

The modal forms *must* and *should* in English academic discourse by Spanish postgraduates

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ABSTRACT

This paper presents a corpus linguistics study investigating the use and functions of the modal verbs, *must* and *should*, in academic discourse. The study analyses a corpus of doctoral dissertations within two distinct fields of knowledge, written in English and submitted to Spanish universities between 2011 and 2021. By employing corpus linguistics, we could interrogate this compilation to obtain concordances that could be analysed from a horizontal perspective, ensuring that each sample was appraised appropriately within its context of occurrence. The frequency and distribution of these modals in various contexts were examined. The findings revealed that *must* and *should* are utilised with differing frequencies and in diverse ways, depending on the academic discipline and the rhetorical purpose of the discourse. The paper contends that the use of modality, particularly deontic modality, is a vital aspect of academic writing, as it signals the writer's stance and the level of necessity, recommendation or obligation in their argumentation.

Keywords: *modality; must; should; academic discourse; corpus linguists.*



I. INTRODUCTION

The study of academic language has been a subject of interest for linguists for several decades, as it is considered a critical mode of communication across various disciplines. Understanding its unique features, structure and use is essential for effective communication and dissemination of knowledge. Examples of this interest include Swales' (1990) influential book, *Genre Analysis: English in Academic and Research Settings*, which provides a framework for analysing academic genres and discourse communities, emphasising the importance of understanding the social and rhetorical context of academic writing. Similarly, Halliday and Martin's (1993) book, *Writing Science: Literacy and Discursive Power*, explores the role of language in constructing scientific knowledge and how linguistic features contribute to creating disciplinary identities. In recent years, scholars such as Hyland (2004), Hyland and Bondi (2006), Flowerdew and Peacock (2012) and Álvarez-Gil and Bondi (2021) have focused on the role of discourse and genre in academic writing, highlighting the significance of understanding the conventions and expectations of different genres and the impact of disciplinary and cultural contexts on academic communication.

Furthermore, academic discourse is characterised by a high level of formality and a specific set of conventions expected to be followed by its participants. One of the key elements in this type of discourse is the use of modality (Alonso-Almeida, 2015), which plays a crucial role in conveying the writer's stance and attitude towards the information presented (Alonso-Almeida, 2014). Within the realm of modality in scientific texts, deontic modals have received significant attention due to their ability to express obligations, permissions, recommendations and prohibitions, as evidenced in works such as Portner (2009), Charlow and Chrisman (2016), Carr (2017), Alonso-Almeida and Álvarez-Gil (2019) and Álvarez-Gil (2021).

This article explores the use of selected deontic modals in academic discourse, specifically focusing on doctoral dissertations written in English and presented at Spanish universities between 2011 and 2021. To achieve this goal, we compiled

a corpus of 220 doctoral dissertations representing major fields of knowledge. Our objective is to provide insights into the frequency and distribution of deontic modals in the corpus and to identify usage patterns across different fields of knowledge. We also draw on relevant literature related to modality in academic discourse to provide a theoretical framework for our analysis (Alonso-Almeida & Álvarez-Gil, 2021; Carrió-Pastor, 2014; Collins, 2009; Gao, 2012; Pic & Furmaniak, 2012; Recski, 2006). Our analysis will contribute to understanding deontic modality in academic discourse and developing effective communication strategies for academic writers in the form of didactic materials reflecting standard uses of modal verbs in the language to achieve specific discourse and pragmatic meanings.

This article is structured as follows. In the first section, we provide an overview of the relevant literature on modality, paying particular attention to the deontic type. In the second section, we describe our corpus and methodology. In the third section, we present our findings, discussing the frequency and functions of deontic modals in the corpus and identifying usage patterns across different fields of knowledge. Finally, we conclude with a discussion of the implications of our findings for academic writing and the role of deontic modals in expressing authority in academic discourse.

II. LITERATURE REVIEW

II.1. Modality

In academic discourse, the use of modal verbs is a crucial aspect of conveying meaning and expressing authority. However, while research on the epistemic modality in English is plentiful (Alonso-Almeida, 2015; Alonso-Almeida & Álvarez-Gil, 2019; Alonso-Almeida & Carrió-Pastor, 2017; Caffi, 1999, 2007; Czerwionka, 2012), the area of deontic modality in academic discourse remains underrepresented in the literature. In this article, the aim is to address this gap by analysing the use of deontic modality in a corpus of doctoral dissertations, with the analysis of the data for detecting deontic

meaning primarily based on Collins (2009), while the understanding of modality draws on Høye (1997), Palmer (1990, 2001) and Collins (2009).

This analysis explores how authors use deontic modality to indicate authority in expressing scientific thought. While there is a general tendency to evaluate mitigation in scientific discourse, a certain degree of imposition and commitment to truth is necessary to effectively communicate scientific ideas. The strategic use of deontic and epistemic modalities can also contribute to the author's reputation in that they may enhance their authority or, otherwise, mitigate the propositional context.

Furthermore, expressing necessity in the scientific domain may be closely linked to argumentative reasoning (Alonso Almeida & Álvarez-Gil, 2021), making the use of deontic modals unavoidable. However, it is important to balance this with the need for mitigation to avoid potential face-threatening acts, as a lack of determinacy may result in a lack of reliance by potential expert readers. By examining the use of deontic modality in academic discourse, this article seeks to contribute to a deeper understanding of the role of modal verbs in conveying authority and expressing scientific ideas.

