledge about how to write a research article and how to express their ideas and the results of the study with appropriate degree of doubt and certainty. Hedges help writers show their uncertainty regarding the interpretation of the findings, leaving some room for further interpretation. However, using only categorical assertions leaves no room for

dialogue with readers and may imply that writers have the final word in that field.

Categorical Distribution

To find out the differences or similarities between native and non-native writers in the use of six categories of hedges and boosters in EE articles, the frequency of hedges and boosters in each category was expressed per 1,000 words and in a percentage. Table 7 shows the categorical distribution of hedges in the articles of native and non-native writers in EE. It indicates that adverbs (28.35%) and modal verbs (27.58%) in the articles of native writers and modal verbs (26.60%) in the articles of non-writers are the most frequently used categories of hedges.

Table 7
Categorical distribution of hedges in EE articles of native and non-native writers

EE Research Articles						
Category of hedges	Native			Non-Native		
	F Per 1,000 W	**Percent**	**Raw number**	**F Per 1,000 W**	**Percent**	**Raw number**
Modal verbs	7.74	27.58	72	4.22	26.60	29
Lexical verbs	5.59	19.92	52	2.62	16.51	18
Adverbs	7.96	28.35	74	3.06	19.26	21
Adjectives	4.62	16.47	43	3.06	19.26	21
Nouns	1.61	5.74	15	2.47	15.59	17
Clausal elements	0.53	1.91	5	0.43	2.75	3
Total	28.07	100	261	15.89	100	109

Note: F = Frequency, W = Words

Table 8 indicates the distribution of six categories of boosters in the EE articles of native and non-native writers. As Table 8 shows, both native (39.79%) and non-native (39.53%)

writers mostly use lexical verbs as boosters.

The results showed that both groups mostly used modal verbs and adverbs to express hedging. This is consistent with the findings of Hyland (1998). Probably, the reason is that, as we noted before, there is a preference for impersonal strategies in the hard sciences and both modal verbs and adverbs are less specific in attributing a source to a viewpoint. For expressing certainty, both groups mainly made use of lexical verbs. The reason seems to be that they are more overt means of showing the author's commitment to a proposition.

Table 8

Categorical distribution of boosters in EE articles of native and non-native writers

EE Research Articles						
Category of boosters	Native			Non-Native		
	F Per 1,000 W	**Percent**	**Raw number**	**F Per 1,000 W**	**Percent**	**Raw number**
Modal verbs	1.82	17.34	17	1.02	16.27	7
Lexical verbs	4.19	39.79	39	2.47	39.53	17
Adverbs	2.47	23.46	23	0.72	11.62	5
Adjectives	1.61	15.30	15	1.31	20.93	9
Nouns	0.43	4.08	4	0.72	11.62	5
Clausal elements	0	0	0	0	0	0
Total	10.54	100	98	6.27	100	43

Note: F = Frequency, W = Words

Distribution of Hedges and Boosters in AL Articles of Native and Non-native Writers

Overall Distribution

The frequency of hedges and boosters across four sections of AL research articles written by native and non-native writers was computed per 1,000 words. The results showed that the overall distribution of hedges and boosters in the articles of native writers (30.78 and 12.03 per 1,000 words) was greater than the articles of non-native writers (25.87 and 9.39 per 1,000 words). However, the results of the Chi-Square tests demonstrated that the difference between native and non-native in the use of hedges in AL articles was not significant. This can be explained by the fact that all of the non-native writers in this study were expert in English and Applied Linguistics. Perhaps, the results would be more different if the writers were chosen from English learners.

However, there were significant differences between these two groups in the use of boosters. In contrast to the tendency of non-native writers in EE to use more boosters than hedges, here non-native writers have a tendency to use more hedges than boosters and there is not a balance between these two strategies in their articles. The reason seems to be the same as we explained in the case of EE articles: the unfamiliarity of non-native writers with the norms of academic writing or with the essential characteristics of appropriate argument, i.e., hedging and boosting. As Hyland (1998) points out hedges and boosters are critical to academic writing. They not only carry the writer's degree of confidence in the truth of a proposition, but also an attitude to the audience. They work to balance objective information, subjective evaluation, and interpersonal negotiation and this can be a powerful persuasive factor in gaining acceptance for claims.

Rhetorical Distribution

The frequency of hedges and boosters across four sections of AL research articles written by native and non-native writers was

computed per 1,000 words. Table 9 shows the total number of words, the distribution of hedges and boosters across four sections of AL articles written by native writers, and their total frequencies. The Table indicates that the highest incidence of hedges is in the Discussion section (36.38 per 1,000 words) and the highest occurrence of boosters is in the Conclusion section (20.42 per 1,000 words).

