Hedges and boosters in medical and engineering research articles: A comparative corpus-based study

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Abstract

This study aimed to compare the use of hedges and boosters in medical sciences and engineering research articles. To fulfil this objective, the researcher provided 30 medical and 30 engineering research articles to identify the hedging and boosting devices used in them. The research articles were analysed according to lexical devices classification, focusing on hedges and boosters. The AntConc concordance software was used to identify the instances of hedges and boosters in both disciplines. Frequency, percentage and the Chi-square test were run to analyse the data. The results indicated that the difference between the frequency of hedges and boosters in medical sciences and engineering research articles was significant and meaningful. Moreover, the outcomes indicated that the most frequent hedges were epistemic modality verbs, quantifiers and nouns and the most frequent boosters were nouns, lexical verbs, modal verbs and adjectives. These discoveries of this paper may have some implications for the teaching of academic writing, especially to EFL learners.

Keywords: Boosters, engineering research articles, hedges, medical research articles

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1. Introduction

Hedges and boosters are communicative strategies for expanding or decreasing the power of explanations. Hedges and boosters attract regard for the way that statements do not simply convey thoughts, yet additionally, the writer's mentality to them and to readers. 'Hedging' is a multi-objective etymological gadget, the learning of which can push a specialist to fittingly express his logical cases. There are various definitions for 'hedging' and various creators have determined various scientific categorisations and capacities for hedge words. For Salagar-Meyer (2011), exploring hedge words is not restricted to logical and scholarly composition (Abedi, Keshmirshekan, & Namaziandost, 2019; Adams-Smith, 1984; Myers, 1989). Others have gone far to examine supporting all in all language writings and contrastive talk (Clyne, 1991; Skelton, 1988; Namaziandost, Nasri, & Keshmirshekan, 2019).

Hedge words could be utilised to pass on personal modesty and quietude. Maybe the most well-known pioneer in the investigation of hedging is Lakoff (1973), who characterised hedging devices as 'words or expressions whose activity is to make things pretty much fluffy' (p. 471). Lakoff, alongside different analysts for example, Hyland (1996), Myers (1985) and Salagar-Meyer (2011), is the most noticeable figure who researched 'hedging' from various perspectives, for instance hedging various sorts, the impact of culture on utilising hedge words, the plausibility of training learners to utilise hedging words and so forth (Hashemifardnia, Namaziandost, & Sepehri, 2018).

As indicated by Lakoff (1973), sometimes a sentence can be neither valid, nor false, nor hogwash. In other words, 'regular languages have dubious limits and fluffy edges' (Lakoff, 1973, p. 458). Lakoff (1975) thinks about two fundamental capacities for hedges words. The first was to demonstrate the absence of sureness with respect to the creator and the subsequent one was to alleviate the creator's claim with goal of obligingness. Zadeh (1965) utilises 'fuzzy set theory' to state it is not the situation that an individual is constantly an individual from a gathering or never an individual from a group; rather, he can be an individual from any gathering somewhat.

Dubois (1987) accepts that hedging is utilised to express the creator's case in a subtle manner, a thought which is shared by numerous different analysts for example, Prince, Frader and Bosk (1982), Rounds (1982) and Skelton (1988). As indicated by Bosk, as hedges mirror the author's or speaker's judgement, they have an 'evaluative' work. As Crystal (1988) puts it, utilising hedge words are not generally established in the creator's absence of information.

Boosting, additionally, called intensifiers or conviction markers conversely, is an issue contemplated under meta-discourse. It makes an unequivocal impression in the reader, that is, an impression of sureness, conviction and affirmation (Nasri, Biria, & Karimi, 2018; Ziafar & Namaziandost, 2019). In other words, boosters might be thought as metadiscoursal markers intending to reinforce scholars' cases on the issue, appropriately a heftier conviction sway on the investor. Along comparative lines, they have a reason for expanding the suggestions, and demonstrate the author's commitment and responsibility to his/her announcements (Hyland, 1998). In a nutshell, boosters are force markers that demonstrate the creator's position on a giant scale by narrowing rambling space.