II.1.1. Deontic modality

Modality is frequently associated with expressing possibility, probability, obligation and necessity. Ormelius-Sandblom and Elisabet (1996, p. 102) define modality more broadly as qualifying a proposition or the content of an utterance. In other words, modality modifies the contents of a proposition to convey the speaker's communicative intentions (Lyons 1977, p. 452). Various language devices can express modality, but this article focuses exclusively on modal verbs.

The literature presents several classifications of modal meanings, but the tripartite division among epistemic, dynamic and deontic modality is widely accepted. Epistemic modality concerns matters of knowledge or belief, allowing speakers to express judgments about states of affairs, events or actions (Høye, 1997, p. 42). Dynamic modality, a subcategory of Palmer's event modality (2001), involves the speaker's willingness and ability to perform an activity. Alonso-Almeida and Álvarez-Gil (2020,

p. 64) argue that 'dynamic modality is an important language feature in technical texts, as uses of modals can only be justified according to the notions of dispositions and potentiality'.

Deontic modality is often defined as the 'necessity of acts in terms of which the speaker gives permission or lays an obligation for the performance of actions at some time in the future' (Hoye, 1997, p. 43). This definition includes notions of permission and obligation, which are commonly associated with deontic modality (Cann, 1993, p. 279). Auwera and Plungian (1998, p. 81) describe deontic modality as 'identifying the enabling or compelling circumstances external to the participant as some person(s) often the speaker, and/or as some social or ethical norm(s) permitting or obliging the participant to engage in the state of affairs'. Mortelmans et al. (2009, p. 16) suggest that this modality type offers insight into the degree of moral desirability of a state of affairs, as seen in the example 'We should pay the bill this time'.

Collins (2009, p. 22) explicitly links deontic meaning with authority, stating that it 'occurs when the factors impinging on the actualisation of the situation referred to in the utterance involve some type of authority – as when a person or a set of rules or a social convention is responsible for the imposition of an obligation or a granting of permission'. This emphasises the importance of authority in the notion of deontic modality and how it can be perceived from various perspectives. According to Portner (2009, p. 2), deontic modality is related to right and wrong according to a system of rules, which implies an evaluative dimension. This evaluative aspect of deontic modality makes it useful for rhetorical purposes, as noted by Charlow and Chrisman (2016, p. 3), who describe it as a phenomenon encompassing normative concepts and thought, such as practical reasoning. It is crucial to distinguish between deontic possibility (or permission) and deontic necessity (or obligation), which include meanings related to what is permitted and what is required, respectively (Auwera & Plungian, 1998, pp. 82–98). These different types of deontic modalities are exemplified in the following examples (a), (b) and (c):

(a) *You may bring a friend to dinner if you like.* (Deontic possibility)

In example (a), the speaker permits the listener to bring a friend to dinner. The deontic modality here is related to what is permitted.

(b) *You must submit the report by the end of the week.* (Deontic necessity)

In instance (b), the speaker imposes an obligation on the listener to submit the report by the end of the week. The deontic modality here relates to what is necessary or required.

Various linguistic forms can express modalities, such as adverbials, modal verbs, clitics and lexical matrices. For this research, we have chosen to focus on modal verbs to analyse the texts in my selected corpus of doctoral dissertations and to compare them to other registers in future studies. Biber et al. (1999, p. 483) identified nine central modal verbs in present-day English: *can, could, may, might, shall, should, will, would* and *must*. Moreover, there are peripheral or marginal modals, such as *need (to), should, dare (to)* and *used to*, as well as periphrastic idiomatic expressions, such as *have to* and *be supposed to* (Biber et al., 1999, p. 484). However, my investigation is confined exclusively to central modal verbs.

Denison (1993, p. 292) elucidated the morphological, syntactic and semantic criteria employed to classify modal verbs. These criteria include the absence of non-finite forms, tense distinction, the lack of third-person singular present indicative suffixes, the capacity to contract and function as clitics in negative forms, the absence of imperative forms, the requirement of a bare infinitive, scope over propositional content, the possibility of co-occurring with other modal verbs in some dialects and sharing the same set of NICE properties as operators, as exemplified below:

A: May I use your phone for just a second?

B: Of course, you may.

II.2. Corpus description and methodology

This study utilises a corpus of 220 English-written doctoral dissertations submitted to Spanish universities between 2011 and 2021. The corpus comprises two sub-corpora

so that major fields of knowledge are represented: (1) social sciences and law and (2) natural sciences. Each sub-corpus encompasses 10 theses per year from its respective field of study. The dissertations were sourced from the institutional repositories of 11 public universities across various regions in Spain, ensuring a diverse corpus in terms of the authors' backgrounds.

The total word count in the corpus exceeds 10 million, distributed almost evenly between the sub-corpora. This count includes all relevant sections of the theses pertinent to this study, excluding metatextual material such as tables of contents, acknowledgements, dedications, bibliographies and biographical data. Table 1 presents the distribution of words and texts per sub-corpus, and the specific disciplines included within each field of knowledge are as follows:

- **Natural sciences:** Chemistry; marine science; geology; astronomy and astrophysics; physics
- **Social sciences and law:** Economics and business; sociology; law and political sciences.

Table 1. *Number of words and texts distributed per corpus.*

Sub-corpus	Number of texts	Number of words
Natural sciences	110	5,331,257
Social sciences and law	110	5,605,840
Total	220	10,937,097

Employing corpora for analysing linguistic phenomena, such as deontic modals, presents distinct advantages by facilitating the examination of instances within authentic contexts found in extensive text collections. In the present study, we adopt a corpus-based approach, utilising the corpus linguistics software tool, AntConc, to extract and analyse occurrences of deontic modals within the corpus. Nevertheless, a notable limitation of computer-based research lies in its inability to automatically evaluate the pragmatic dimension, even if the corpus contains part-of-speech

tagging. Pragmatic interpretation considers all types of contexts and this may require visual inspection of the texts. Consequently, manual context assessment becomes essential for disambiguating meanings and comprehending pragmatic and discursive functions. This study employed a combination of computer interrogation of PhD texts and meticulous visual inspection of instances within specific contexts to address this limitation.

