

Necessity and Obligation Modals in English Academic Discourse: A Corpus-Based Analysis

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Abstract:

Modals are linguistic units that seem to be ubiquitous in nearly all genres and text categories. However, there are some tendencies in which some modals are more likely to occur in a particular text category than the others. It is said that modals are less frequent in academic texts compared to fiction and news. This paper then aims at describing the modals, focusing to those expressing necessity/obligation, by using corpus-based analysis. This study uses a general reference corpus, Corpus of Contemporary American English, and compiled the data from the academic subcorpus. The results show that statistically the usage frequency of necessity and obligation modals is negligible; however, no matter how small it is, it still purports to mark something. Among the modals in the same category there are some tendencies, e.g. modal should is the most frequent of all, followed by must, have to, shall, be supposed to, and have got to. The collocate analysis focuses on should and must and found out that the most frequent verb type following these two modals belong to thinking verbs (e.g., consider, learn, understand). However the most frequent modal constructions are should have and must have enabling a slightly different interpretation. Besides, due to the nature of language in an academic setting, it is thus predictable that the use of the core modals (e.g., should, must) is more frequent than the quasi-modals (e.g., have to).

Keywords: *academic text, corpus, , modals, necessity, obligation*

1. Introduction

Studying language use in different genres and text categories is perpetually appealing as each genre and category has its own linguistic characteristics. The language used in literary works (e.g., prose and poetry) concerns more on the aesthetic aspect as the author manipulatively use the linguistic code (Leech & Short, 2007). In news text, language style is prominent to build up the newsworthiness (Bednarek & Caple, 2012). Both fiction and news, however, attempt to be closer to their readers. Unlike fiction and news, academic discourse is perceived as obtuse text

category due to the choice of words and complex grammatical structure (Biber & Gray, 2016). Although basically news and academic discourse have a similar purpose to deliver information (Biber & Conrad, 2009), it turns out that they have rather discrete characteristics. Regarding the communicative purpose, academic discourse involves interpretation, while news primarily focuses on factual reporting (Biber & Conrad, 2009). If news and fiction purport to be close to the readers, thus everyday language is preferable; however, academic texts (the term academic texts and academic discourse in this study are used interchangeably) primarily see things differently. In academic discourse, events are perceived as a network of cause and event, different from fiction and news who perceive events as sequence (Hyland, 2009, p. 7). It is interesting then to further study academic discourse, especially relating to the use of a certain linguistic unit in academic texts.

Regarding the use of linguistic units, Biber & Conrad (2009, pp. 115–117) and Biber & Quirk (2012) have identified several linguistic features of different text categories, also in academic texts, including the use of modals to manifest modality expressions (e.g., permission, possibility, ability, obligation, necessity, prediction, volition). Biber & Conrad (2009) state that modals are most frequently used in fiction and least frequently found in news, to make academic discourse in between. Meanwhile, Oktavianti (2019) finds out that the use of modals is more frequently used in news text than in academic discourse. Despite the different description of usage frequency of modals in distinct text categories, Biber & Conrad (2009) and Oktavianti (2019) agree that modals *may* and *can* are the most commonly used in academic discourse, even though Oktavianti (2019) mentions further details of the modals, such as *would* and *will* that are frequently used in academic texts. Those modals, based on some observations, serve as practical means of hedging in academic writing (Dudley-Evans, 1994; Hardjanto, 2016; Hyland, 1994, 1998).

Considering that modals are quite important units in academic writing, hence there have been some previous studies on modals in academic discourse. Despite what has been carried out by Biber & Conrad (2009) and Biber & Quirk (2012), there are some studies focusing on modals used by non-native speakers of English compared to the native speakers (Gabrielatos & McEnery, 2005; Hinkel, 2009; Hykes, 2000; Yamamoto, 1999), the use of modals as means of hedging strategy in academic writing (Dudley-Evans, 1994; Hardjanto, 2016; among others), cross-linguistic variation of modal use (see Carrió-pastor, 2007), and comparing the use of modals by English foreign learner to an English corpus (Mcenery & Kifle, 2001; Yang, 2018). Previous studies on necessity/obligation modals were carried out by analyzing the use of the modals in different English varieties through corpus investigation (Daugis, 2017; Rajalahti, 2006; Tagliamonte & D'Arcy, 2007). Nevertheless, little is known about other types of modality expressions (e.g., necessity/obligation) in academic context. Whereas, using necessity/obligation modals is inevitably important due to the function to emphasize necessity and expose obligation in academic writing (Yamamoto, 1999). This study then aims at investigating the frequency of use of necessity/obligation modals in academic texts and how they are used in an academic corpus as the representation of actual language use. It is intriguing to find out the answer to these questions so that this study can complement the available studies on modals in academic context. Nonetheless, this study focuses merely on some necessity/obligation modals; they are core modals *shall*, *must*, and *should*, quasi-modals *have to*, *have got to*, and *be supposed to*.