Boosting has consistently been concentrated together with hedging, which is a de-intensifier explanation and a speculative language to decrease the essayist's dedication. While there exist, a few examinations directed uniquely on supporting, boosting shockingly has been kept away from to be considered particular from hedging. With an unequivocal speech, it has remained under the shadow of hedging as a result of cohandling (Nasri & Biria, 2017; Ziafar & Namaziandost, 2019).

Along these lines, an examination that slips into specific so as to research insistent articulations would be of most extreme significance to ready to increase further understanding into boosting. On the highest point of this, since a paper is composed to change over an information to another or to

help the thought by persuading the readers, boosting is a basic part so as to understand that go for the creators (Azadi, Biria, & Nasri, 2018; Keshmirshekan, Namaziandost, & Pournorouz, 2019). More, it is hard to measure the impact of a kind of writing over the group of audience; however, through boosting it might be conceivable to build the effect level by expressing the goals.

Researches show that hedges and boosters serve three primary goals: (1) Danger limiting technique to flag distance and to stay away from outright articulations; (2) methodologies to precisely mirror the assurance of information and (3) affableness strategies among authors and editors (Abedi, Namaziandost, & Akbari, 2019; Salager-Meyer, 1997; Nivales, 2010; Hinkel, 2009; Hosseini, Nasri, & Afghari, 2017). Due to the crucial role of hedging and boosting in academic writing, this research compares hedges and boosters in medical sciences and engineering research articles.

1.1. Statement of the problem

Investigating hedges and boosters in medical and engineering research articles have not received the attention it deserves. While hedging and boosters have received the most attention in the context of casual and oral discourse (Nittono, 2003), there are a few cross-linguistic and cross-disciplinary studies on hedging in academic articles. The limited number of studies conducted in this area has shown that there are some variations in the use of hedges across disciplines (Varttala, 2001). The cross-linguistics studies on hedging and boosting have mainly focused on those authors who are from Western and American culture. This study examined hedging in non-Western European authors like Iranian authors to see if there are any differences in using hedges and boosters by these authors.

From another point of view, many Iranian EFL learners face difficulties while using hedges and boosters during writing academically and professionally, as large body of research has shown that ESL learners have difficulty in interpreting and using hedges appropriately (Allison, 1995; Blum-Kulka, 1982). In addition, hedging and boosting have received the most attention in the context of casual and oral discourse (Coates, 1987; Horman, 1989; Nasri, Namaziandost, & Akbari, 2019; Nittono, 2003) but not in writing.

The limited number of studies which are conducted in this area has shown that there are some variations in the use of hedges and boosters across languages (Vassileva, 2001; Yang, 2003) and across disciplines (Namaziandost, Saberi Dehkordi, & Shafiee, 2019; Varttala, 2001). The cross-linguistics studies on hedging and boosting have mainly focused on those languages which belong to western culture. This study examines hedging and boosting in two different disciplines (i.e., Medical Sciences and Engineering) to see if there are any differences in using hedges and boosters in these two areas.

1.2. Research questions

This study tries to answer the following questions:

RQ 1. Is there any significant difference between medical sciences and engineering research articles in terms of using hedges and boosters?

RQ 2. What types of hedges and boosters are used more frequently in medical sciences and engineering research articles?

1.3 Significance of the study

Hedges and boosters tend to play an important role in metadiscourse features since, according, they are the precise layer of the text in which the writer's personal intrusion into his or her text adds emotional flavour and demonstrates the degree of commitment toward the ongoing proposition. Furthermore, interpersonal metadiscourse helps the writers to directly refer to the reader so that it involves the readers into the text and makes it more interactional. Interpersonal metadiscourse functions also give the reader clues about the writer's certainty in the message whether the writer uses words related to possibility or with strong words such as must, certainly or definitely. They help the readers to understand the text better. To sum up, interpersonal metadiscourse is the device by

which writers choose the way how they want to deliver their messages to readers and how they want to be understood.

