Hedging in engineering discourse: new features of common technique

Tetiana Maslova

National Technical University of Ukraine
"Igor Sikorsky Kyiv Polytechnic Institute"

Abstract

Being rather broad and multi-functional, the term "hedging" often overlaps with other aspects of communication, such as modality, evidentiality, politeness, indirectness, and vagueness. This is the objective of the present paper to review the theories and research data available at present to deal with linguistic devices of hedging in the English academic writing, where authors tend to mitigate the strength of their scientific claims in order to save face and reduce the potential opposition of academic community, and analyze the specific features of hedges encountered in today's engineering discourse.

Key words: *engineering discourse, academic writing, scientific communication, hedges, approximators, epistemic verbs, metadiscourse markers, hard sciences, soft sciences, pragmatic effect, emphasis*

Introduction

Linguistic means of hedging are defined as "words whose job is to make things more or less fuzzy". It was G. Lakoff who pointed out in the 1970-ies that semantics of these predicate modifiers that make a distinction in degree of properties is not independent of pragmatics [10]. Since then a large number of scientists have been investigating the pragmatic nature of hedges used to express author's tentativeness and possibility with respect to the truth of propositions both in spoken and written discourses, and across various disciplines (Biber, Brown and Levinson, Caffi, Carter and McCarthy, Crismore and Vande Kopple, Fraser, Hübler, Hyland, Ilchenko, Lewin, Meyer, Prince et al., Salager-Meyer, Schneider, Skelton, Swales, Yarkho and others).

The recent cross-cultural studies have revealed that hedging, being culturally determined, is inherently characteristic of English academic texts [1-4]. Furthermore, the quantitative analysis has shown that hedges dominate among all the metadiscourse markers in Master's and PhD theses written in English, with even slightly more hedging markers in the doctoral texts, where writers are supposed to develop more discursively elaborated arguments [6]. For that reason, hedging is worth studying as it is a strategy that is gaining importance in scientific communication and helps promote understanding of intercultural differences.

Classification of hedges

One of the first taxonomies of hedges, proposed by F. Salager-Meyer in her study on medical English written discourse, includes such subcategories as:

- "shields", which comprise modal auxiliaries *seem, appear* and modal verbs (*can, could, may, might, will, would*), epistemic verbs (*believe, speculate, suggest*), probability adverbs (*likely, possibly, probably*), and their related adjectives;

- "approximators", which refer to imprecise quantity, degree, frequency and time (*approximately, roughly, quite, usually, generally, somehow, somewhat, occasionally*);

- phrases which express author's personal doubt and involvement (*I believe*, *as far as I know*, *to our knowledge*, *it is our view that*) [14, p. 154-155].

Crismore and Vande Kopple state that hedging can be expressed not only through personal voice (*it seems to me, I suppose that*), but also by impersonal voice (*it seems that, it is supposed that*) [11, p. 35].

In K. Hyland's taxonomy hedges belong to interactional metadiscourse markers, used to express the author's position and involve the audience. Along with hedges, aimed at softening the author's claims, he also distinguishes between "boosters", which emphasize the degree of author's certainty, "attitude markers", which express the author's perspective or evaluation of the propositional content, "self-mentions", which contribute to revealing the author's stance, for example, by personal pronouns, and "engagement markers", which explicitly address the audience so that to draw it into the discourse [13].

Quantitative analyses of hedges in academic writing

Studying hedges as a means of expressing politeness and etiquette in Anglo-American scientific community, O. Ilchenko suggests that they are employed in the language of science to serve the purposes of mitigating the effect of negative statements, facilitating information decoding, and attracting the reader's attention. Approximators and epistemic verbs are said to be most frequently used hedges, followed by verbal markers of impersonality (impersonal use of pronoun *it*, indefinite pronouns, passive voice), and volitional modality (*I mean, I should say*, *It occurs to me*, etc.) [1].

This fully conforms to the results of research done by P. Martin-Martin, where hedges are grouped based upon the explicit functions they fulfil, namely the strategy of "indetermination", that is expressing uncertainty, vagueness and fuzziness (epistemic modality, approximators), "subjectivisation", including the use of personal pronouns *I/ we* with verbs of cognition (*think, believe*) and performative verbs (*suppose, suggest*), and "depersonalisation" achievable through passive and impersonal constructions. It is shown that the strategy of

indetermination is preferred by academic writers, especially in the Discussion/ Results section of medical research articles, while that of depersonalisation ranks second, being encountered either in Introduction, or Discussion/ Results [12].