Furthermore, this study takes no account of the pragmatic aspect of the necessity/obligation modals; the terms *epistemic*, *deontic*, *dynamic*, thus are ignored.

2. Literature Review

The nature of necessity/obligation modals is also salient to take into account before analyzing the frequency and so forth. Gahér (2003) argues that necessity embodies truth-value proposition. In the *Oxford Dictionary of English* (2014), *necessity* is defined as “the state or fact of being required”. The term *obligation* implies legal and moral (Allen, 1980; Zimmerman, 1996). Thus, in the *Oxford Dictionary of English*, (2014), an obligation is defined as “*an act or course of action to which a person is morally or legally bound; a duty or commitment*”. Firmly related to ‘obligation’, the term ‘necessity’, Collins (2014) groups obligation and necessity meaning into one, assuming that the meanings are basically related and the modals expressing those meanings are somewhat overlapping.

Modals that belong to this meaning category are—among others—*shall*, *must*, *should*, *have to*, *have got to*, and *be supposed to*. Core modal *shall* is identified as having the strongest obligation meaning as it also ensures that the action is carried out (Palmer, 1990), so it is preferable to be used in legal documents. Even though *shall* has polysemous meanings, yet the original meaning is to state obligation (Tagliamonte, 2013, p. 123). Other core modals under this category are *should* and *must*. Based on Collins (2014) and Palmer (1990), modal *should* is an internal obligation, yet it is more likely to be used as suggestion (Eastwood, 2002; Murphy, 2012). Therefore the meaning is not as strong as *must* (Murphy, 2012, p. 66). Interestingly core modal *must* is also likely to be used to show logical conclusion instead of obligation. Collins (2009, p. 60) says that the difference of *must* and *have to* lies in the context of immediacy. Other periphrastic modals under this category are *have got to* and *be supposed to* (Collins, 2009; Palmer, 1990). According to Palmer and Collins, the meaning of *have got to* is as vigorous as *must*, as is observed in *Historical Thesaurus of English*. As for *be supposed to*, it is assumed to show a more objective meaning—similar to *ought to*, although *be supposed to* is more frequently used than *ought to* (Collins, 2009, p. 81).

3. Research Methodology

This study uses a synchronic corpus, namely *Corpus of Contemporary American English* or COCA (Davies, 2008). The primary reasons of selecting COA are due to its large size (comprising 560 million words), its updated compilation (the latest compilation is from 2017), and its availability of academic subcorpus (comprising 112 million words). Some other corpora might have larger size (e.g., GloWbe, iWeb), but they are not updated, and they focus on varieties of English and Internet language. Although there is a specific corpus for academic English, e.g. Michigan Corpus of Upper Level Students Papers, it only comprises 2,6 million words, smaller than subcorpus academic of COCA, and it is outdated since it is compiled from 2002 to 2009.

The data were collected from academic subcorpus of COCA by using keywords search. By keywords, there are several English necessity/obligation modals, such as *must*, *have to*, *have got to*, *be supposed to*. The qualitative data are the collocates of the modals under study and the quantitative data are the frequency of use of those modals. The analysis of the data was also carried out differently for different types of data. The qualitative data were analyzed semantically by classifying the verbs into types of verbs, referring to the classification of primary verb types by

Dixon as in table 1. For instance, a verb collocate identified in the corpus, *learn*, is classified into *thinking* verb, since it deals with thinking activity.

