



Co-occurrence of modal markers in the Latin sentence: a quantitative and qualitative approach

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p.a. Le doyen
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Abstract

This thesis aims to investigate the co-occurrence of modal markers at the sentence level within a corpus of Classical Latin texts. The absence of systematic analyses for this phenomenon in Latin, compared to existing studies across a few other languages, underscores the significance of this research in addressing a notable gap in the literature. Employing a combination of quantitative and qualitative methods, this study will determine the extent and the main features of this phenomenon in Latin within a newly created corpus.

The methodology involves representing co-occurrences as symmetric matrices and utilising specific attraction metrics in order to calculate the attraction between markers and types of modality in co-occurrence. Subsequently, and based on the quantitative data, the focus shifts to a qualitative analysis of the passages, aimed at discerning the types of relationships established between different modalities and/or markers, contingent upon the syntactic structure hosting the co-occurrence.

The findings reveal that the co-occurrence of modal markers in Latin is infrequent, aligning with observations in parallel studies on languages such as English, French, Dutch and Japanese. Two distinct types of co-occurrence emerge from this study: hierarchical, where one marker scopes over the other, and non-hierarchical, where the two markers maintain separate scopes. While hierarchical co-occurrences have received attention in previous studies, non-hierarchical instances have been largely overlooked in the literature.

This thesis contributes by providing corpus data and insights into the co-occurrence of modal markers in a historical language, paving the way for future diachronic and typological analyses of this phenomenon. Additionally, it investigates and determines the main features of non-hierarchical co-occurrences, shedding light on the use of different combinations of modal values in discourse. The methodology developed in this study, combining quantitative and qualitative methods, holds broader applicability for diverse research topics involving the combination of linguistic units.

Keywords: modality; Classical Latin; co-occurrence; corpus linguistics; argumentation

Résumé

Cette thèse vise à étudier la cooccurrence des marqueurs modaux au niveau de la phrase dans un corpus de textes en latin classique. L'absence d'analyses systématiques de ce phénomène en latin, par rapport aux études existantes sur quelques autres langues, souligne l'importance de cette recherche pour combler une lacune notable dans la littérature. En combinant des méthodes quantitatives et qualitatives, cette étude déterminera l'étendue et les principales caractéristiques de ce phénomène en latin dans un corpus nouvellement créé.

La méthodologie consiste à représenter les cooccurrences sous forme de matrices symétriques et à utiliser des métriques d'attraction spécifiques pour calculer l'attraction entre les marqueurs et les types de modalité en cooccurrence. Ensuite, en se basant sur les données quantitatives, l'accent est mis sur une analyse qualitative des passages, visant à discerner les types de relations établies entre les différentes modalités et/ou marqueurs, en fonction de la structure syntaxique hébergeant la cooccurrence.

Les résultats révèlent que la cooccurrence des marqueurs modaux en latin est rare, ce qui est en accord avec les observations faites dans des études parallèles sur des langues comme l'anglais, le français, le néerlandais et le japonais. Deux types distincts de cooccurrence émergent de cette étude : hiérarchique, où un marqueur englobe l'autre, et non hiérarchique, où les deux marqueurs conservent des portées distinctes. Alors que les cooccurrences hiérarchiques ont été abordées dans des études antérieures, les cas non hiérarchiques ont été largement négligés dans la littérature.

Cette thèse contribue en fournissant des données de corpus et des perspectives sur la cooccurrence des marqueurs modaux dans une langue historique, ouvrant la voie à de futures analyses diachroniques et typologiques de ce phénomène. De plus, elle explore et détermine les principales caractéristiques des cooccurrences non hiérarchiques, éclairant l'utilisation de différentes combinaisons de valeurs modales dans le discours. La méthodologie développée dans cette étude, qui combine méthodes quantitatives et qualitatives, a une applicabilité plus large pour divers sujets de recherche impliquant la combinaison d'unités linguistiques.