Indeed, other studies on how often hedges occur in academic texts indicate the difference in their distribution across sections of a research paper due to communicative purposes to serve. Hedges appear least in Methods, as it is the least discursive section, and are most often found in Discussions, where claims are made and the significance of results argued [6, p. 243].

In qualitative terms the highest frequency of hedges of 84% occurs in the Results and Discussion sections, with only 4% in Methods [9, p. 10].

Studies of hedges across different disciplines

The linguists report that there are some similarities and differences across the various disciplines in terms of using hedges [4; 5; 7; 8].

The similarity between them is that all scientists tend to display their humility and deference by following the Politeness Principle of communication. For example, the findings of research into the language of four different disciplines (English Language Teaching and Economics representing soft sciences, and Biology and Civil Engineering representing hard sciences) have discovered little variation in the number and types of interactional metadiscourse markers.

Still, a few differences include a larger quantity of boosters in soft sciences, and the lack of engagement markers and self-mentions in hard sciences [9, p. 72-73].

Another analysis of hedges in the dissertations from six academic disciplines, namely Electronic Engineering, Computer Science, Business Studies, Biology, Applied Linguistics, and Public Administration, indicates a higher percentage of interactional markers in the soft knowledge disciplines, hedges being actually well over twice and self-mentions almost four times more frequent than in the hard fields. This could be explained by a greater role of explicit personal contribution of research in the humanities and social sciences, where interpretations are typically more explicit and the criteria for establishing proof are less reliable [7].

The research on hedges in engineering discourse

So far, most pragmatics studies of hedging have been conducted in the field of soft sciences, where hedges are found to be greater in number and of wider variety, thus constituting a more resourceful subject for qualitative and quantitative analyses. However, the pragmatic potential of using hedges in hard sciences seems to be a promising area for further linguistic research, since even being fewer in number the hedging devices used by engineers in the professional communication tend to acquire new senses and domains of applicability.

The recent discourse analysis of research papers in the field of power industry has revealed a few techniques that engineers use to communicate in a polite but still assertive manner. Among those one can find:

- hedges used to attract attention to exact numbers and facts;

When followed by precise statistics or other information, hedges may actually contribute to attracting attention of the reader. In the example below the prediction of reduction in the overall costs in the future (*It is highly likely*) is then specified by more accurate figures (*by between 15% and 33% over the next decade)*, which makes the data provided look much more reliable and convincing.

e.g. It is highly likely, however, that overall costs will fall in the future as experience grows, innovations occur, technology advances, and competition increases. The overall cost of offshore wind energy is expected to drop <u>by between 15% and 33% over the next decade</u>.

- hedges used to increase the emphasis;

When combined with words of positive semantics, hedges, which are traditionally expected to mitigate the negative comments and criticism, lead to a contrast, which makes the emphasis even more vivid. In the example given, the hedged disadvantages of high voltage direct current technology (*less mature technology, generally much larger, significantly higher costs, special design studies are often needed*) are listed along with a few advantages (*do not suffer from the length limitation, a higher capacity)*, the contrast being also indicated with "but" and "however".

e.g. Use of HVdc to connect offshore wind is a <u>less mature technology</u>. But dc cables do not suffer from the length limitation that comes with the use of ac cables. <u>In many cases,</u> dc cables will have <u>significantly lower losses</u> than ac and can be designed to have a <u>higher capacity</u>. Substations with HVdc are <u>generally much larger</u>, however, and costs are <u>significantly higher</u>. Special design studies are <u>often</u> needed for HVdc connections.

- hedges used to make conclusions sound polite but still persuasive;

Although hedges are said to be most often seen in the Conclusion section, in engineering research papers they turn out to be not as tentative as expected (e.g. modals "will", "can", and "could" are more frequent than "may", "might"). Moreover, they are found to be accompanied by interactional metadiscourse markers, such as "boosters" and "attitude markers", as well as other means of enhancing the positive impression of the final statements. In the next example the hedges like modal verb "could", approximator "many" and probability adverb "potentially" are used to describe the possible development of the technology proposed, and the promising perspectives of this endeavour are expressed through positive semantics of the verb "improve", noun "benefit", intensifier "highly", superlative adjective "highest", and booster "in particular".

e.g. <u>Many other</u> storage technologies <u>could</u> be similarly modelled and investigated. <u>In particular,</u> high power and low capacity storage devices, such as super capacitors, <u>could</u> be added to compensate highest frequency imbalances thus <u>highly improving</u> results and reducing power requirements for the FB. Having <u>many different</u> power plants in the model it is then <u>potentially useful</u> to research control strategies in order to reach for the <u>highest economical or environmental benefit</u>.

