MULTIMODAL COMMUNICATION IN THE 21ST CENTURY: PROFESSIONAL AND ACADEMIC CHALLENGES. 33rd Conference of the Spanish Association of Applied Linguistics (AESLA), XXXIII AESLA CONFERENCE, 16-18 April 2015, Madrid, Spain

A comparison analysis of modal auxiliary verbs in Technical and General English

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Abstract

Engineering students should be able to identify, comprehend and accurately use those discourse elements which characterize scientific language.

Modality is a complex aspect of the English language for Spanish students due to the differences in expression between Technical and General English in terms of frequency of use and semantic values. Therefore, it is important to present the different uses of modality in context.

In this work we present an analysis of modal verbs in Technical and General English based on a corpus. The results will allow us to shed some light on the role played by these verbs in both genres, with special emphasis on their use in technical texts.

1. Introduction

Engineering students should be able to identify, comprehend and accurately use those discourse elements which characterize scientific language and differentiate it from other genres (Salager-Meyer, 1994; Hyland, 2005; Vold, 2006; Morales, 2008).

Modality is a complex aspect of the English language for Spanish students due to the differences in expression between Technical and General English in terms of frequency of use and semantic values. Therefore, in addition to the theoretical explanations provided in seminal grammars (Quirk et al. 1985; Halliday 1985; Greenbaum & Quirk,

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1990; Downing & Locke, 1992), it is important to present the uses of modality in real communicative propositions within an appropriate semantic and pragmatic context.

The use of corpora has proved to be essential for the analysis of lexical, syntactic, pragmatic and rhetorical aspects of language: 'Computerized corpora have proved to be excellent resources for a wide range of research tasks. In the first place, they have provided a more realistic foundation for the study of language than earlier types of material, a fact which has given new impetus to descriptive studies of English lexis, syntax, discourse and prosody. Secondly, they have become a particularly fruitful basis for comparing different varieties of English' (Aijmer & Altenberg, 1991:1).

Additionally, the improved performance of today's computers and the availability of different types of texts in digital format have allowed the development of more reliable studies based on the analysis of specific corpora.

In this paper we compare the different uses of modal auxiliary verbs in Technical and General English, based on the analysis of a corpus of about 30,000 words. The results of the analysis of the two corpora have allowed us to identify the different uses of modal auxiliaries in both varieties of English with the purpose of developing effective reading strategies in students of English for specific purposes, because, as Schleppegrell (1991: 271) suggests, 'developing the students' skills in different genres requires knowledge about how grammatical resources are typically used in realizing those genres'.

2. Modal auxiliary verbs in English

We will focus our study on the use of modal auxiliary verbs since, according to Huckin & Olsen (1991: 542), scholars and scientists are required to use linguistic resources accurately when presenting their research findings for publication, and the appropriate selection of modal auxiliary verbs help them reach that goal.

Modality is concerned with the codification of the speaker's attitude towards "the proposition that the sentence expresses" (Lyons, 1977: 452) or, in other words, with the "speaker's assessment of, or attitude towards, the potentiality of a state of affairs" (Radden & Dirven, 2007: 234). Modal verbs may express more than one type of modality, such as possibility, probability, necessity, obligation, and so on. Because modal verbs may have different semantic values depending on the context in which they appear, their use determines the propositional value of the message transmitted (Alcaraz, 2000: 66).

The analysis presented in this work is based on the classification and values of modal auxiliary verbs described in traditional English grammars (Leech & Svartvick, 1975, Quirk *et al.,* 1985, Greenbaum & Quirk, 1990, Downing & Locke, 1992). Modal verbs have been grouped into two groups according to their frequency of use. The first group comprises the modal verb *can* and its past form *could,* which are mainly used in English to express ability, permission and possibility. The second group includes other modal auxiliary verbs mainly used to indicate obligation or necessity (*must, have to, should, need to, ought to*), permission or possibility (*may, might*), and intention, prediction or probability (*would*).

3. Methodology

The development of analysis tools easily available to researchers has led to a new impetus of corpus linguistics as they facilitate the reliable study of the linguistic features that characterize the different varieties of English (Bowker & Pearson, 2002; Flowerdew, 2004; Parodi, 2006).

This paper analyzes the use of modal auxiliary verbs in Technical and General English based on a corpus of approximately 30,000 words consisting of two sub-corpora of 15,000 words for each gender. Each sub-corpora consists of 3,000 words excerpted from five literary works available on the free access Amazon portal for Kindle (e-book version) in the case of the literary sub-corpus, and 5 research articles in digital format retrieved from the free access portal for researchers ResearchGate that deal with such topics as materials, energy, technology, environment and thermodynamics in the case of technical sub-corpus.