Metadiscourse is one of the language areas which consider the relations between the reader and the writer of the texts. It is believed that teaching students of different disciplines and fields of the studies to use metadiscourse markers effectively in their writings and also speeches could improve their writing and reading skills and, therefore, helps them to better communicate with their audiences. The findings of this study may make the syllabus designers and also teachers of English for Academic Purposes be more aware of the different kinds of metadiscourse devices used in different disciplines and fields of the studies and as a result, help them to increase their readers or students' knowledge of metadiscourse strategies, an issue which consequently could improve their communicative and also reading and writing skills.

The findings of the present study have implications for teachers and material developers of journalism. They suggest that teachers and material developers of articles should be aware of differences in the use of hedging devices in both English and Persian so that they can use them as communicative strategies to qualify their commitment, reduce the force of their statements, express probability, save their face, persuade readers and avoid any possible rejection of their statements. This results in improving the clarity of the future writing of teachers and material developers of journalism. This study is significant since hedges are sometimes needed in utterances to present the information vaguely, uncertainly or imprecisely. In other words, hedging is used to reduce the potential risk of a claim or prevent embarrassing situations in case one is found to be wrong.

2. Methods

2.1. Corpus

The present study is descriptive research which generally applies a quantitative data collection method to conduct an in-depth analysis of the usage of hedges and boosters in medical sciences and engineering research articles. The corpus of this study is a set of research journals downloaded from reliable journals available on the Internet. Engineering research articles were downloaded from *Journal of Engineering* (https://www.hindawi.com/journals/je/), *International Journal of Engineering Science* (https://www.journals.elsevier.com/international-journal-of-engineering-science) and *International Journal of Engineering* (IJE) (http://www.ije.ir/); and medical sciences research articles were downloaded from *Journal of Medical Sciences* (JMedSci) (https://www.jmedsci.com/index.php/Jmedsci), *Journal of Medical Sciences* (http://www.jmedscindmc.com/aboutus.asp) and *Journal of Medical Sciences* (http://www.journalonweb.com/jmedsci/). To identify the hedging and boosting devices used in both disciplines, 40 papers (20 engineering research articles and 20 medical sciences research) published between 2015 and 2019 are selected to represent each discipline.

2.2. Instruments

The AntConc concordance software (Anthony, 2016) was employed to detect the instances of hedging and boosting in the medical sciences and engineering research articles. AntConc is a lightweight, simple and easy to use corpus analysis toolkit that has been shown to be extremely effective in the technical writing classroom. AntConc is a freeware, multiplatform tool for carrying out corpus linguistics research and data-driven learning. AntConc contains seven tools: Concordance, Concordance Plot, File View, Clusters, Collocates, Word List and Keyword List. The researcher used the

word List tool for counting the total number of words (hedges and boosters) in all the research articles.

2.3. Data collection procedures

This study seeks to discover how frequently different categories of hedging and boosting (based on Holmes' [1988] classification) are used in medical sciences and engineering research articles and whether there are any differences in the writers' use of hedging and boosting devices. To meet the purposes of this study, 40 research articles were downloaded from the Journals mentioned in the corpus section – 20 medical sciences and 20 engineering research articles. Initially, in making sure of the reliability of the analysis method, the study was piloted based on 10% of the data. To do so, this part of the data was scrutinised by the researcher and her supervisor to reach agreement over the method and feasibility of the study. Inter-ratter reliability of the analysis was calculated through Cohen's Kappa correlation (K=0.92). In the main phase of the study, based on Holmes' (1988) classification, instances of hedging and boosting were identified, coded and categorised and finally the data were analysed. Instances of hedging and boosting devices were detected through the AntConc software.

2.4. Data analysis

To identify the hedging and boosting devices, the articles downloaded in two mentioned disciplines were meticulously examined. Based on Holmes' (1988) classification model, hedging and boosting devices were identified, coded and categorised. To find out whether there are any differences between the hedging and boosting devices distribution in both medical sciences and engineering research articles, frequency counts and percentages were calculated for each gender in both corpora. Then, the Chi-square test was employed to see if the differences are statistically significant.

3. Results

In the following sections, the results are presented using frequency, percentage and Chi-squire.