III. RESULTS AND DISCUSSION

The results section of this work presents a comparative analysis of the modal verbs, *should* and *must*, in two distinct subcorpora. The study aims to provide insight into the different functions that modal verbs can perform within academic discourse. Instances from the two subcorpora will be given ensuring that the examples were from dissertations presented in different years and authored by diverse individuals. The comparative analysis is based on identifying the functions performed by *should* and *must* in both compilations, encompassing recommendations, obligations, deductions and predictions. The findings of this study offer a valuable contribution to understanding the usage of these modal verbs in academic discourse and can inform future research in this field.

Concerning the absolute frequency of these modal verbs in the two subcorpora analysed, it is shown below in Figure 1.

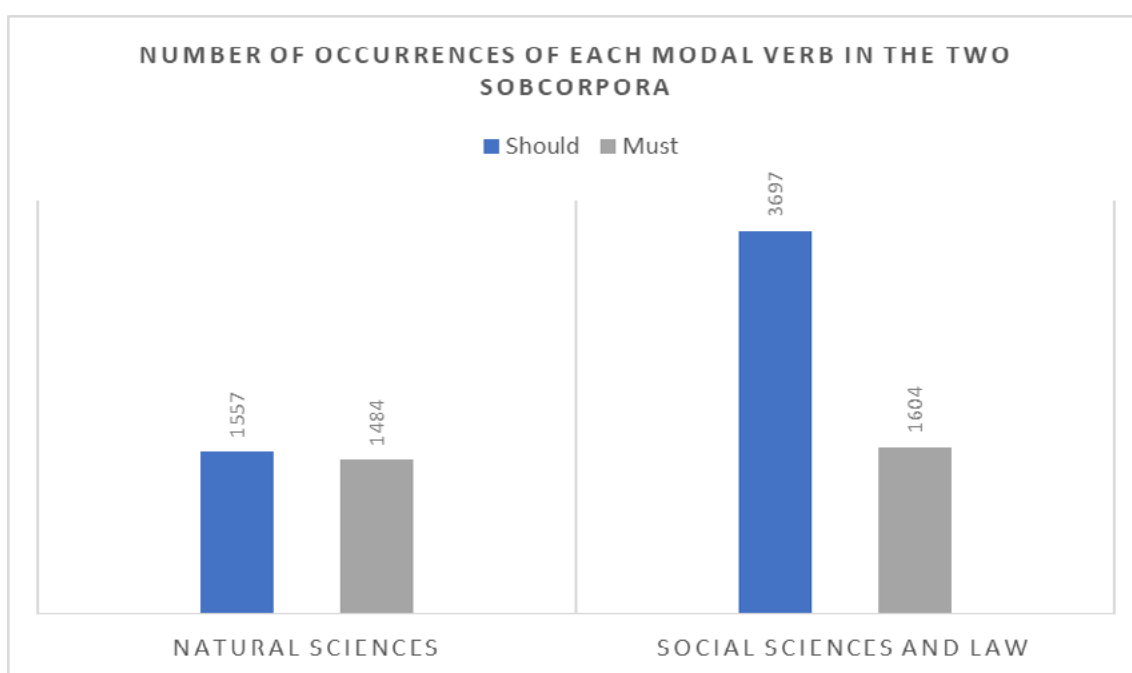


Figure 1. Occurrences of *must* and *should* per subcorpora.

Table 2. Absolute and relative frequencies of each modal verb per subcorpora.

	Natural Sciences		Social Sciences and Law	
Modal verb	Absolute frequency	Relative frequency (per 10k tokens)	Absolute frequency	Relative frequency (per 10k tokens)
<i>must</i>	1,484	2.78	1,604	2.81
<i>should</i>	1,557	2.92	3,697	6.48

As can be seen from Table 2, the relative frequencies of *must* is almost identical in both subcorpora. However, it is in the case of *should*, in which a great variation can be found since the frequency of this modal verb in the case of the subcorpus of Social Sciences and Law is more than double the frequency in the subcorpus of Natural Sciences.

An analysis of selected examples from both subcorpora leads to the conclusion that deontic modals in our corpus can be classified into three main groups according to the function they serve in a specific sentence: (a) recommendation or suggestion, (b) obligation and (c) necessity.

III.1. Expression of recommendation or suggestion: Deontic possibility

The following examples belong to dissertations within the sub-corpus of natural sciences:

1. A cartoon of the block face was drawn [sic] with the cut-off corner on a block sheet and the area of interest that **should** appear in the ultrathin sections sketched (Benítez-Santana, 2011).
2. That means that it **should** exist a more general theory [sic], which includes the Standard Model as a valid approximation for low energy. This more general theory **must** give answers to the previous unresolved questions (Calancha-Paredes, 2011).
3. This fact illustrates that downscaling exercises based on a single configuration of parameters **should** be interpreted with extreme caution (García-Bustamante, 2011).