Mots-clés: modalité; latin classique; cooccurrence; linguistique de corpus; argumentation

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List of Abbreviations

Glosses

ACC	accusative
ADN	adnominal
CON	conditional
DAT	dative
ENU	enumerative
EPI	epistemic
ESS	essive
EXPL	expletive
FOC	focus
GEN	genitive
GER	gerund
NEG	negation
NOM	nominative
NPST	non-past tense
PASS	passive
POL	politeness
POT	potential
PST	past tense
Q	question particle
QUE	interrogative
QUO	quotative
VRB	verbalisation

Modality and state of affairs

DEOACC	deontic acceptability
DEOAUTH	deontic authority
DYN	dynamic
EPI	epistemic
SOA	state of affairs

To my beloved grandmother Angela

1 Introduction

This thesis presents a study on the co-occurrence of modal markers at the sentence level in a corpus of Classical Latin texts. More specifically, it aims to identify lexical expressions of possibility and necessity (two notions that fall within the domain of modality), such as the Latin modal verbs *possum*, ‘I can’, or *debeo*, ‘I have to’, occurring together within the same sentence. With this work I aim to provide new data and analyses to a phenomenon that is still under-explored, and which has not yet been targeted in a systematic study on Latin nor any other historical language. Having determined the size of this phenomenon in Latin, I will focus on the way in which the modal expressions can interact with each other from a semantic perspective and, when applicable, with an argumentative function. By combining quantitative and qualitative methods, this study seeks to analyse this phenomenon in Classical Latin from various perspectives, looking at both the lexical expressions that co-occur and the types of modality they express. The notions of modal marker, modal categories and co-occurrence will be described in more detail in the following sections.

This study was conceived within the framework of the project *WoPoss. A world of possibilities. Modal pathways over an extra-long period of time: the diachrony of modality in the Latin language* (Dell’Oro, Bermúdez Sabel, and Marongiu 2020; Bermúdez-Sabel, Dell’Oro, and Marongiu 2024), on which it is largely based. As I will explain in Chapters 3 and 5, the annotation scheme that I have used for the analysis, as well as the list of markers used for retrieving the co-occurrences, are adopted from the *WoPoss* project and its theoretical framework. The scope of *WoPoss* is much wider than the focus of this thesis. The project aims at investigating the evolution of modality in Latin through the annotation of a large diachronic corpus of Latin texts. The *WoPoss* corpus spans from the prehistory of the Latin language to the 7th century CE. The definition of modality adopted within the project refers to a functional-cognitive theoretical framework, and its annotation scheme largely builds on the systematisation described by Nuyts (2016). The theoretical framework of the project and its annotation scheme are both described in the *Guidelines for annotation* for the *WoPoss* corpus (Dell’Oro 2023b).

1.1 What is a modal passage: basic notions

In order to guide the reader throughout this work, I will first give a brief introduction on some basic terms on modality, which will be frequently used for the analysis and the explanation of the examples. Let us consider example 1.

- (1) Write down everything you **can think** about it.¹

This sentence illustrates a modal passage, which consists of a modal marker, a scope containing a state of affairs which describes a representation and a modal relation between the two.

The modal marker in example 1 is the modal auxiliary *can*. A modal marker is a linguistic expression that can belong to different parts of speech (verbs, adjectives, nouns or adverbs) and which expresses a modal notion. I will explain in details how modality is defined in this work and what types and sub-types of modality exist. For now, I will simply observe that the concept of ‘modality’ is used to refer to an expression of possibility, necessity, probability or volition through which a speaker qualifies the representation described in the clause. In example 1 the modal verb *can* expresses a notion of possibility.

Another important component for the definition of a modal passage is the scope of the modal marker. The scope is the portion of text on which the marker operates, and it includes the “range of semantic elements in a clause” (Nuyts 2016, 48) which can be affected by the modal marker. The scope of the modal marker *can* in example 1 is *you... think about it*. The scope modalised by a modal marker can (but does not necessarily have to) contain a state of affairs which describes a representation. The representation described in example 1 is *that you think about it* i.e., the representation of the addressee of the imperative clause in the act of thinking of everything they know about the topic in question. By applying the notion of possibility, or more precisely, ability, to such a representation, the speaker modalises the representation ascribing the notion of ability to the participant of the clause i.e., in this case ‘you’. In this study, only passages in which the scope describes a state of affairs will be considered for the analysis. All cases in which the modal marker does not modify a state of affairs were annotated as not modal. To explain what this means for the analysis of a (potentially) modal passage in Latin, let us consider example 2. In this passage the Latin noun *necessitas* ‘necessity’ occurs. This noun is a potential modal marker in Latin, and expresses the notion of necessity.