Table 1. Dixon's primary verb types

Verb type	Examples	
Primary A	Motion and rest	<i>move, walk, follow, stand</i>
	Affect	<i>touch, kick, hit, knock</i>
	Giving	<i>supply, serve, contribute, deliver</i>
	Corporeal	<i>eat, smoke, scrub, sleep</i>
	Weather	<i>rain, thunder</i>
	Competition	<i>fight, race, win, attack</i>
	Social contract	<i>manage, promote, nominate, punish</i>
	Using	<i>use, operate, wear, waste</i>
	Obeying	<i>obey, refuse, order</i>
Primary B	Attention	<i>See, hear, notice, smell</i>
	Thinking	<i>think, consider, understand, know</i>
	Deciding	<i>decide, select, choose, prefer</i>
	Speaking	<i>say, tell, talk, speak, discuss</i>
	Liking	<i>like, want, enjoy, approve</i>
	Annoying	<i>frighten, shock, annoy, trouble</i>
	Acting	<i>act, behave, copy, imitate</i>
	Happening	<i>happen, organize, commit, do</i>
	Comparing	<i>include, compare, comprise, differ</i>
	Relating	<i>depend (on), indicate, demonstrate</i>

This classification of verb types is selected in this study due to its ability of being not too concrete (that makes the classification too difficult) or too simple (that doesn't show the nature of verbs). There are some other classifications of verbs, but they are too concrete (Levin, 1993), too simple (Chafe, 1970), or too abstract (Pavey, 2010) for text analysis. As for the quantitative data, they were normalized (see Brezina, 2018). The base of normalization used in this research is per one million words. To minimize mistake and to obtain valid results, the counting of normalized frequency (nf) used a feature available in COCA (frequency per one million words). In making this study more comprehensive, there is also an interpretation of the frequency and the available theory on necessity and obligation modals to reveal the dynamic use of the modals. The interpretation followed *thick description* model proposed by Geertz (Stake, 2010) by taking advantage of the frequencies, the relevant theories, and the assistance from another corpus, *British National Corpus* (Davies, 2004), and a historical thesaurus, *Historical Thesaurus of English* (2016) to complement the analysis.

4. Findings and Discussion

The discussion covers two main analyses: usage frequency of necessity/obligation modals and the collocates of the modals as found in COCA. At the end of this section, however, the elaboration of dynamic use of the modals is inevitably necessary.

4.1 Frequency of necessity/obligation modals in academic discourse

This section elaborates the usage frequency of necessity/obligation modals in academic discourse, focusing on *must*, *have to*, *have got to* and *be supposed to*. According to the search results in COCA, core modal *must* is the most frequently used in academic discourse compared

with other modals under study. Quasi-modal *have to* occupy the second rank, followed by *be supposed to* and *have got to* in the last position. Table 2 below presents the frequency.

Table 2. Frequency (nf) of necessity/obligation modals in academic discourse

Rank	Modals	Nf
1	should	174
2	must	121
3	have to	64
4	shall	11
5	be supposed to	3.75
6	have got to	0.75

Based on table 2, it is evident that necessity/obligation expressions can still be found in academic discourse or in other words academicians still need the expressions. However, it is important to take note that the use of *should* dominates all other modals expressing nearly the same meaning (174 times per one million words). In the second position, core modal *must* is used 121 times per one million words. Following *must*, there is quasi-modal *have to* occupying the third most frequent (64 times per one million words). The comparison to other genres is appealing to show since the use of *must* and *have to* in fiction and news show contrary order in which *have to* is more frequently used than *must*, as described in table 3 below.

Table 3. Frequency (nf) of *must* and *have to* in different text categories

Modals	Fiction	Academic	News
Must	95	121	135
have to	201	64	296

This difference is plausible to occur because the nature of academic language seems to be on the opposite side of fiction and news. However, this dynamic of *must* and *have to* has been identified by Collins (2009, p. 67) in his empirical research.

In the fourth position is *shall* that is presumably seldom to use in daily use of language. According to Leech, Hundt, Mair, & Smith (2009), the use of *shall* is decreasing over the last decades so it is not surprising to identify its less frequent of use in this study. Similar to *shall*, *be supposed to* and *have got to* occupy the lower position—and *have got to* in the lowest one—among other modals under study. Besides, *have got to* is identical to a colloquial context or informal conversation (Azar & Hagen, 2016) so the use of this modal is the lowest of all in an academic context. Based on the frequency findings, it is obvious that academic discourse does not need to express strong and authoritative obligation and necessity (such as expressed by *must* and *shall*) as frequently as other modality expressions.