3.1. Analysing the use of hedges in medical and engineering research articles

Table 1. Frequency and percentage of hedges in medical and engineering research articles

Types of hedges	Medical research articles		Engineering research articles	
	Frequency	Percentage	Frequency	Percentage
Adverbs of Frequently	99	10.43	55	7.72
Quantifiers	188	19.81	149	20.92
Epistemic modality verbs	212	22.33	156	21.91
Epistemic lexical verbs	73	8.32	61	8.56
Formal and informal adjectives and adverbs	89	9.37	77	10.81
Nouns	105	11.06	88	12.35
Conversational and informal	49	5.16	28	3.93
Introductory phrases	57	6.00	36	5.05
Vague references	77	7.86	62	8.70
Total	949	100%	712	100%

Table 1 shows the number of hedges used in medical and engineering research articles. After counting hedges, 949 hedges in medical and 712 hedges in engineering research articles were found. Medical hedges were outnumbered by the engineering research articles ones. The most frequent hedges in medical research articles were epistemic modality verbs (212) (22.33%), quantifiers (188) (19.81%) and nouns (105) (11.56%), respectively. The least used hedges in medical research articles were conversational and informal (49) (5.16%).

Moreover, based on Table 1, the most prevalent hedges in engineering research articles were epistemic modality verbs (156) (21.91%), quantifiers (149) (20.92%) and nouns (88) (12.35%), respectively. The least used hedges in engineering research articles were conversational and informal (28) (3.93%). In both disciplines, epistemic modality verbs and quantifiers were used the most. In addition, the hedges of conversational and informal were the least used in both medical and engineering research articles.

Table 2. Chi-square results

	Value	df	Asymptotic Significance (two-sided)
Pearson Chi-square	1661.000[a]	8	.010
Continuity correction[b]	1656.919	8	.000
Likelihood ratio	2268.703	8	.000
Linear-by-linear association	1660.000	1	.000
N of valid cases	1661		

a. 0 cells (0.0%) have expected count <5. The minimum expected count is 305.20.
b. Computed only for a 2×2 table

Based on Table 2, the difference between the frequencies of hedges in medical and engineering research articles is significant and meaningful. In other words, hedges in these two disciplines were not used equal and not at the same or close levels of frequency i.e., Sig. = 0.010 ($p<0.05$). Figure 1 clearly shows the fact that the difference between using hedges in these two disciplines is significant since the hedges in medical research articles are employed at a higher degree.
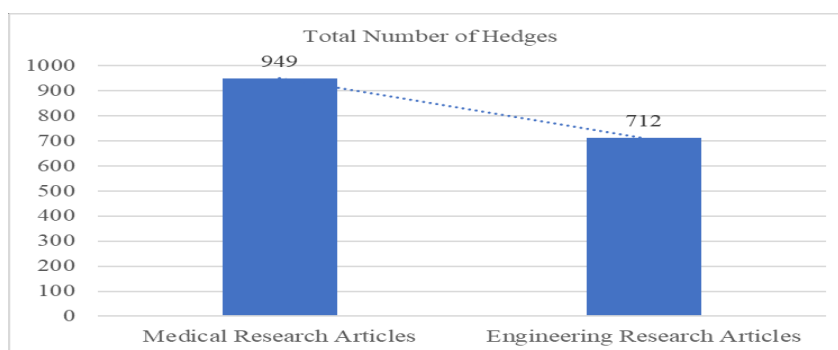

Figure1. Total number of hedges in medical and engineering research articles

3.2. Analysing the use of boosters in medical and engineering research articles

Table 3. Frequency and percentage of hedges in medical and engineering research articles

	Medical research articles		Engineering research articles	
Category	Frequency	Percentage	Frequency	Percentage
Modal verbs	398	16.72	411	15.50
Lexical verbs	509	21.39	629	23.73

Adjectives	433	18.20	496	18.71
Adverbs	268	11.26	303	11.43
Nouns	789	33.16	811	30.60
Total	2397	100	2650	100

Table 3 illustrates the distribution of five categories of boosters in medical and engineering research articles. It indicates that nouns (33.16), lexical verbs (30.82%), modal verbs (26.97%) and adjectives (18.20%) are the most frequently used categories as boosters in medical research articles. Regarding the engineering research articles, nouns (60.60%), lexical verbs (23.73) and adjectives (18.71) were the most frequent ones, respectively.