¹ This and all the other English examples in this work are taken from the British National Corpus (BNC) (BNC Consortium 2007, last accessed 24/01/2024). The corpus was queried on the SketchEngine platform (Kilgariff et al. 2014) using Corpus Query Language (CQL) queries. Throughout this work, the modal markers presented in the examples will be indicated in bold. For the examples in Latin, both the Latin marker and its translation will be indicated in bold.

- (2) *qua necessitate et ignominia permotus Libo discessit a*
 which necessity and dishonour concern Libo depart from

Brundisio obsessionem=que nostrorum omisit.
 Brundisius siege=and our dismiss

Libo, concerned by these **circumstances** (lit. 'necessity') and the dishonour, departed from Brundisium and lifted the siege of our men.² (Caesar, *Commentarii de bello civili* 3, 25)

This passage belongs to the *Commentarii de bello civili*, written by Caesar (see section 4.3.3). In particular, it recounts the siege of Brindisium, a city in southern Italy, in modern-day Puglia, which was then under the control of Pompeius. Caesar attempts to initiate negotiations with Pompeius through his allies, among which the tribune Libo. After repeated refusals from Pompeius to engage in peace negotiations, Caesar attacks Pompeius' forces in Brindisium, including Libo, and forces them to lift the siege. In this sentence, the noun *necessitas* does not modalise a state of affairs (nor does it have a scope), but only describes a circumstance in which Libo has no choice but to leave.

To make a comparison with a passage in which *necessitas* has a modal value, I propose to analyse example 3.

- (3) *Postero die Caesar similiter praemissis prima nocte impedimentis*
 following day Caesar similarly send_first beginning night luggage

de quarta vigilia ipse egreditur, ut siqua esset imposita
 from fourth guard himself come_forth so_that if_any be impose

dimicandi necessitas, subitum casum expedito exercitu
 fight necessity sudden emergency without_baggage army

subiret.
 approach

The following day Caesar, in the same way, having first sent away the baggage at the beginning of the night, he came out himself from the fourth watch division, so that if any **necessity to fight** had arisen, he could have managed the sudden emergency with the army free of baggage. (Caesar, *Commentarii de bello civili* 3, 77)

This passage belongs to the same work as the preceding one. The events are subsequent to those narrated in the previous passage. Both Caesar and Pompeius are moving their troops. Caesar is heading towards Apollonia, but both armies are currently stationed in the area of

² The translations of the passages presented throughout this work are mine, unless otherwise specified.

Asparagium, a city in Illyria near Dyrrachium, where one of the main battles of the civil war between Caesar and Pompeius will take place. In this passage the marker *necessitas* does have a scope which describes a state of affairs i.e., *dimicandi* 'to fight'. Based on what has been explained above, this occurrence of *necessitas* here is modal: the modal passage describes a scenario where, for Caesar and his troops, it will be necessary to fight.

Another typical example of non-modal uses of a potential modal marker is the use of adjectives with an attributive function to a nominal constituent. In example 4, it is possible to see three non-modal occurrences for the adjectives *dubius* 'doubtful', *incertus* 'uncertain' and *certus* 'certain'.

- (4) *Quia scibam **dubiam** fortunam esse scenicam, spe **incerta** **certum***
 as know unsteady fortune be of_the_stage hope hesitant certain
mihi laborem sustuli.
 me toil endure

As I knew that fortune in theatre is **unsteady**, with **hesitating** hope I endured **certain** toil. (Terence, *Hecyra* 16–17)

In this passage, the three adjectives modify three different nominal constituents, respectively *fortunam*, *spe* and *laborem*. As their scope does not describe a state of affairs, the three markers are not modal in this specific passage.

But when one of them is used e.g. in the construction *dubium est*, and scopes over a verbal predicate, the notion of uncertainty emerges. Consider example 5.

- (5) *Dicat ... sibi non **fuisse** **dubium** quin nullo foedere a*
 say ... himself not be doubtful that_not any treaty by
re publica bene gerenda impediretur.
 state well rule hinder

Let him say that ... he never doubted (lit. **it was** not **doubtful** to him) that he would not be hindered by any treaty from ruling the state successfully. (Cicero, *Pro Cornelio Balbo* 47) (from Pinkster 2021, 97)

In this passage, *dubium est* (in the form *dubium fuisse*) modifies the representation *nullo foedere a re publica bene gerenda impediretur*, introduced by the particle *quin*. Moreover, *dubium esse* is negated by *non*: *non fuisse dubium*. Therefore, the construction expresses the notion of certainty expressed by the speaker that he will not let any treaty to hinder him from ruling the state successfully.