Table 9
Frequency of hedges and boosters in AL research articles of native writers

AL Articles (Native)										
Total words	**Abstract**		**Introduction**		**Discussion**		**Conclusion**		**Total**	
	848		3,993		2,886		1,077		8,804	
Total devices	**H**	**B**	**H**	**B**	**H**	**B**	**H**	**B**	**H**	**B**
	26	8	108	41	105	35	32	22	271	106
F per 1,000	30.66	9.43	27.04	10.26	36.38	12.12	29.71	20.42	30.78	12.03

Note: F = Frequency, H = Hedge, B = Booster

Table 10 indicates the distribution of hedges and boosters in AL research articles of non-native writers. According to Table 10, the Introduction (29.52 per 1,000 words) and Conclusion (27.97 per 1,000 words) sections in the articles of non-native writers contain the most hedges and the highest incidence of boosters is in the Discussion section (13.82 per 1,000 words).

The results indicated that there was a similarity between native and non-native writers in the use of boosters in AL articles. It was observed that the highest occurrence of boosters in both groups was in the Discussion and Conclusion sections and the lowest in the Abstract and Introduction sections. However, there was a significant difference in the use of hedges in four rhetorical sections of articles between native and non-native writers. The highest incidence of hedges in the articles of native writers occurred in the Discussion followed by the Abstract, Conclusion, and Introduction. But in the articles of non-native writers this was almost the opposite, i.e., the Introduction followed by Conclusion, Discussion, and Abstract. Again, the highest occurrence of hedges

in the Introduction can be explained by non-native writers' inadequate linguistic or pragmatic knowledge about the norms of argumentation.

Table 10
Frequency of hedges and boosters in AL research articles of non-native writers

AL Articles (Non-Native)										
Total words	**Abstract**		**Introduction**		**Discussion**		**Conclusion**		**Total**	
	898		4,031		3,690		965		9,584	
Total devices	**H**	**B**	**H**	**B**	**H**	**B**	**H**	**B**	**H**	**B**
	16	6	119	26	86	51	27	7	248	90
F per 1,000	17.81	6.68	29.52	6.45	23.30	13.82	27.97	7.25	25.87	9.39

Note: F = Frequency, H = Hedge, B = Booster

Figures 5 and 6 illustrate the distribution of hedges and boosters across four sections of AL articles written by native and non-native writers in a more tangible way.

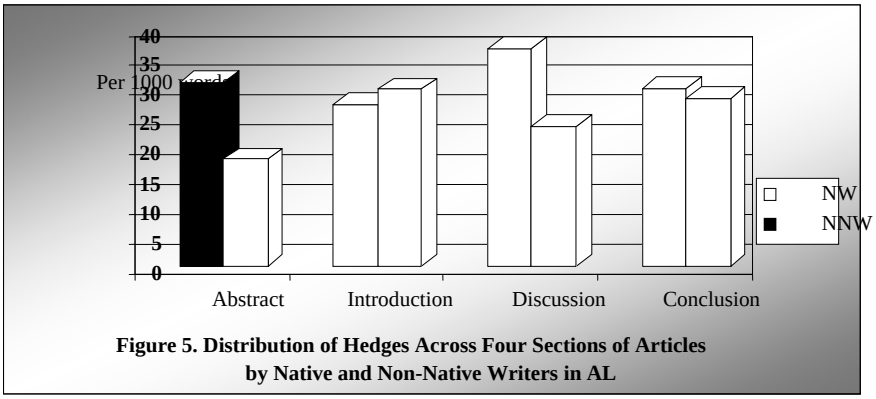

Figure 5. Distribution of Hedges Across Four Sections of Articles by Native and Non-Native Writers in AL

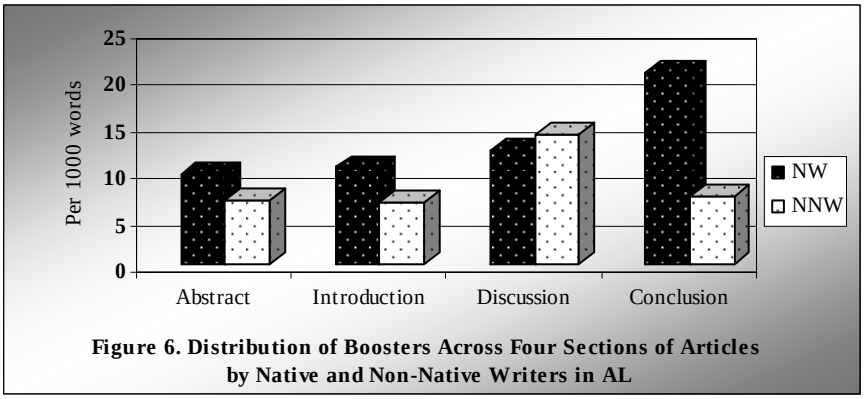

Figure 6. Distribution of Boosters Across Four Sections of Articles by Native and Non-Native Writers in AL