To compare and identify the difference between these two disciplines in terms of using booster, another Chi-square test was run.

Table 4. Chi-square results

	Value	df	Asymptotic significance (2-sided)
Pearson Chi-square	5029.000[a]	4	0.020
Continuity correction[b]	5024.989	4	0.000
Likelihood ratio	6957.064	4	0.000
Linear-by-linear association	5028.000	1	0.000
N of valid cases	5029		

In Table 4, the Chi-square (0.020) is meaningful at α level (α=0.05) with a degree of freedom of 4 (sig.<0.05). This indicates that there a significant difference between using boosters in medical (*M*=479.4) and engineering (*M*=530) research articles. It can be concluded that boosters were used in engineering research articles more than medical research articles.
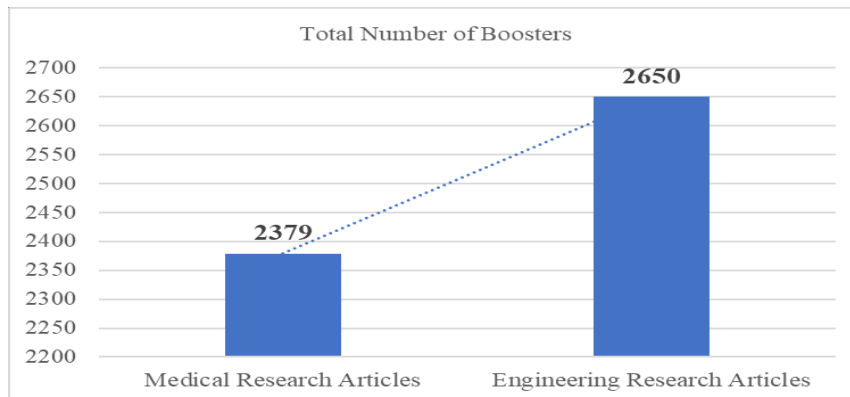

Figure 2. Total number of boosters in medical and engineering research articles

Figure 2 depicts the distribution of boosters across two disciplines of articles in a more tangible way. This figure obviously shows that the engineering research articles considerably outperformed in the use of boosters in contrast with medical research articles.

4. Discussion and Conclusion

RQ 1. Is there any significant difference between medical sciences and engineering research articles in terms of using hedges and boosters?

After collecting the data and counting all hedges and boosters in medical and engineering research papers, the researcher used frequency and percentage to analyse the data and to provide the answer

for the research questions. The results showed that hedges in medical research papers outnumbered the hedges in engineering research papers; but considering the boosters, it was revealed that engineering research papers used more than medical ones.

Moreover, based on the results obtained from Chi-square, the difference between the frequencies of hedges and boosters in medical and engineering research papers was significant and meaningful. In fact, hedges and boosters in both disciplines were not used equally; hedges in medical research papers were more frequently used than the engineering ones and regarding boosters it is vice versa.

The findings of this study are in line with Ydjo and Demir (2014) who compared hedging strategies in the academic discourse of Turkish writers and native writers of English. They found that native writers of English used more hedges than Turkish writers. The results of this study are contrasted to Hinkel (1997) and Carlson (1988) who found that there was not a significant difference between native and non-native speakers in using hedges.

RQ 2. What types of hedges and boosters are used more frequently in medical sciences and engineering research articles?

Concerning the statistics of the second research question, the findings indicated that epistemic modality verbs (22.33%), quantifiers (19.81%) and nouns (11.56%) were employed more than other hedges in medical sciences research articles. The least applied English hedges were conversational and informal (5.16%). Regarding hedges in engineering research articles, it was revealed that epistemic modality verbs (21.91%), quantifiers (20.92%) and nouns (12.35%) were applied more than other hedges such as conversational and informal (3.93%).