4.2 The Collocates of *should* and *must* in Academic discourse

The following discussion is about the collocates of *should* and *must* observed in COCA. Nevertheless, the collocates investigated in this study are limited to the first right collocates only (R1) or the verb collocates since grammatically modals must be followed by verbs (i.e., bare infinite verbs). Thus, it is robustly assumed that the R1 is occupied by verb. The following table (table 4) presents the right collocates of the modals in academic texts.

Table 4. Right collocates of *should*

R1	Nf
Have	6.81
Include	1.87
Take	1.63
Consider	1.61
Provide	1.27
Make	1.04
Focus	1.00
Do	0.92
Know	0.83
Use	0.74

As shown in table 4, *have* occupy the second most frequent collocate of *should*. There are two possibilities for interpreting this construction. First, it comprises *should* and lexical verb *have* expressing suggestions for something that has not happened. Second, it might consist of *should* and auxiliary *have*, interpreted as suggestions or expectation on something happened in the past (Azar & Hagen, 2016). Due to the hybrid status of *have* (both serve as lexical and functional category), this verb, for the sake of classification, is ignored. Following Dixon's primary verb types (Dixon, 2005), some of the verb collocates belong to *thinking* type, such as *include*, *consider*, *focus*, and *know*. The other verbs are *take*, *provide*, *make*, *do*, and *use*.

Table 5. Right collocates of *must*

R1	nf
Have	6.63
Take	1.60
Make	1.05
Consider	0.92
Include	0.87
Do	0.85
Learn	0.81
Understand	0.78
Work	0.74
Provide	0.74

Similarly, the two most frequent collocate of *must* is *have* forming *must have*. As in *should have*, the existence of *have* following *must* enable different interpretation of the modal construction. It can show obligation on something that has not happened (*must* and lexical verb *have*) or express a conclusion about what happened (past) and based on putting details and clues together and making an inference (Azar & Hagen, 2016). Like the collocates of *should*, some of the collocates are classified to *thinking* type (e.g., *consider*, *include*, *learn*, *understand*). The copious use of this verb type in an academic text is not surprising because academic texts are firmly connected with the writing of scientific work involving thinking activities. Some other verbs identified in the corpus are *take*, *make*, *do*, *work*, and *provide*.

To complete the analysis, it is necessary to classify the verb collocates into verb types to provide the mapping of *should* and *must* as the representatives of necessity/obligation modals in academic discourse.

Table 6. Verb types of the collocates

Verb type	Verb	nf	Total frequency (nf)
Thinking	Consider	2.74	5.35
	Focus	1	
	Know	0.83	
	Learn	0.81	
	Understand	0.78	
Motion and Rest	Take	3.23	3.23
Comparing	Include	2.74	2.74
Affect	make	2.09	2.09
Giving	provide	2.01	2.01
Happening	Do	1.76	1.76
Using	use	0.74	0.74
Social contract	work	0.74	0.74

Table 6 shows that the most frequent collocates of *should* and *must* belong to several types of verbs; they are *thinking*, *motion and rest*, *comparing*, *affect*, *giving*, *happening*, *using*, and *social contract*. Among all types, *thinking* is obviously the most frequent, and thus, the most significant collocate of necessity/obligation modals in academic context.

The underlying reason for *thinking* verbs being the most frequent collocates can be associated with the activity undertaken in academic context. It is known that in academic text, scientific thinking is required and thus it involves thinking activities all along. In relation to necessity/obligation modal, it is necessary to consolidate the activity of thinking (i.e., cognitive activities) to ensure the academic value. Hence it is plausible that *thinking* verbs dominate the collocate type of *should* and *must* in the academic setting. In the corpus, the *thinking* verbs include *consider* (2.74), *focus* (1), *know* (0.83), *learn* (0.81), and *understand* (0.78).

Meanwhile, the second most frequent verb type is *motion and rest* verb either being used literally or metaphorically. In the collocate list for *should* and *must*, the only motion and rest verb type is *take* occurring 3.23 times per one million words, in *should* it co-occurs 1.63 times per one million words and it co-occurs with *must* 1.60 times. There is no significant difference in terms of co-occurrence frequency between *should* and *must*. Some uses of *take* as the right collocate of *should* are recorded in the figure 1.