In (1), the modal *should* is employed to convey a recommendation or suggestion, indicating that the area of interest in ultrathin sections holds importance and thus should be included. In contrast, in (2), the speaker suggests that a more general theory is expected to exist, encompassing the standard model as a valid approximation for low-energy scenarios. The use of *should* also implies that this expectation is founded on logical reasoning or evidence. Conversely, *must* is utilised to express a necessity or an obligation. The speaker asserts that this more general theory is required to address previously unresolved questions, signifying that no other option or alternative exists. It is intriguing to observe that in (2), the author's involvement varies when using *should* in the first sentence – employed to convey their opinion – while *must* is used in the second sentence to indicate a fact resulting from the aforementioned 'general theory'. In instance (3), *should* is employed to express a recommendation, suggesting that interpreting downscaling exercises based on a singular configuration of parameters necessitates careful consideration.

4. As a consequence, the energy demand will increase exponentially. To solve the problem, we **should** not rely on oil/carbon for the forthcoming years, as we would surely increase the CO₂ [sic] emissions and air pollution. Also, we **should** not depend on nuclear energy because it represents a perilous road, as demonstrated by accidents like Fukushima or Chernobyl (Buencuerpo-Fariña, 2017).

In (4), *should* is employed to articulate a recommendation or suggestion. The speaker contends that resolving the growing energy demand necessitates alternative oil, carbon and nuclear energy solutions. Utilising *should* implies that the speaker deems these recommendations as the most suitable or desirable courses of action based on their judgement and values. The speaker insinuates that dependence on oil, carbon or nuclear energy may result in adverse consequences, such as increased CO₂ emissions, air pollution or threats to human health and safety. By deploying *should*, the speaker refrains from presenting these recommendations as incontrovertible facts, but rather as preferred actions aligned with their beliefs and values.

5. We do not know if this method works for any structure of this type. To deal with this problem, we **should** define properly the type of solution that we consider valid (García-Segador, 2020).
6. As mentioned above (Fig. 4), in order to form the macrocycles, all the monomers comprising the assembly **must** adopt exclusively a syn conformation exclusively. This is a degree of freedom that is lost when comparing open and cyclic oligomers and **must** contribute to a reduction of the maximum attainable EM value of the systems (Serrano-Molina, 2021).

In (5), the modal verb *should* conveys a suggestion or recommendation. The speaker indicates that defining the type of solution deemed valid is necessary or advisable to address the issue of uncertainty regarding the method's efficacy for any structure of this kind. The usage of *should* implies that the speaker offers a recommendation or advice. The sentence communicates the idea that determining the valid solution type can help

ensure the method's effectiveness across various structures of this kind. Conversely, in (6), the modal verb *must* is utilised to express a conclusion. The speaker proposes that the loss of a degree of freedom in the monomers comprising the assembly inevitably contributes to a decrease in the system's maximum attainable EM value. The use of *must* signifies the speaker's belief that this is a necessary or unavoidable consequence of the loss of a degree of freedom. The sentence conveys the notion that the loss of a degree of freedom in the monomers is a factor that must be considered when examining the system's maximum attainable EM value.

7. In any case, since the properties of bulk systems can be represented by summing up pairwise interactions by virtue of the Clausius' virial theorem, the characteristics and properties of the (energy-volume) curve **must** recall those of the one-dimensional potential energy curve. Under this simplified view, the rupture limit of a one-dimensional interaction **must** be determined by the same conditions than [sic] in bulk but considering the distance, force and stretching force constant instead of the volume, pressure and bulk modulus, respectively. (Lobato-Fernández, 2019).

In the sentence, 'The characteristics and properties of the energy-volume curve must recall those of the one-dimensional potential energy curve' (7), the modal verb *must* is employed to convey a logical conclusion or inference. The speaker suggests that, based on the representation of bulk systems using pairwise interactions and Clausius' virial theorem, the energy-volume curve should possess characteristics and properties akin to those of the one-dimensional potential energy curve. The use of *must* signifies the speaker's conviction that this is a necessary or inescapable outcome of representing bulk systems through pairwise interactions. Similarly, in the sentence, 'The rupture limit of a one-dimensional interaction must be determined by the same conditions as in bulk', the modal verb *must* is once more utilised to express a logical conclusion or inference. The speaker posits that the conditions determining the rupture limit of a one-dimensional interaction should resemble those that govern rupture in bulk, albeit with different variables. The employment of the modal verb underscores the speaker's

belief that the conditions dictating rupture in the one-dimensional case can be inferred from those in bulk.

The sub-corpus of social sciences and law also features instances of deontic possibility, as evidenced in the following example:

8. To this end, organizations **should** develop and apply measures in which ceiling effects can be avoided so that individuals ranging from mildly to extremely talented [...] (Gallardo-Gallardo, 2013).

In conclusion, example (8) utilises the modal verb *should* to convey a recommendation or suggestion. The speaker advocates for the desirability of organisations to develop and implement measures to circumvent ceiling effects. The statement communicates the notion that organisations can adopt strategies to prevent ceiling effects, thereby ensuring that individuals with diverse levels of talent receive recognition and appreciation.

9. [...] potential historical origins of East and Southeast Asian regional integration. Effectively, this is the main motivation of the present work, which, in order to be demonstrative, **should** cover the longest possible time span before the era of multilateralism began after World War II (Ayuso-Díaz, 2021).

Lastly, in (9), *should* functions to convey a recommendation or suggestion. The speaker proposes that the current study should encompass the most extensive time span possible before the emergence of multilateralism following World War II to ensure its illustrative value. Nevertheless, this is not an inflexible prerequisite.

10. As a matter of fact, if two different risky positions perfectly depend on the same risk factor, they **should** not benefit from diversification effects. Thus, in risk management, we **should** always use comonotonic additive risk measures (García-Jorcano, 2017).