Additionally, the advanced search options recently incorporated in Adobe Reader applications allow researchers to study specific grammatical and lexical devices in a faster and more reliable way. The program searches the item to be analyzed through the PDF text and automatically draws up a list with all sentences containing the specified item.

The methodology followed to accomplish this study combines computer analysis for the initial detection of the modals under survey with manual analysis for the identification of their functions and values because there is no program that can automatically differentiate the semantic meaning of such verbs in context.

After identifying all cases of modal verbs in the different texts and to facilitate the computation of data, a code was assigned to each text and a page in MSExcel was opened with fields corresponding to each function for the verbs studied. Subsequently, the results were represented both numerically and graphically, using the data graphical presentation tools available in the Excel spreadsheet.

4. Data analysis

The analysis of the results indicates a somehow higher frequency of modal auxiliaries in technical corpus, with a total of 431 cases compared to the 383 cases found in the general language corpus. However, major differences can be seen in the kind of modal verb and meaning in each genre.

To simplify the analysis of results and facilitate their application to teaching, we have grouped these verbs into two main groups, according to the data found in our study: *can* and its verbal form *could*, because their frequency in both genders exceeds 63% of all cases, and rest of modal verbs, which account for about 37%. The following paragraphs analyze both groups in more detail.

4.1. Group A: can and could

The first significant finding is that although the total number of occurrences is slightly higher in Technical English (275 cases) than in General English (242 cases), in terms of percentage both corpora present similar figures (63.8% in Technical English and 63.2% in General English).

The major differences between both varieties of English, however, are to be found in their semantic values. Thus, whereas in General English *can* and *could* cover a wider range of semantic values, in technical texts they are mostly used to express general possibility, as illustrated in the following table:

Table 1. Semantic values of *can/could* in Technical and General English

Semantic values	TECHNICAL E.	GENERAL E.
CAN ability	12	35
CAN permission	0	3
CAN possibility	148	51
CAN'T impossibility	14	23
COULD(NOT) ability in the past	0	102
COULD possibility	101	21
COULD permission	0	7
TOTAL CAN/COULD	**275**	**242**

As we can see, in Technical English, from the 275 occurrences found in the corpus, 249 refer to possibility distributed as follows: 148 cases of *can* and 101 cases of *could*, accounting for 90.4% of the use of these two verb forms. The negative form of *can* presents 14 cases (5.1%) and indicates impossibility, and only 12 cases (4.4%) express ability.

　(1)　«*this can enhance the EER value of algal biodiesel…*» (TEC -> possibility*)*

By contrast, in General English *can/could* offer a wider variety of meanings, out of which we can identify three main values: *could* indicating ability/lack of ability in the past, with 102 cases (42%), followed far behind by *can* with the values of possibility (51 cases and 21% of total cases in this group) and ability (35 cases and 14.5%). Other semantic values showed a lower frequency in our corpus.

　(2)　«*…the single child they could afford.*» (GEN-> ability in the past*)*
　(3)　«*Now I can feel Amy looking over my shoulder…*»　(GEN-> ability*)*

Table 2 shows the percentages for the different values of *can/could* in both genders, and clearly illustrates the differences in use of this modal verb.

Table 2. Percentage of *can/could* in Technical and General English

Semantic values	TECHNICAL E. %	GENERAL E. %
CAN ability	4.4	14.5
CAN permission	0.0	1.2
CAN possibility	53.8	21.1
CAN'T impossibility	5.1	9.5
COULD(NOT) ability in the past	0.0	42.1
COULD possibility	36.7	8.7
COULD permission	0.0	2.9

4.2. Group B: other modal auxiliary verbs

In this group we have included the modal verbs *must, have to, may, might, should, would, ought to* and *need to* together with their negative forms.
Again the total number of occurrences is somewhat larger in the scientific corpus (156) than in the general corpus (141), although overall percentages are similar in both corpora (36.2% in the technical corpus versus 36.8% in the general corpus).
Similarly, we can appreciate the prevalence of some particular modal verbs and certain semantic values in Technical English against a greater selection of verbs and functions in General English.
Table 3 illustrates these differences between both genres.