The image shows a screenshot of a concordance search tool interface. The title bar reads 'Corpus of Contemporary American English'. Below the title bar, there are four main columns: SEARCH, FREQUENCY, CONTEXT, and OVERVIEW. The table contains 22 rows of search results. Each row includes a list number, year, source, and a snippet of text where 'should take' is used. The text snippets are color-coded to highlight the search terms and surrounding context. For example, row 1 shows: '# Those who believe skin exposure to be unnecessary should take a look'. Row 2 shows: 'power in the world. Now more than ever we should take leadership role at the U.N. in the drive to establish'. Row 3 shows: 'also suggests that anyone who has had a heart attack should take statin, whatever their cholesterol level. 4 on the not'. Row 4 shows: 'with a musculoskeletal injury, healthcare providers should take a human history to assess the possibility that the injury w'. Row 5 shows: 'their assigned part moves from note to note; they should take a step forward as space allows or step in place if'. Row 6 shows: 'is a lifelong process, and therefore career counseling should take a respect approach, regarding potential and creativity over'. Row 7 shows: 'How should they be distributed? # a) Everyone should take a straw, and the person with the shortest one would not'. Row 8 shows: 'education campaigns and the "bully pulpit," states should take a principled stand against the fathering of children out of'. Row 9 shows: 'with time, any video-based analysis of crowd motion should take a long-window approach. It per-forms the analysis over a'. Row 10 shows: 'argument can be made for the position that ANWR leasing should take a back seat to another class of policies. # This argument'. Row 11 shows: 'of higher education. He felt early on that academics should take a stand on local issues. # Kenneth Clark is clearly an'. Row 12 shows: 'believe that a government in a "big industrializer" should take a leading role in financial mobilization and allocation to'. Row 13 shows: 'new economy asset lockups. And third, Delaware courts should take a traditional approach to deal protection, meaning that'. Row 14 shows: 'a case. # "I do n't think attorneys should take a divorce case or an employment law case without first chec'. Row 15 shows: 'year after graduation, he suggested to one that they should take a frame steamer back to America and arrive on the eve of'. Row 16 shows: '). # Leaders in the field of social work should take a prescriptive role in advocating for improved pain manage'. Row 17 shows: 'well water is pumped into the household plumbing, you should take a sample for lead from the discharge end of the holding tan'. Row 18 shows: '# Both school counselors and school psychologists should take a whole, practical role in facilitating the educational'. Row 19 shows: 'system leaders and their healthcare colleagues should take a more active role in reform. Unfortunately, many of the'. Row 20 shows: 'that those who wanted to become elementary teachers should take academic coursework in the subjects they would actually b'. Row 21 shows: 'articulated by Brandeis and Young; business leaders should take a account of the environment in which the corporation oper'. Row 22 shows: 'not look for orders from the above in case they should take a action. Their operations are to be compared with the

Figure 1. Concordances of *should take*

Figure 1 presents some examples of *should take* concordances in which, as is seen from the figure, some use of *take* relates to the expression *take into account* and *take into consideration*. These two expressions are commonly used in academic context, as they are associated with thinking activity. Interestingly there is none of them shows the use of *take* literally showing motion-related activity. It is assumed that this *motion and rest* verb type is used in academic context metaphorically to refer to a certain action, e.g., *take place*, *take into account*, etc.

As for the third most frequent, there is *comparing* verb type. In the corpus under study, the verb belongs to this type is *include*, occurring 2.74 times per one million words. The use of *comparing* type in scientific context is predictable because it enables the comparison of theories, methods, data, etc, to state exclusion and inclusion. The use of this type to co-occur with necessity and obligation modals is to emphasize the inclusion or the exclusion. Some of the search results are displayed in figure 2 to provide clear instances of the use of *include* exhibiting inclusion in academic text.