In statement (10), the modal verb *should* is employed to convey a recommendation or a desirable course of action grounded in the speaker's judgement. In this instance, the author advocates the use of comonotonic additive risk measures in risk management,

with the aim of precluding potential loss in diversification effects. Furthermore, *should* is utilised in the initial sentence to denote a hypothetical scenario, suggesting that if two distinct risky positions exhibit perfect dependence on an identical risk factor, they should not benefit.

III.2. Expression of necessity: Deontic necessity

In the sub-corpus of natural sciences, we can find the following instances from three different doctoral dissertations in which the modal verb serves to express deontic necessity:

11. The metal centers **must** undoubtedly be considered as important building constituents in MOFs, due to the fact that they transfer their chemical and physical inherent properties to the final material (Platero-Prats, 2011).

In example (11), *must* is used to convey a sense of necessity, indicating that metal centres play an important role in MOFs and cannot be overlooked when considering their inherent properties. Combining the modal verb and the adverb undoubtedly reinforces the sense of necessity mentioned above.

12. In addition, in the assumptions of the multiscattering formalism it is implicitly assumed that the objects are stationary, at fixed positions in space, so all results shown here are valid for quasistatic processes. Therefore, we **must** carefully consider when this quasistatic assumption does not apply, because the stationary system could abandon equilibrium, requiring more careful study. (Rodríguez López, 2012).

In example (12), *must* conveys a sense of necessity, indicating that the quasistatic assumption is crucial to the results' validity and that the system's departure from equilibrium requires more careful study.

13. For a clearer interpretation of the following figures, one **must** keep in mind that the x-axis shows the time in UTC, and [sic] vertical axis indicates temporal scales [...] (Román-Cascón, 2016).

In the case of *must* in example (13), it is used to convey a sense of necessity, indicating that readers need to keep in mind that the x-axis shows the time in the UTC, and the vertical axis indicates temporal scales for a clearer interpretation of the following figures.

On the other hand, in the corpus of social sciences and law, we find the following examples that illustrate this function:

14. The literature review suggested that the in-store fashion experience **should** be an enjoyable and pleasurable experience and the hedonic elements are crucial on [sic] this (Blazquez-Cano, 2014).

In example (14), the modal verb *should* is used to express the idea that hedonic elements are crucial for an enjoyable and pleasurable in-store fashion experience. This implies that the inclusion of hedonic elements is necessary to create a positive experience for the customers.

15. However, from the point of view of an investor who **must** decide whether to diversify across countries or industries, these underlying reasons are irrelevant and we therefore [sic] do not study them (Bermejo, 2016).

In example (15), *must* is used to convey necessity. The author explains that while there may be underlying reasons for diversifying across countries or industries, these reasons are irrelevant to the investor's decision-making process. The use of *must* emphasises the idea that these underlying reasons are not necessary to consider when making investment decisions.

16. An assessment of the contributions made by IEOs about Moroccan integration seems to indicate that, while Morocco **must** still make certain efforts to improve economic stability in the domestic sphere and competitiveness in the international market, its commitment to insertion [] (Fernández-Fernández, 2018).

Meanwhile, in example (16), the modal verb *must* is used to indicate a necessity. In this case, the author suggests that Morocco must make certain efforts to improve

economic stability in the domestic sphere and competitiveness in the international market if it wants to integrate effectively into the global economy.

III.3. Expression of requirement: Deontic obligation

Finally, a collection of excerpts was selected to exemplify the employment of the modal verbs *must* and *should* in their deontic obligation function. The initial instances presented below are derived from the natural sciences sub-corpus.

17. The existence of a FP implies that ETGs are well-virialised systems, have self-similar structures and contain stellar populations that **must** follow tight age and metallicity constraints (Domínguez-Sánchez, 2012).

In example (17), the term *must* serves to express a requirement or a compulsory condition. The speaker posits that the stellar populations within ETGs must adhere to strict age and metallicity constraints. This suggests that any deviation from these constraints would be incompatible with the existence of an FP. The employment of *must* indicates that these constraints are crucial for both the formation and preservation of the self-similar structures characteristic of ETGs and the virialisation of their systems.

18. To obtain asymptotically flat solutions, the metric functions **should** satisfy the following set of boundary conditions at infinity [...] (Blazquez-Salcedo, 2014).

19. Depending upon the target's electrical conductivity the electric field supply **must** have different specificities (Pérez-Muñoz, 2018).

In example (18), *should* is employed to convey a requirement, signifying that the metric functions must meet a series of boundary conditions to derive asymptotically flat solutions. In contrast, example (19) utilises the modal verb *must* to express obligation. The speaker indicates that it is essential for the electric field supply to possess distinct specificities based on the target's electrical conductivity. The use of *must* implies that there will be consequences if the specificities are not suitably adjusted. The speaker underscores the significance of tailoring the electric field supply to the target's electrical conductivity for achieving the intended outcome.

The following presents a selection of examples from the social sciences and law sub-corpus, accompanied by their respective comments:

20. Public pension systems have appeared to be a powerful instrument to reduce poverty among the aged population and this is an aspect we should not renounce. As a consequence, the parametric reforms **must** try to simultaneously satisfy these two objectives. (Peinado-Martínez, 2011).

In (20), the modal verb *must* conveys a sense of obligation. The speaker argues that parametric reforms are required to reduce poverty among the ageing population and preserve the public pension system as an influential tool. This sentence communicates the crucial nature of satisfying both goals for parametric reforms to successfully maintain the public pension system as a potent instrument for alleviating poverty among the elderly population.