Conclusions

Investigating the pragmatic nature of hedges used across various disciplines, most studies indicate that in both soft and hard sciences hedges are more often found in the Discussion section of research papers, where claims are made and the

significance of results argued. A higher percentage of hedges in the soft knowledge disciplines is usually explained by a greater role of explicit personal contribution of research in the humanities and social sciences. However, hard science fields are currently becoming more and more practical, and the communicative purposes hedges serve in engineering discourse can go beyond the traditional Politeness Principle of scientific communication. The insight into the use of hedges in engineering discourse within the present research has revealed some new aspects of pragmatic effect of hedging that contribute to the increase of persuasiveness and emotionality. Strange as it may seem, hedges are found to attract attention to exact numbers and fact, to make polite negative statements more effective, and enable the conclusions to sound somewhat more convincing. This can be explained by the fact that at present, when promoting their innovative ideas, engineers have to address both academics in the field and practitioners outside it so that they tend to apply more powerful rhetorical strategies. Thus, it is reasonable to conduct further linguistic investigations of engineering discourse in terms of quantity and quality of hedging devices used to fulfil communicative strategies specific to professional communities.

References

1. Ільченко О. М. Етикет англомовного дискурсу: Монографія / О. М. Ільченко. – К.: ІВЦ «Політехніка», 2002. – 288 с.

2. Маслова Т. Б. Прагматика некатегоричных высказываний в научной коммуникации английского языка / Т. Б. Маслова // Trends in the development of modern linguistics in the age of globalization: materials of the III international scientific conference on October 13-14, 2016. – Prague: vědecko vydavatelské centrum "Sociosféra-CZ", 2016. – С. 20-24.

3. Сафроненкова Е. Л. Лингво-культурная специфика научного текста: на материале англоязычных научно-теоретических текстов: автореферат дис. ... канд. филолог. наук: 10.02.04 / Е. Л. Сафроненкова. – Санкт-Петербург, 2014. – 17 с.

4. Цапко В. И. Некатегоричные высказывания в лингвистических текстах: на материале английского и русского языков : автореферат дис. ... кандидата филолог. наук : 10.02.20 / В. И. Цапко. – Пятигорск, 2009. – 26 с.

5. Ярхо А. В. Референціальний хеджинг як стратегія етикетизації у дискурсі англомовної науково-дослідницької статті: контрастивний аналіз / А. В. Ярхо // Вісник Харків. нац. ун-ту ім. В. Н. Каразіна. – 2010. – № 930. – С. 82-90.

6. Hyland, K. Hedging in academic writing and EAP textbooks / Ken Hyland. – English for Specific Purposes. – Vol. 13, No. 3, 1994. – p. 239-256.

7. Hyland K. Metadiscourse in academic writing: a reappraisal / Ken Hyland // Applied Linguistics 25/2. – Oxford University press, 2004. – p. 156-177.

8. Hyland, K. Talking to the academy: Forms of hedging in science research articles / Ken Hyland // Written Communication – 13 (2), 1996. – p. 251-281.

9. Khedri, M., Ebrahimi, S. J., Heng, C.S. Interactional metadiscourse markers in academic research article result and discussion sections / Mohsen Khedri, Seyed Jamal Ebrahimi, Chan Swee Heng // 3L: Language, Linguistics, Literature®. The Southeast Asian Journal of English Language Studies. – Vol. 19 (1), 2003. – p. 65-74.

10. Lakoff G. Hedges: a study in meaning criteria and the logic of fuzzy concepts / George Lakoff // Journal of Philosophical Logic 2/4, 2973. – p. 458–508.

11. Lee K. Y. Hedging expressions used in academic written feedback: a study on the use of modal verbs / Kok Yueh Lee // Research in Corpus Linguistics. – Vol. 1, 2013. – p. 33-45.

12. Martin-Martin P. The Mitigation of Scientific Claims in Research Papers: A Comparative Study / Pedro Martin-Martin // International Journal of English Studies. – Vol. 8 (2), 2008. – p. 133-152.

13. Maslova T. Metadiscourse markers of academic and professional English / Tetiana Maslova // Global changes in Ukraine: Global changes in English teaching in Ukraine: Book of Convention papers / Comp. A. Radu. Eds. A. Radu, L. Kuznetsova. – Lviv, 2016. – p. 123-124.

14. Salager-Meyer F. Hedges and textual communicative function in medical English written discourse / Francoise Salager-Meyer // English for Specific Purposes. – 13/2, 1994. – p. 149-170.