Categorical Distribution

In order to find out the similarities or differences between native and non-native writers in the use of different categories of hedges and boosters in AL articles, the frequency of hedges and boosters per 1,000 words in each category and their percents were calculated. Table 11 represents the categorical distribution of hedges in the articles of native and non-native writers. It indicates that lexical verbs (33.21%) and adverbs (28.41%) in the articles of native writers and modal verbs (29.43%) and lexical verbs (28.22%) in the articles of non-writers are the most frequently used categories of hedges.

Table 12 shows the categorical distribution of boosters in the articles of native and non-native writers in AL. According to this Table, in the articles of both native (41.5%) and non-native (60%) writers boosters occur mostly in the form of lexical verbs.

Table 11
Categorical distribution of hedges in AL articles of native and non-native writers

AL Research Articles						
Category of hedges	Native			Non-Native		
	F Per 1,000 W	**Percent**	**Raw number**	**F Per 1,000 W**	**Percent**	**Raw number**
Modal verbs	7.61	24.72	67	7.61	29.43	73
Lexical verbs	10.22	33.21	90	7.30	28.22	70
Adverbs	8.74	28.41	77	6.05	23.38	58
Adjectives	2.72	8.85	24	2.50	9.67	24
Nouns	0.68	2.21	6	2.29	8.87	22
Clausal elements	0.79	2.58	7	0.10	0.40	1
Total	30.78	100	271	25.87	100	248

Note: F = Frequency, W = Words

Table12
Categorical distribution of boosters in AL articles of native and non-native writers

AL Research Articles						
Category of boosters	Native			Non-Native		
	F Per 1,000 W	**Percent**	**Raw number**	**F Per 1,000 W**	**Percent**	**Raw number**
Modal verbs	1.36	11.32	12	0.41	4.44	4
Lexical verbs	4.99	41.5	44	5.63	60	54
Adverbs	3.97	33.01	35	1.35	14.44	13
Adjectives	0.90	7.54	8	0.41	4.44	4
Nouns	0.34	2.83	3	1.35	14.44	13
Clausal elements	0.45	3.77	4	0.20	2.22	2
Total	12.03	100	106	9.39	100	90

Note: F = Frequency, W = Words

Conclusion

The results of the data analysis showed some similarities and differences in the overall, rhetorical, and categorical distribution of hedges and boosters between EE and AL articles and the articles of native and non-native writers in these disciplines. The results are summarized below:

Similarities

1. There was a similarity between EE and AL research articles in the use of boosters.
2. There was a similarity in the distribution of boosters between EE articles of native and non-native writers.
3. There was a similarity in the use of hedges in AL articles written by native and non-native writers.
4. In both EE and AL articles, the Discussion and Conclusion sections contained more hedges and boosters than the Introduction and Abstract sections.
5. The highest incidence of boosters in the articles of native and non-native writers was in the Discussion and the lowest in the Introduction.
6. The highest occurrence of boosters in AL articles of native and non-native writers was in the Discussion and Conclusion sections and the lowest in the Abstract and Introduction sections.
7. There was a broad agreement in the use of lexical verbs, adverbs, and modal verbs as boosters in EE and AL articles.
8. In both disciplines, native and non-native writers mainly made use of lexical verbs as boosters.
9. In EE articles, native and non-native writers used mostly modal verbs and adverbs to express hedging.
10. In AL articles, native and non-native writers made use of lexical verbs, modal verbs, and adverbs as hedges.

Differences

1. The occurrence of hedges in AL articles was higher than EE articles.
2. There was a difference in the use of hedges between native and non-native writers in EE research articles.
3. There was a difference between native and non-native writers in the use of boosters in AL research articles.
4. In both disciplines of EE and AL, the Discussion and Abstract sections in the articles of native writers contained the highest occurrence of hedges; this was the lowest in the articles of NN writers.
5. In EE articles, hedging was presented mainly through modal verbs, but in AL articles lexical verbs were used to express hedging.