21. Finally, it is notable that there are important normative issues to be addressed about what roles universities **should** and **should** not undertake in the knowledge economy, as well as issues about whether we truly understand the diverse and multiple impacts that they actually do have (García-Estevez, 2012).

22. Respondents **must** assess 41 different indicators such as the social, economic, functional and physical situation of their own city. Telephone interviews using the CATI system are used for this purpose (Computer Assisted Telephone Interview) (Cuadrado-Ballesteros, 2012).

In example (21), the modal verb *should* is employed to convey a sense of obligation or duty. The speaker implies that addressing normative issues concerning the roles universities should undertake or avoid in the knowledge economy is both obligatory and responsible. The use of *should* signifies the speaker's belief in the importance and necessity of this action. The sentence conveys the notion that resolving these normative issues is crucial for delineating the roles of universities within the knowledge economy.

In example (22), *must* is utilised to express obligation or requirement. The speaker implies that the respondents are obliged or required to evaluate the 41 distinct

indicators using the CATI system. The sentence communicates that it is the respondents' responsibility to assess these indicators to furnish accurate information regarding their city's social, economic, functional and physical aspects.

23. Before the IPO, the company **must** perform the required disclosure obligations (Alfonso-Pérez, 2014).

24. To develop our predictions, we build on the recent literature that suggests monitors possess limited time and attention and **must** rationally allocate their effort, challenging the view that all independent directors behave as efficient and diligent monitors [] (Vázquez-López, 2019).

In the instance of the modal verb *must* in (23), it conveys a compulsory action required prior to the IPO. This highlights the significance and necessity of meeting disclosure obligations to adhere to regulations and offering pertinent information to potential investors. In the case of (24), *must* is utilised to signify an obligation. The sentence implies that monitors represented here by independent directors possess limited time and attention; consequently, they should rationally allocate their efforts. The employment of *must* suggests that this action is essential for independent directors to fulfil their monitoring role effectively.

25. This law established that employers, landlords and hospitals **should** verify the immigration status of prospective tenants, employees and patients (Ortiz-Valverde, 2020).

26. The main idea is that German firms were embedded into an institutional setting that prevented unilateral or discretionary decisions, so they **must** focus on long-term strategies and pursue economic returns in the long run. (Herrero-Alba, 2020).

In example (25), *should* is employed to convey a sense of obligation. The statement, 'The law established a requirement for employers, landlords and hospitals to verify the immigration status of prospective tenants, employees and patients', indicates that *should* implies a recommendation rather than an absolute necessity. In contrast, example (26) utilises *must* to express a compulsory obligation. The speaker asserts

that the institutional setting precluded German firms from making unilateral or discretionary decisions, necessitating a focus on long-term strategies and pursuing economic returns over an extended period.

IV. CONCLUSIONS

In conclusion, this study has shown the use of two significant modal verbs, *must* and *should*, in English academic discourse in Spanish universities. Our analysis has revealed that these modal verbs convey varying degrees of obligation, necessity and recommendation. Moreover, we have pinpointed specific contexts where these modal verbs are employed and the ramifications of their usage for the text's overall meaning. While it is accurate that in both sub-corpora, the deontic modals examined chiefly convey obligation, necessity and suggestion, their utilisation differs between the fields of social sciences and law and natural sciences. After analysing the data, we discovered that the employment of deontic modals with the meaning of deontic obligation is more prevalent in the social sciences and law, while there is a heightened inclination to use them to express deontic possibility in the natural sciences. Furthermore, the data indicate a predilection for using *should* to convey deontic possibility, while *must* is employed more frequently to express deontic obligation and necessity.

Overall, this study underscored the importance of comprehending the use of modal verbs in academic discourse and its influence on the clarity and persuasiveness of the text. We expect that this paper will contribute to the evolution of effective writing practices and foster communication across various academic disciplines. In addition to the interpersonal nuances associated with the use of deontic modals, it is evident that employing such modal meanings in thesis writing serves a textual purpose. Specifically, they aid in establishing clear argumentative patterns where the notion of necessity is pivotal and fundamental in conveying the candidate's overall perspective on the subject matter. Future studies should delve further into these aspects, as the persuasive meaning of deontic modals plays a significant role in the process of PhD writing.

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VI. REFERENCES

- Alfonso Pérez, G. (2014). *Modeling of dual listed Chinese stocks. Weak arbitrage environment*. [Doctoral dissertation, Universidad Complutense de Madrid].
- Alonso-Almeida, F. (2021). Los modales dinámicos en textos de historia en lengua inglesa (1700–1900). *Signos. Revista de lingüística*. <https://doi.org/10.4067/S0718-09342021000200529>
- Alonso-Almeida, F. (2015). On the mitigating function of modality and evidentiality. Evidence from English and Spanish medical research papers. *Intercultural Pragmatics*, 12(1), 33–57. <https://doi.org/10.1515/ip-2015-0002>
- Alonso Almeida, F. (2014). Evidential and epistemic devices in English and Spanish medical, computing and legal scientific abstracts: A contrastive study. *Linguistic Insights-Studies in Language and Communication*.
- Alonso-Almeida, F. & Álvarez-Gil, F. J. (2021). Developing argumentation in history texts: Epistemic modality and evidentiality. *Pragmalingüística*. <http://dx.doi.org/10.25267/Pragmalinguistica.2021.i29.01>
- Alonso-Almeida, F. & Álvarez-Gil, F. J. (2020). 'so that it may reach to the jugular'. Modal Verbs in Early Modern English Recipes. *Studia Neofilologica*, XVI, 61-88. <https://doi.org/10.16926/sn.2020.16.04>
- Alonso-Almeida, F. & Álvarez-Gil, F. J. (2019). Modal verb categories in CHET. In I. Moskowich et al. (Eds.), *Writing history in Late Modern English: Explorations of the Coruña Corpus* (pp. 150-161). John Benjamins.