SEARCH	FREQUENCY	CONTEXT	OVERVIEW
1 2012 ACAD LibraryResources	A B C	Planning and Programs Preservation planning must include	through assessment of risk to collections; these activities
2 2015 ACAD DeltaKappaGamma	A B C	occur. Instead, the authors argue that the experience must include	assessment preparation phase and structured onsite
3 1992 ACAD MusicEduc	A B C	by seriously considering the issues involved. Magnets must include	solid philosophical base, a suitable model, a healthy respect
4 2017 ACAD The Review of Metaphysics	A B C	the whole to which it belongs, that representation must include	representation of itself representing that whole, which must
5 2011 ACAD MusicEduc	A B C	in music education programs, new models of music education must include	variety of musical styles and genres and should embrace
6 2015 ACAD ArtBulletin	A B C	to the editor-in-chief. Submissions must be in English and must include	list of illustrations and copies of the illustrations. Please
7 2012 ACAD Futurist	A B C	the way to the center of the earth. It must include	communications system capable of sending real-time senso
8 2012 ACAD DeltaKappaGamma	A B C	, furthermore, that a successful induction program must include	professional development support system tailored to
9 2013 ACAD LangSpeechHearing	A B C	IEP. IDEA mandates that membership of the IEP team must include	parent and, whenever appropriate, the child with a disabili
10 1999 ACAD InstrPsych	A B C	agreed upon. As a result, assessment and intervention must include	variety of measures. Because ADD is often viewed as a
11 2014 ACAD PolSciQuarterly	A B C	are more highly educated and better informed. Since we must include	variable in the response model that is not in the selection
12 1997 ACAD MusicEduc	A B C	been extended to May 16, 1997. Each nomination must include	complete resume, listing in detail the individual's service
13 2012 ACAD Ref&UserServQ	A B C	after her program ended. Exemplary practice then for L2.0 must include	recommendation for continuing the learning opportunities
14 2001 ACAD ReView	A B C	particular assessment or part of an assessment, the IEP must include	statement of why that assessment is not appropriate for the
15 2003 ACAD Education	A B C	must appear throughout the standards. This evidence must include	commitment to technology -- including the unit's efforts to
16 2002 ACAD CommCollegeR	A B C	of their past overall academic success. # The programs must include	variety of factors, as identified by the respondents to this
17 2009 ACAD TheologStud	A B C	fact, I believe that a fully adequate virtue theory must include	significant discussion of what it means for a virtuous agent
18 1996 ACAD BioCycle	A B C	of its residents, had decided that the preferred system must include	comprehensive recycling program and a resource recovery
19 1996 ACAD ReView	A B C	public education to the child. This notice to parents must include	description of the action proposed or refused, by the agent
20 1998 ACAD Generations	A B C	consent in acute care. # families care therefore must include	total range of options and alternatives in order to maximiz
21 2012 ACAD MechanicalEng	A B C	transition from fossil-based to sustainable energy must include	side-by-side analysis of the economics as well as the EROI o
22 2002 ACAD MusicEduc	A B C	therefore believes that every grade through 12 curriculum must include	balanced, comprehensive, and sequential program of fine

Figure 2. Concordances of *must include*

Other verb types found as the collocates of *should* and *must* are *affect*, *giving*, *happening*, *using*, and *social contract*. For *affect* type, there is only one verb found, that is *make*, occurring 2.09 times per one million words in COCA academic subcorpus. *Giving* type (verb *provide*) occurs 2.01 times per one million words. The rest of the verb types also comprises one verb found in the corpus, such as *do* belongs to *happening* (occurring 1.76 times per one million words), *use* belongs to *using* (occurring 0.74 times per one million words) and *work* belongs to *social contract* (occurring 0.74 per one million words).

4.3 The Dynamic Use of Necessity and Obligation Modals in Academic Discourse and Beyond

Academic discourse (e.g., research articles, theses, etc.) is known to present or deliver scientific facts or findings. In practice, there seem to be some cases in which the findings are obscure so the authors need to tone down the statement to avoid opposition. This can be done through the use of hedging system (Crompton, 1997; Hardjanto, 2016; Hyland, 1994, 1998; Sanjaya, Sitawati, & Suciani, 2015). Hedging refers to any linguistic units used to mark the lack of commitment to

the truth-value of proposition (Hyland, 1998, p. 1). In English, some of the possible ways to hedge author's statement is by using modals, e.g., *can*, *could*, *may* (Hardjanto, 2016; Hyland, 1994, 1998; Sanjaya et al., 2015). The function of hedging is in accordance with the nature of modals as the manifestation of modality in a way that it also deals with the possibility, prediction, necessity, etc., something that is not factual (Lyons, 1977; Palmer, 1990). This is in line with Hyland (1998, p. 1) stating that hedging is part of epistemic modality to demonstrate unwillingness to make commitment to the truth of proposition. The use of modals, thus, is inevitable and ubiquitous in nearly all text categories, including academic text, even though a particular text might use it more frequently than others.