Hedges and boosters are complex devices with a variety of functions, and they are central to the negotiation of claims and effective argumentation in academic writing. The use of hedges and boosters in academic discourse is regulated both by general rules of communication and the norms and practices of particular disciplines. Lack of familiarity with these features of academic discourse may be detrimental to foreign language learners' academic and professional opportunities. This is because such unfamiliarity can affect the impact of the argument, and how the academic competence of the writer is evaluated by the readers. Therefore, special attention should be devoted to the teaching of these devices to the foreign language learners of English in the research or ESP (English for Specific Purposes) courses.

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Appendix 1

Sources of the selected articles

Applied Linguistics

Applied Linguistics (1 article)
Indian Journal of Applied Linguistics (2 articles)
Iranian Journal of Applied Linguistics (1 article)
RELC (2 articles)
SYSTEM (3 articles)
TESL Canada Journal (1 article)

Electrical Engineering

Electrical Power and Energy Systems (1 article)
IEEE Transactions on Biomedical Engineering (3 articles)
IEEE Transactions on Power Electronics (1 article)
IJE Transactions A: Basics (1 article)
IJE Transactions B: Applications (1 article)
International Journal of Engineering (1 article)
Iranian Journal of Electrical & Electronic Engineering (1 article)
Iranian Journal of Science and Technology, Transactions B (1 article)

Appendix 2

List of Hedges and Boosters

Compiled from Quirk et al. (1985), Holmes (1988), Hyland (1996a, 1998), Hyland and Milton (1997), and Varttala (2001).

1. List of Hedges

Modal Verbs	**Adverbs**	Relatively	Probable
Can	About	Reportedly	Rare
Could	Allegedly	Roughly	Relative
May	Almost	Seemingly	Remarkable
Might	Apparently	Seldom	Rough
Should	Approximately	Significantly	Significant
Will	Around	Slightly	Slight
Would	Arguably	Sometimes	Small
Lexical Verbs	Barely	Somewhat	Substantial
Appear	Commonly	Strongly	Theoretical
Argue	Conceivably	Substantially	Typical
Assert	Considerably	Supposedly	Uncommon
Assume	Doubtless	Tentatively	Unlikely
Attempt (to)	Fairly	Theoretically	Usual
Believe	Frequently	Typically	Well-Known
Claim	Generally	Unlikely	**Nouns**
Conclude	Given that	Usually	Alternative
Consider	Greatly	Vastly	Approximation
Doubt	Highly	Virtually	Assertion
Estimate	Hypothetically	Widely	Assessment
Evaluate	Largely	**Adjectives**	Assumption
Expect	Likely	Apparent	Belief
Feel	Mainly	Approximate	Chance
Hypothesize	Markedly	Common	Claim
Imply	Maybe	Conceivable	Conclusion
Indicate	Modestly	Considerable	Doubt
Interpret	Mostly	Consistent with	Estimate/-ion
Maintain	Nearly	Frequent	Evaluation
Note	Normally	General	Expectation
Offer	Occasionally	Hypothetical	Hope
Observe	Often	Improbable	Idea
Perceive	Partially	In accord with	Implication
Presume	Partly	Indicative	Indication
Propose	Perhaps	Large	Interpretation
Prove	Possibly	Likely	Likelihood
Report	Potentially	Little	Opinion
Seem	Practically	Main	Possibility
(can be) seen	Presumably	Major	Premise
Speculate	Primarily	Modest	Probability
Suggest	Probably	Noticeable	Proposal
Suppose	Provided (that)	Plausible	Suggestion
Suspect	Quite	Possible	Tendency
Tend	Rarely	Potential	View
Think	Reasonably	Primary	

2. List of Boosters

Modal Verbs

Can't
Couldn't
Have to
Must
Will
Won't
Would

Lexical Verbs

Assure
Confirm
Demonstrate
Do
Establish
Find
Indicate
Know
Predict
Reinforce
Show

Adverbs

Absolutely
Actually
Always
Assuredly
Basically
Certainly
Clearly
Completely
Definitely
Entirely
Essentially
Evidently
Exactly
Explicitly
Extremely
Factually
Fully
Fundamentally
Indeed
Indisputably
Inevitably
In fact
Intensively
Necessarily
Never
No doubt
Obviously
Of course
Patently
Plainly
Precisely
Really
Surely
Truly
Totally
Thoroughly
Unarguably
Undeniably
Undoubtedly
Unquestionably

Adjectives

Absolute
Certain
Clear
Complete
Confident
Definite
Essential
Evident
Exact
Extreme
Impossible
Inevitable
Obvious
Really Perfect
Plain
Real
Sure
Thorough
Total
True

Nouns

Certainty
Confidence
Evidence
Fact
Precision