The notion of scope is of particular relevance for this study because different types of modality can be distinguished also based on their scope properties. As it will be explained later in this chapter and more extensively in Chapter 7, different theoretical approaches have produced modal hierarchies in which the types of modality are ordered based on the range of semantic categories that each type of modality can take under its scope (Narrog 2020, 48). Such categories generally include, besides modality, negation, tense, mood and aspect among others. Semantic categories other than modality will not be systematically investigated in this study, however, in Chapter 7 I will show that based on the co-occurrences extracted from the corpus an internal hierarchy can be traced among different modal categories based on how many and which other modal categories they can scope over.

The modal relation is established between the modal marker and the state of affairs, and it is analysed in terms of a certain type of modality depending on the type of marker and the state of affairs that the marker qualifies. In other words, the choice of the type of modality expressed in the modal passage is highly dependent on the context. In the case of example 1, the passage expresses the modal notion of ability, which is ascribed to the participant of the state of affairs, *you*, and applied to the action *to think (about it)*. The markers targeted in this study were selected based on the fact that they could express the basic notions of possibility and necessity. The types of modality annotated for the analysis will be introduced and further explained in the following chapters, but for the sake of this introduction I will briefly mention the main modal notions.

The notions of possibility and necessity can be articulated in various ways, depending on the type of modal meaning they express in relation to the representation that they qualify. Generally speaking, expressions of possibility and necessity can refer to the ability or capacity of the participant (as in example 1) or internal necessity, as in the sentence *I desperately need to see her*. The same notions in different contexts can express external obligations or permissions, as in the sentence *Applicants for certificates must notify the Society if any of the above cases apply*. Additionally, possibility and necessity can be applied to the speaker's knowledge domain and therefore be defined in terms of subjective judgment of the veracity of the representation, as in the sentence *It must be a dream*. While internal and external possibility or necessity have been defined in various ways in literature, as I will show in Chapter 2, the definition of the third type of modality as epistemic is fairly agreed-upon.

1.2 Modal markers in co-occurrence

In this section I will define the co-occurrence of modal markers as it is understood in this study, and I will briefly mention the different pathways of analysis that open up with respect to the different types of co-occurrence.

First of all, it is important to specify what is meant in this study by the expression 'co-occurrence of modal markers'. In this work, I focus on the analysis of modal markers in co-occurrence at the level of the sentence i.e., a stream of text delimited by a strong punctuation sign (see section 4.5 in Chapter 4). An illustration of the co-occurrence as defined in this study is given in example 6, where the modal markers *maybe* and *can* appear in the same sentence.

(6) **Maybe** I **can** find someone to apprentice me.

As it will be shown throughout this work, the co-occurrence of modal markers can be classified into two basic types of co-occurrence, based on the syntactic structure of the sentence and on the semantic interaction between the two markers.

In the first type of co-occurrence one of the modal markers scopes over the other, that is, it includes another marker in its own scope. Consider example 6 presented above. In this sentence, the adverb *maybe* scopes over the verb *can*. Both express the modal notion of possibility: the former describes an evaluation of the state of affairs as possible by the speaker, and the latter refers to a possibility related to the participant who is involved in the state of affairs. In this type of co-occurrence it is possible to observe a syntactic hierarchy in which the two markers occupy different layers: *maybe*, which modalises *can*, is placed on a higher position with respect to the co-occurring marker that is being modalised i.e., *can*. This type of structure also has consequences on the semantic interpretation of the modal passage: the hierarchical relation that is established at the level of the sentence structure is transferred onto the semantic relations established between the markers that appear in co-occurrence. The marker that is higher in the hierarchy projects its modal value down the hierarchy onto the co-occurring marker in a lower position and onto the scope associated to it. Coming back to example 6, the modal adverb *maybe* projects the modal value of epistemic probability down the hierarchy, onto the value of possibility expressed by the co-occurring marker *can* and onto the representation qualified as possible by *can*. This hierarchy of semantic relations can be represented as [EPIPOS[DYNPOS[SOA]]]. In more general terms, in the first scenario of co-occurrence illustrated in example 6, the markers can occur on different levels of the clause structure, creating a modal hierarchy in which the hierarchical relationships that can be established between different types of modality seem to follow cross-linguistic tendencies. The literature has investigated the hierarchical relationships between types of modality, observing the scope properties of each type of modality, and including in the hierarchy other qualificational categories, such as tense, aspect and negation. The aim of these studies is to identify typologically valid hierarchies for ordering the types of modality and, in certain cases, the other qualificational categories (van Valin and LaPolla 1997; Dik 1997; Cinque 1999; Cinque 2001; Hengeveld and Mackenzie 2008; Cinque 2006; Nuyts 2006). Some