Interestingly, the smaller frequency of necessity and obligation modals in academic text might indicate something. As stated by Brezina (2018), even the absence of a linguistic unit might signal something in corpus analysis. Biber & Quirk, (2012) state that the smaller frequency of modals of necessity/obligation has something to do with the effort to avoid face threatening force resulted from obligation meaning. It demonstrates that the use of necessity and obligation modals in the academic text is not as significant as other modals. Regarding the use of necessity and obligation modals in academic text, it is found that *should* is the highest, followed by *must*, *have to*, *shall*, *be supposed to*, and *have got to*. It is important to note that the first and second most frequent modals are *should* and *must* classified as core modals. Sociolinguistically, core modals are preferable in certain circumstances due to its prestige (Leech et al., 2009) and its widespread usage across registers and dialects. Besides, reflecting to the nature of language used in academic context, it is evident that academic authors tend to use core modals, the unmarked forms or the canonic forms of modality system. On the contrary, quasi-modals such as *have to*, *be supposed to*, *have got to* are not as frequent as *should* and *must* because quasi-modals are the typical features of colloquialization (Leech et al., 2009).

Previous corpus investigation using *Survey of English Usage* (SEU) and LOB corpus shows that *will* and *can* occur twice more often in spoken English than in written English (Coates, 1983). In addition, it also presents that *may* and *must* are the only modals that can be found more frequently in written English than in spoken English (Coates, 1983, p. 24). It is not surprising that in the corpus used in this study, differs from fiction and news texts, core modal *must* has higher frequency than quasi-modal *have to*. Another relevant proof can be seen from the high frequency of *be going to* in spoken language (COCA) and the higher frequency of *have to* compared to *must* in all other text categories (fiction and news). According to Baker (2011) and Oktavianti (2019), there are some modals that show a tendency to remain constant known as *lockwords*, including *can*, *could*, *would*, and some others. None of these modals, however, are modals expressing necessity and obligation. Apart from that, the highlighted point is all *lockwords* of modal system are core modals so it is irrefutable that core modals are more preferable and desirable to use compared with other modality manifestations, such as quasi-modals.

There is, however, an abnormality in relation to modal *shall*. Although it is a core modal, but over time the use of *shall* is dramatically decreasing in nearly all text categories and all instances of language use. The meaning of *shall* is basically the strongest of all necessity/obligation modals. According to Tagliamonte (2013, p. 123), *shall* originally express necessity/obligation in its earliest use. Based on the *Historical Thesaurus of English* (2016), both future-related meaning and necessity meaning conveyed by *shall* since its use in Old English, along with some other

meanings. The thesaurus demonstrates that obligation and future meaning are the meanings embodied by *shall* up to this day. Interestingly, its lose of some other meanings is parallel with the declining usage as recorded in COCA since 1990, as illustrated by figure 3.