Regarding boosters in both disciplines, it was shown that nouns (33.16), lexical verbs (30.82%), modal verbs (26.97%) and adjectives (18.20%) were the most frequently used categories as boosters in medical research articles. Furthermore, in engineering research articles nouns (60.60%), lexical verbs (23.73) and adjectives (18.71) were the most frequent ones.

This result supports Mojica (2005) who stated that modals and probabilities are the most prevalent applied hedging devices. As expected, the use of modal verbs does not show politeness but rather conveys a lack of precision. The use of probabilities basically in education articles as a non-scientific discipline is also supported by Salager-Meyer (2011).

The findings of this study are supported by Vassileva (2001) who asserted that the most frequent surface forms of hedging are modal verbs and the most preferred modality verbs by English writers are may and might. In consistent with Vassileva study, the current research is compatible with Clyne's (1991) study that found similar results in favour of native writers and modality verbs.

Considering the key role of hedges and boosters in academic writing, there might be a necessity for greater and more systematic attention to be given to these fundamental interpersonal strategies (Hyland, 1998). This means that recognition and the efficient utilisation of hedges and boosters must be taught to students particularly to non-native English speakers, who are surely not familiar with hedges and boosters and thus find them difficult to use properly (Hyland, 1995).

It has been claimed by Salager-Meyer (1997) that EFL readers mostly like to give the same weight to interpretations and ideas as to facts. Thus, it is crucially important that learners can identify hedges and boosters in written texts. By comparing the different types of discourse students could be resulted to pay attention not only the frequency and various forms of hedges and boosters but also the different reasons underlying the use or non-use of hedges and boosters in various texts (Mirshekaran, Namaziandost, & Nazari, 2018; Varttala, 2001).

The findings of this study might motivate some ideas for further researches. So far, many studies have carried out to investigate the role of interpersonal metadiscourse markers like hedge in various fields, but unfortunately, the news discourse has taken for granted. Despite the importance of news articles, the journalists' strategies for representing their inputs need to be analysed to clarify the

positive and negative points of them (Namaziandost, Abedi, & Nasri, 2019; Shakibaei, Shahamat, & Namaziandost, 2019).

Moreover, based on the results, this research proposes the EFL teachers to pay attention to the significance of hedges and boosters to increase the students' knowledge of the parts of discourse. This might become references for advisors to have many attentions on students under their guidance. Familiarising students with the rule and norms of academic writing might help students, especially those who write their final assignments. Furthermore, the current study can be a baseline for future researchers to check hedges and boosters in academic context, written or spoken for the comparison. There can be further researches on clear hedges and boosters usually used by specific group of people. There can also be further study surveying the functions or motivations behind the utilisation of hedges and boosters in academic writings by also interviewing the authors. Finally, the researches on hedges and boosters in academic spoken discourse, for instance, in English debate, can be performed because of exploration of English linguistics in general (Tahmasbi, Hashemifardnia, & Namaziandost, 2019).

In summary, the main purpose of the current study was to compare the use of hedges and boosters in medical and engineering research articles. After counting all hedges applied in these two disciplines, it was shown that hedges were more frequently used in medical articles than the engineering ones. However, boosters were used in engineering research articles more than the medical articles. Based on the findings, epistemic modality verbs and quantifiers were the most prevalent hedges in both disciplines. Metadiscourse markers such as hedges and boosters are vital elements in writing and speaking, as Hyland (2005) holds that metadiscourse elements such as hedges and boosters play a fundamental role in contributing new knowledge and making academic claims. Thus, teaching metadiscourse markers to the students should be followed seriously. The teachers should acquaint the students with hedging and boosting devices. In addition, articles are read by most researchers. Academic articles are worth studying since these articles echo the cross-cultural distinctions. They are impressive, argumentative texts that represent cultural and ideological aspects (Ansary & Babaii, 2009; Namaziandost & Nasri, 2019a).

For future research, it would be interesting to look into how hedges and boosters are dealt with in other disciplines and by non-native speakers of English. In this way, we will be able to grasp differences and similarities in the use of hedges and boosters by native and non-native speakers of English and provide learners of English with guiding principles regarding the use of hedges and boosters in academic articles. Moreover, it would be recommended that gender differences in the use of lexical hedges check and investigate.

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