studies of this nature have been carried out on specific languages, often English (Coates 1983), but also Japanese (Narrog 2009), or even under-studied and endangered languages such as Manchu (Rentzsch 2012), a language belonging to the Tungusic language family, which comprises languages spoken in eastern Siberia and Manchuria. I should add to these studies the only reference that I could find, though limited in content, for this specific type of co-occurrence in Latin, that is Pinkster (2004, 196), for his marginal observations about the combination of epistemic adverbs in Latin. In this study I will present the hierarchical relationships observed among the types of modalities that co-occur in the corpus. Although my results will only be partial, as they are specific to Classical Latin texts, they will hopefully serve as a starting point to verify the trends identified in this study on a larger sample of data for Latin. Besides illustrating the semantic relationships among the various types of modalities, I will also focus on the type of syntactic structures that may favour this type of relationship.

In the second type of co-occurrence the two markers keep separate scopes, meaning that they do not occur in a hierarchical relation. The two markers can share the same scope, but none of the two is included within the scope of the other. Consider example 7.

(7) **Can't** stop you poking your nose in, but I **can** keep an eye on you.

In this sentence, the markers *can* (negative) and *can* (affirmative) co-occur in a sentence consisting of two coordinate clauses, linked by the adversative conjunction *but*. The two markers qualify two different representations, independently. *Can't* scopes over *stop you poking your nose in*,³ and *can* scopes over *keep an eye on you*. Neither of the two markers appears within the scope of the other, which does not allow for establishing a scope hierarchy in the sentence.

An important notion that will be used for the analysis of this type of co-occurrences is the Aristotelian square of logical oppositions, which has been applied, among others, to modal notions, resulting into the representation shown in Figure 1.1.

In the square of modal oppositions the vertices are occupied by the modal notions of possibility and necessity. The square has a positive side (vertices A and I), and a negative one (E and O). As can be deduced from Figure 1.1, logical relations of different nature exist between the four poles i.e., implication, contrariety and contradiction, depending on the participants in the relation. The nature of these relations will be set out in more detail in Chapter 8. This type of representation of the relations within the modal domain has interested not only logicians and philosophers, but also linguists (Horn 1989; Palmer 2001; Bertocchi and Orlandini

³ The primary scope of *can't* here is *stop you*. The subordinate *poking your nose in* depends on the main verb of the scope and therefore is also part of the scope (Dell'Oro 2023b, 15).

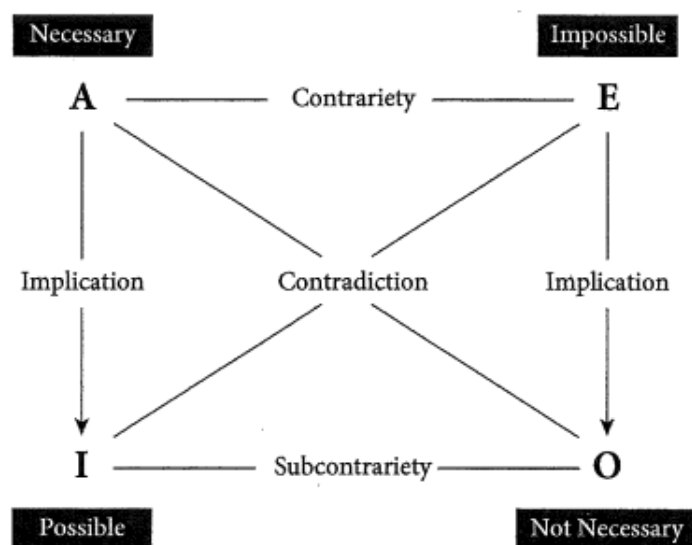


FIGURE 1.1: Aristotelian square for modality (van der Auwera and Aguilar 2016, 24).