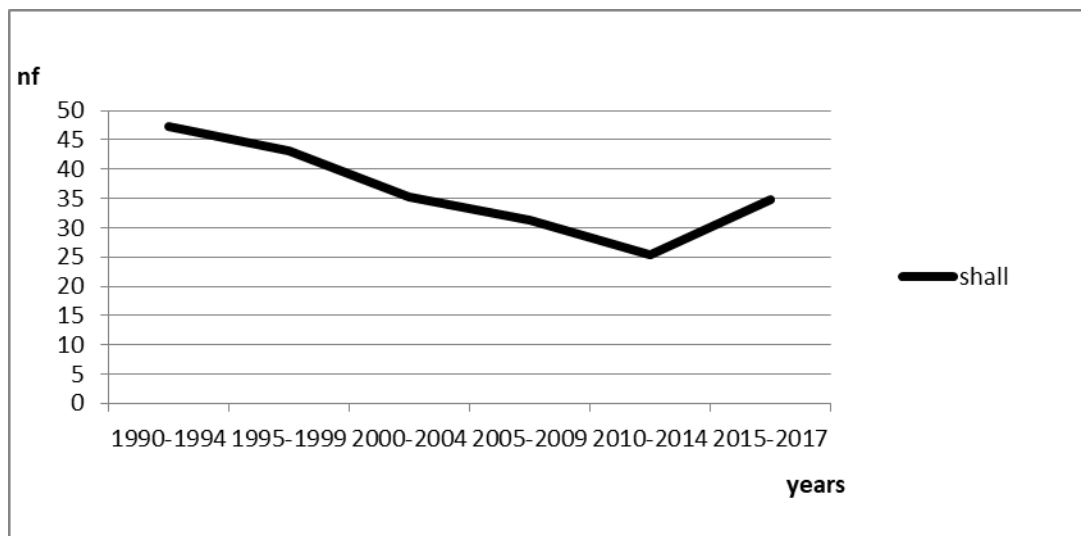


Figure 3. The use of *shall* from 1990—2017

Figure 3 presents the normalized frequency of *shall* usage over time, from 1990—2017, showing a tendency to fall off, but as of 2015 onwards there seems to be some escalation. This proves that the use of modals is as dynamic as the society using them.

The last two modals of necessity/obligation in this study are *be supposed to* and *have got to* having the least frequency of usage. As previously stated, it has something to do with colloquialization, which is not a typical characteristic of academic texts. The following table presents the different normalized frequencies of quasi-modals *have to*, *be supposed to*, and *have got to* in spoken and written English based on data gathered from COCA.

Table 7. Frequency (nf) of quasi-modals in speech and writing (COCA)

Modals	Speech	Writing
have to	175	29
be supposed to	1508	695
have got to	81	46

Table 7 comprehensibly provides empirical basis for the claim that there is a distinct characteristic of spoken and written English including modals choice in different media. It is evident that quasi-modals are preferable in speech rather than in writing.

This elaboration attempts to demonstrate that there are at least two plausible reasoning of the least frequency of necessity and obligation modals in academic context. First, it is related to the English-speaking society in general. Mcenery (2018) says that there is a tendency of change in the society related to the expression of necessity and obligation. Furthermore, McEnery argues that the characteristics that change into more democratic one also affect the choice of linguistic units used by the members of the society. This corresponds to what Deakin (2005) claims.

Deakin proves that during 1939—2000 there is a significant change in the democratic way of life of British people: they are getting more actively participating in many aspects. It is seen in the comparison of all modality expressions recorded in COCA and *British National Corpus* (BNC), necessity/obligation is the smallest one (Oktavianti, 2019). The use of modals expressing necessity/obligation always has the lowest frequency in COCA and BNC, signaling that this sort of expression is not that significant in everyday life, compared to other modality expressions, such as prediction and possibility. Moreover, theoretically, academic texts purport to presents networks of cause and effect, thus presents facts as objective as possible. The use of modal, thus, is not the main concern. Thirdly, the use of modals lays on the context, and hence they are adjusted to the nature and characteristics of the context. Academic texts serve as the scientific work to present scientific ideas or discussions. To serve the function, standard language is selected to provide wide coverage of readers. Besides, it also uses technical or specific terms for the purpose of inclusion. As stated by Biber & Gray (2016), language used in academic context is obtuse because of using technical languages understood by the community. Hence, this act results in the prestige of the language. It affects other choices of linguistic units, restricted to those from standard form and are able to show prestige when they are written. It is evident then core modals *should* and *must* enacting as the standard form of modals occupy the highest frequencies (except *shall*) and quasi-modals have lower frequencies.

5. Conclusion

This study found that among six modals of necessity/obligation under study, *should* and *must*, the core modals, are the most frequent ones in academic texts, followed by *have to*, *shall*, *be supposed to*, and *have got to*. Based on the corpus, modals of necessity/obligation *should* and *must* in academic context frequently co-occur with *have* in *must have* and *should have*. As with the verb type, *thinking* verbs occupy the most frequent verb type as the collocates of the modals. It demonstrates that in writing academic text, some thinking activities are involved, in which it really is. Other verb types are classified rather equally, showing that none is really dominant, and emphasizing that *thinking* type is quite significant as the collocates of necessity/obligation modals. In relation to the dynamic use of necessity/obligation modals in academic texts, there is a tendency that certain modals are more frequent than the others. Academic texts merely allow the use of Standard English, resulting in the more restricted choice of linguistic devices, including modals. Hence core modals are more frequently used in academic context than quasi-modals, making it reasonable to have core modals *should* and *must* occupying the most frequent modals of necessity/obligation and quasi-modals *be supposed to* and *have got to* occupying the least frequent ones.

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