- Alonso-Almeida, F. & Mele-Marrero, M. (2014). Stancetaking in seventeenth-century prefaces on obstetrics. *Journal of Historical Pragmatics*, 15(1), 1–35. <https://doi.org/10.1075/jhp.15.1.01alo>
- Álvarez-Gil, F. J. (2021). Authority and deontic modals in Late Modern English. In I. Moskowich et al. (Eds.), *“All families and genera”: Exploring the Corpus of English Life Sciences Texts*.
- Álvarez-Gil, F. & Bondi, M. (2021). Metadiscourse devices in academic discourse. *Revista Signos*, 54(106), 518-528.
- Auwera, J. van der, & Plungian, V. A. (1998). Modality’s semantic map. *Linguistic Typology*, 2(1), 79-124. <https://doi.org/10.1515/lity.1998.2.1.79>
- Ayuso Díaz, A. (2021). *Connected by conquest: East and Southeast Asia commercial integration during the Age of Empires*. [Doctoral dissertation, Universidad Carlos III de Madrid].
- Benítez Santana, T. (2011). *First evidences of the effect of polyunsaturated fatty acids in fish neural activity and their implications in behaviour* [Doctoral dissertation, Universidad de Las Palmas de Gran Canaria].
- Bermejo, V. J. (2016). *Essays on Program Evaluation and Investment*. [Doctoral dissertation, Universidad Carlos III de Madrid].
- Biber, D., Johansson, S., Leech, G., Conrad, S., & Finegan, E. (1999). *Longman Grammar of Spoken and Written English*. Longman.
- Blázquez Salcedo, J. L. (2014). *Rotating objects in general relativity and gauge theories*. [Doctoral dissertation, Universidad Complutense de Madrid].
- Blazquez Cano, M. (2014). *Consumer experience in a multichannel retail environment: a cross-country study of the fashion sector*. [Doctoral dissertation, Universidad Complutense de Madrid].
- Brown, P. & Levinson, S. (1987). *Politeness: Some Universals in Language Usage*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511813085>

- Buencuerpo Fariña, J. (2017). *Light harvesting using photonic crystals for photovoltaic applications*. [Doctoral dissertation, Universidad Complutense de Madrid].
- Caffi, C. (1999). On mitigation. *Journal of Pragmatics*, 31(7), 881-909. [https://doi.org/10.1016/S0378-2166\(98\)00098-8](https://doi.org/10.1016/S0378-2166(98)00098-8)
- Caffi, C. (2007). *Mitigation* (Studies in Pragmatics). Elsevier.
- Calancha Paredes, H. (2011). *Study of the production of the $\Sigma b(^*)_{\pm}$ with the CDF detector at the tevatron*. [Doctoral dissertation, Universidad Complutense de Madrid].
- Cann, R. (1993). *Formal Semantics. An Introduction*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511975752>
- Carr, J. (2017). Deontic modals. In *The Routledge handbook of metaethics* (pp. 194-210). Routledge.
- Carrió Pastor, M. (2014). Cross-cultural variation in the use of modal verbs in academic English. *SKY Journal of Linguistics*, 27(1), 153-166.
- Charlow, N., & Chrisman, M. (2016). *Deontic Modality*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780198717928.001.0001>
- Collins, P. (2009). *Modals and Quasi-modals in English*. Rodopi. <https://doi.org/10.1163/9789042029095>
- Cuadrado Ballesteros (2012). *Determinant factors of functional decentralisation and externalisation of local public services*. [Doctoral dissertation, Universidad de Salamanca].
- Culpeper, J. (2011). *Impoliteness: Using Language to Cause Offence*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511975752>
- Culpeper, J., Kerswill, P., Wodak, R., McEnery, A., Katamba, F., Culpeper, J., & Hardaker, C. (2018). *Politeness in Interaction. English Language, Description, Variation and Context*. Red Globe Press.

- Czerwionka, L. (2012). Mitigation: The combined effects of imposition and certitude. *Journal of Pragmatics*, 44(10), 1163-1182. <https://doi.org/10.1016/j.pragma.2012.05.002>
- Denison, D. (1993). *English Historical Syntax: Verbal Constructions (Longman Linguistics Library)*. Longman.
- Domínguez Sánchez, H. (2012). *Mass and star formation rate evolution of infrared selected galaxies in the cosmos field*. [Doctoral dissertation, Universidad Complutense de Madrid].
- Erickson, F., & Mohatt, G. (1982). "Cultural organization of participation structures in two classrooms of Indian students". In G. Spindler (Ed.), *Doing the ethnography of schooling: Educational anthropology in action*. Waveland Press, Inc. 132-174.
- Fernández Fernández, F. (2018). *South-South Agreements in the Framework of North-South Integration the Case of Morocco in the Euro-Mediterranean process*. [Doctoral dissertation, Universidad de Santiago de Compostela].
- Flowerdew, J., & Peacock, M. (2012). *Research perspectives on English for academic purposes*. Cambridge University Press.
- Gao, Q. (2012). Interpersonal functions of epistemic modality in Academic English Writing. *Chinese Journal of Applied Linguistics*, 35(3), 352-364.
- Gallardo Gallardo, E. (2013). *Disentangling the 'talent' concept as applied to the world of work*. [Doctoral dissertation, Universidad de Barcelona].
- García Bustamante, E. (2011). *Statistical downscaling of surface wind field and wind energy over a complex terrain area*. [Doctoral dissertation, Universidad Complutense de Madrid].
- García Estevez (2012). *Essays on universities and economic development*. [Doctoral dissertation, Universidad de Barcelona].