2002; Orlandini 2001 among others). As I will show in Chapter 8, the square can be applied to the different modal categories that are part of the theoretical framework used in this study and for the analysis of their co-occurrence at the sentence level. For instance, the relation of contradiction often underlies the use of two occurrences of the same markers with opposite polarity (e.g. *it is possible* and *it is not possible*) in co-occurrence to serve rhetoric uses of the co-occurrence. In this specific type of co-occurrence (*possible* and *not possible*), which I will define 'loop co-occurrence' (see Chapter 6), the repetition of the same marker is used with the purpose of emphasising the modalised representation, or the opposition between the two representations modalised by the two markers. In some other cases, this use of the co-occurrence is closer to a figure of speech: the repetition of the marker helps enriching the discourse and delivering the message intended by the author. However, this case should not be confused with what I will define as rhetorical-argumentative uses of the co-occurrences. It is important to clarify at the very beginning of this work that the term "rhetorical", in the context of rhetorical-argumentative uses of the co-occurrences is not meant to refer to figures of speech, nor to rhetorical oratory as a literary genre. Instead, this term pertains to the linguistic study of the semantic-syntactic structures employed by the speakers (in both written and spoken language) to convey or put forward specific messages, primarily for argumentative purposes (Anscombe and Ducrot 1983). This topic will be prominent in Chapter 7 and especially Chapter 8, for the analysis of specific passages with co-occurrences. For instance, in some cases the co-occurrence of different types of modality can be used for argumentative purposes, building on relation of implication that exists between some of the modal notions represented in the square of modal oppositions e.g. between vertices A and I. In order to understand how this mechanism is established, it is essential to introduce the

concept of semantic scale and to define the scalar relationship between two concepts. On a scale, different items are ordered in a linear way based on a predefined principle. In semantic scales, the ordering of different expressions is based on their semantics, and can be based on quantitative or qualitative principles e.g. the adjectives *attractive*, *pretty*, *beautiful* (Horn 1989, 232). According to the Maxim of Quantity by Grice (1975), given a scalar relationship between two concepts, asserting the higher value on the scale implies the assertion of the lower value as well. The concept of semantic scale can also be applied to certain gradable modal notions such as epistemic modality or deontic acceptability. For instance, the expression of epistemic modality includes different degrees of commitment of the speaker to the veracity of the state of affairs. This allows for a range of different epistemic expressions, which span from possibility to absolute certainty. In the co-occurrences extracted from my corpus, the use of epistemic markers expressing different degrees of certainty in the same sentence often follows an argumentative schema in which the expression of epistemic possibility modalises the state of affairs with the weaker argumentative force, and the expression of epistemic certainty instead marks the stronger argument.

It is important to specify from the outset that this study will consider markers of necessity, possibility, and probability, excluding the notion of volition from the analysis. In Chapter 2 I will describe how the status of the notion of volition within the modal domain has been often object of debate in the literature, and how in some cases, this notion has even been excluded from the modal domain. As I will show in Chapter 2, the theoretical framework on which this work is based considers volition as a fully legitimate part of the modal system, more specifically as a modal category within the deontic domain (see section 2.2 in Chapter 2). In this study, however, I have opted to concentrate on examining the relationships and potential combinations observed at the sentence level between the concepts of possibility and necessity. The reason for excluding volition is as follows. This study fits into a line of research that has focused, both cross-linguistically and in specific languages, on the relationships between the notions of necessity and possibility. Leaving aside hierarchical co-occurrences, the juxtaposition of different types of possibility and necessity seems to build on logical and argumentative relationships that can exist between these two notions. As I will show in Chapter 3, section 3.3, numerous cases of co-occurrences of modal markers of possibility and necessity in Latin are known. These few examples, only marginally mentioned in the literature, highlight how the study of the contrast between these two notions can contribute to producing knowledge on a variety of topics. Among these, we can mention i) the argumentative use of co-occurrence, especially in the presence of symmetric syntactic structures (e.g. *non solum... sed etiam* 'not only... but also') or specific constructions (i.e. in concessive contexts); ii) the co-occurrence as a tool for disambiguating highly polysemous markers in a historical language, for which we lack informants; iii) the use of co-occurrence

as a repetition to emphasise a specific argument in a rhetorical discourse. However, systematic studies on the subject are lacking, especially for Latin. A corpus-based research study of this kind of co-occurrences can pave the way for quantitative studies that advance knowledge on the three points listed above, and more. Therefore, while I acknowledge that volitional modality is a fully integral component of the modal domain which might also play a crucial role in relationships with notions of obligation, denial, and permission, I argue that a comprehensive study focusing on co-occurrence specific to volition warrants a separate examination, comparable in scope and methodology to the present work.