Table 3. Other modal verbs and semantic values in Technical and General English

Semantic values	TECHNICAL E.	GENERAL E.
MUST obligation/necessity	16	10
HAD TO obligation in the past	0	6
NOT HAVE TO no obligation	0	1
MAY/MIGHT permission	0	8
MAY/MIGHT possibility	78	49
SHOULD obligation/necessity	34	5
WOULD prediction/probability	12	38
WOULD intention	0	16
NEED TO necessity	16	4
OUGHT TO obligation	0	4
TOTAL OTHER MODALS	**156**	**141**

In Technical English we can observe two main semantic values, namely possibility and obligation/necessity.
Possibility is expressed by the verb *may/might* computing half of the cases found in this group (78 cases, 50%).
  (4) *«Models may provide robustness….»(TEC->* possibility)
In the technical corpus, the values of obligation and necessity (42%), are expressed mainly through the modal verb *should* (34 cases and 21.8%) and, to a lesser extent, *must* and *need to* totaling 20.2% with the same number of cases for each verb (16 and 10.3%).
  (5) *«the assessment of nanoecotoxicity should be pursued in a holistic way….»(TEC->* necessity)
  (6) *«…lignin produces a highly acidic bio-oil that must be upgraded prior to use….»(TEC ->* obligation)

(7) *«the extracted algal carbohydrates need to be hydrolyzed further….»(TEC->* necessity)

Finally, with only 12 cases (7.7%), *would* occurs in the technical corpus to express prediction.

(8) *«These interactions affect the aggregation of the NPs in solution, which ultimately would influence the results of the in vivo or in vitro nanotoxicity studies.»(TEC->* prediction)

Conversely, General English presents a greater range of uses and frequencies. There are two verbs with similar frequency, *may/might* with 57 cases (40.5%), and *would* with 54 cases (38.3%). However, these modal verbs are used to express different semantic values. More specifically, *may/might* has two values: possibility (34.8%) and permission (5.7%), and *would* is used to indicate either prediction or probability (27%) and intention (11.3%).

(9) *«We might use the same word to describe a gorgeous sunset, or an alpine landscape» (GEN->* possibility)

(10) *«May I ask where you came by this, Monsieur…? » (GEN->* permission)

(11) *«Even then, I knew that road would not lead to glory » (GEN->* prediction)

(12) *«Something impressive was being created, probably a crepe, because crepes are special, and today Amy would want to cook something special » (GEN->* intention)

In the general corpus we can also see a greater variety of verbs to express obligation or necessity (21%), in particular, *must* (7.1%), *have/had to* (4.3%), *should* (3.5%), *need to* (2.8%) and *ought to* (2.8%).

(13) *«The first thing I must do is distinguish between them» (GEN->* obligation)

(14) *«We then work out what we ought to see, or hear, etc» (GEN->* obligation)

These differences can be better observed in Table 4.

Table 4: Percentage of other modal verbs in Technical and General English

Semantic values	TECHNICAL E %.	GENERAL E %.
MUST obligation/necessity	10.3	7.1
HAD TO obl in the past	0.0	4.3
NOT HAVE TO no obligation	0.0	0.7
MAY/MIGHT permission	0.0	5.7
MAY/MIGHT possibility	50.0	34.8
SHOULD obligation/necessity	21.8	3.5
WOULD prediction/probability	7.7	27.0
WOULD intention	0.0	11.3
NEED TO necessity	10.3	2.8
OUGHT TO obligation	0.0	2.8

5. Conclusions

In this paper we analyzed the use of modal auxiliary verbs in General and Technical English for educational purposes.

Although the results show a somewhat greater use in terms of number of cases in Technical English (431 versus 383 in General English), the most significant differences are found in the semantic values and verbs used in each corpus.

Thus, we can see that in Technical English these verbs are primarily used to express possibility (83% of the total) and to a much lesser extent, necessity and obligation (15%). By contrast, in General English we find a wider range of modal values, among which we can highlight the values of ability (35.8%) and possibility (31.6%), although other values were hardly found in our technical corpus, such as permission, probability or intention.

Similar findings can be observed in relation to the verbal forms used in both genres. Thus, in Technical English the semantic values mentioned above are realized through a small selection of auxiliary verbs, namely *can/could* and *may/might* to express possibility, and *should, need to* and *must* to express obligation and necessity. However, in General English we find more verbal forms including past or negative verbal tenses, which are hardly used in Technical English, as well as the use of one auxiliary verb to express different semantic values depending on

the discursive context; that is the case of *would* which appeared in our general corpus to express intention or probability, *may/might* to express possibility or permission, or the modal *can/could* which was found to indicate ability, possibility or permission.

The results allow us to conclude that Technical English prefers the use of certain auxiliary verbs to express very specific semantic values, unlike General English, which presents a greater variety of verbal forms and semantic meanings.

The data obtained will help us to better plan the grammatical content of our courses of Technical English by focusing on the main uses of these modal verbs in order to develop more efficient and effective reading strategies for our engineering students.

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