- García Jorcano (2017). *Sample size, skewness and leverage effects in value at risk and expected shortfall estimation*. [Doctoral dissertation, Universidad Carlos III de Madrid].
- García Segador, P. (2020). *Combinatorial Structure of Polytopes associated to Fuzzy Measures*. [Doctoral dissertation, Universidad Complutense de Madrid].
- Halliday, M. A. K., & Martin, J. R. (1993). *Writing science: Literacy and discursive power*. Falmer Press.
- Halliday, M. A. K., & Matthiessen, C. M. I. M. (2014). *An Introduction to Functional Grammar*. Taylor & Francis. <https://doi.org/10.4324/9780203783771>
- Han, C. H. (1999). Deontic modality, lexical aspect and the semantics of imperatives. *Linguistics in the morning calm*, 4, 475-95.
- Herrero Alba, D. (2020). *Institutions, Labor Market Segmentation and Competitiveness in the German Political Economy*. [Doctoral dissertation, Universidad Complutense de Madrid].
- Hoye, L. (1997). *Adverbs and Modality in English*. Routledge.
- Hyland, K. (2005). *Metadiscourse. Exploring Interaction in Writing*. Continuum.
- Hyland, K. (2004). *Disciplinary discourses: Social interactions in academic writing*. University of Michigan Press.
- Hyland, K., & Bondi, M. (Eds.). (2006). *Academic discourse across disciplines* (Vol. 42). Peter Lang.
- Hyland, K., & Paltridge, B. (2011). *The Continuum Companion to Discourse Analysis*. Continuum.
- Leech, G. (2014). *The Pragmatics of Politeness*. Oxford: Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195341386.001.0001>
- Lobato Fernández, R. (2019). *A Mechanical Insight into the Stability of the Chemical Bond*. [Doctoral dissertation, Universidad Complutense de Madrid].

- Lyons, J. (1977). *Semantics*. Cambridge University Press.
- Mortelmans, T., Boye, K., & Auwera, J. van der. (2009). Modals in the Germanic Languages. In B. Hansen & F. Haan (Eds.), *Modals in the Languages of Europe. A Reference Work* (pp. 1-58). Mouton de Gruyter.
- Ormelius-Sandblom, E. (1996). The modal particle *schon*: Its syntax, semantics, and pragmatics. In T. Swan & O. J. Westvik (Eds.), *Modality in Germanic Languages. Historical and Comparative Perspectives* (pp. 75-131). Mouton de Gruyter.
- Ortiz Valverde, G. (2020). *Foreign Direct Investment, migration and trade in economic integration and desintegration processes: a CGE analysis*. [Doctoral dissertation, Universidad Complutense de Madrid].
- Palmer, F. R. (1990). *Modality and the English Modals* (2nd ed). Longman.
- Palmer, Frank R. 2001. *Mood and Modality*. Cambridge University Press.
<https://doi.org/10.1017/CBO9781139167178>
- Peinado Martínez, P. (2011). *Pension system's reform in Spain: a dynamic analysis of the effects on welfare*. [Doctoral dissertation, Universidad del País Vasco].
- Pérez Muñóz, A. (2018). *Electrochemical effects in doping with ionic liquids: the case of cuprate superconductor $YBa_2Cu_3O_{7-x}$* . [Doctoral dissertation, Universidad Complutense de Madrid].
- Platero Prats, A. E. (2011). *New Alkaline-Earth Polymeric Frameworks as green materials for sorption and heterogeneous catalysis*. [Doctoral dissertation, Universidad Autónoma de Madrid].
- Pic, E., & Furmaniak, G. (2012). A study of epistemic modality in academic and popularised discourse: The case of possibility adverbs perhaps, maybe and possibly. *Revista de Lenguas para Fines Específicos*, 18, 13-44.
- Portner, P. (2009). *Modality*. Oxford University Press.

- Rayson, P. (2008). From key words to key semantic domains. *International Journal of Corpus Linguistics*, 13(4), 519–549. <https://doi.org/10.1075/ijcl.13.4.06ray>
- Recski, L. J. (2006). Investigating the use of modality in academic spoken discourse: A functional account of US Dissertation Defenses.
- Rodríguez López, P. (2012). *Casimir effect in systems in and out of equilibrium*. [Doctoral dissertation, Universidad Complutense de Madrid].
- Román Cascón, C. (2016). *Radiation fog, gravity waves and their interactions with turbulence in the atmospheric boundary layer*. [Doctoral dissertation, Universidad Complutense de Madrid].
- Searle, J. R. (1969). *Speech Acts: An Essay in the Philosophy of Language*. Cambridge University Press. <https://doi.org/10.1017/CBO9781139173438>
- Serrano Molina, M. (2021). *Functional Multicomponent Hydrogen-Bonded Macrocycles*. [Doctoral dissertation, Universidad Autónoma de Madrid].
- Swales, J. M. (1990). *Genre analysis: English in academic and research settings*. Cambridge University Press.
- Vázquez López, A. B. (2019). *Three Essays in Corporate Governance, Accounting and Law*. [Doctoral dissertation, Universidad Carlos III de Madrid].
- Werlich, E. (1976). *Genre Analysis*. Quelle und Meyer.

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