1.3 Why a study on the co-occurrence of modal markers in Latin?

It seems appropriate to explain here why an analysis of the co-occurrence of modal markers in Latin is necessary. As will be shown in Chapter 3, the notion of co-occurrence of modal markers has traditionally been used to refer to a specific type of co-occurrence, namely the one established between a modal adverb and a modal verb. This combination, also called "double modality" (Halliday 1970, 331), has long been the focus of studies, albeit not numerous, on the co-occurrence of modal markers in different languages. The second type of co-occurrence detected in this study, namely the co-occurrence that does not instantiate a modal hierarchy, has remained on the sidelines of most studies, if not outright ignored. Surely, to my knowledge it has never been the subject of a systematic study of the phenomenon. In this work, therefore, the term "co-occurrence of modal markers" is understood in a broader sense, as the presence of two or more modal markers within the same sentence, with the sentence being defined as the stream of text enclosed between two strong punctuation marks. The choice to broaden the scope to both types of co-occurrence, i.e., hierarchical and non-hierarchical, is data-driven: the results of the analysis of the co-occurrences found in the corpus highlight, as I will show, an overwhelming majority of the second type of co-occurrences compared to the first one, despite hierarchical co-occurrences being the only object of nearly all the studies on this phenomenon. Upon completing the analysis of both types of co-occurrence, the advantages of a more extensive definition of the phenomenon compared to the one traditionally understood in literature have become evident. As it will be shown in Chapter 3, the studies on the co-occurrence of modal markers are not numerous. Moreover, none of them focuses on a historical language. Marginal observations can be found in literature about specific cases of co-occurrence or on the co-occurrence of individual pairs of markers in Latin. A brief summary of these mentions will be given in section 3.3, but a systematic study on the co-occurrence of modal markers in Latin is missing. On the

one hand, the study of hierarchical co-occurrences contributes to an ongoing scientific discussion by bringing data on a historical language, thus expanding the sample of languages on which the phenomenon has been investigated, as well as the type of syntactic relationships (considering not only adverb on verb types of relation). On the other hand, the study of non-hierarchical co-occurrences highlights all the opportunities and research paths that this topics offers, which are currently largely unexplored.

Generally speaking, the way in which different types of modality relate to each other in co-occurrence can reveal much about the structure of the modal system of a certain language. From an onomasiological point of view, it can also be revealing about how different modal concepts can be expressed at the lexical level, based on other modal expressions with which they co-occur. Depending on the type of co-occurrence this analysis can contribute to the study of modality, not only in Latin, in the following ways.

Hierarchical relationships observed between different markers at the sentence level build on the hierarchical organisation of the modal domain in a specific language. As described in the previous section, several studies within different theoretical framework have attempted a systematisation of the modal system within a hierarchy, combining modal categories and other types of qualificational categories. Besides purely theoretical studies, specific works have developed modal hierarchies based on corpus data on modern languages, such as Dutch (Nuyts 2004) and Japanese (Narrog 2009). A similar study on Latin, and historical languages in general is still missing. One of the contributions of this study is therefore to provide a first overview of how modal categories combine with each other hierarchically, and contribute to the theoretical discussion by adding information about an historical language as Latin. This type of relations will be studied specifically in Chapter 7.

On the other hand, a specific study on non-hierarchical co-occurrences can help shedding some light on the uses of modal categories in combination for different purposes. As it will emerge from the analysis presented in Chapter 8 (and in a few cases in Chapter 7), the co-occurrence of modalities can be used to support the argumentative strategies of the speaker, for instance by marking propositions with different argumentative strength by means of markers expressing different degrees of epistemic modality (e.g. *maybe* X, but *certainly* Y). In other cases, the speaker can leverage the contrast between different types of modalities (such as the possibility within the legal context and the possibility according to moral norms) to support their argument in favour of a particular position (e.g. *you are allowed to do it, but this does not mean that you should*). In addition to this, the study of non-hierarchical co-occurrences might uncover nuances of meaning of specific markers by looking at the wider syntactic and semantic context in which they occur. This is the case for highly poly-functional and vague markers such as the Latin verb *oportet* 'it ought, it is necessary', which

has been often observed in co-occurrence with similar markers in the so-called "distinctive contexts" (Bolkestein 1980, 14; Núñez 1991, 89) i.e., in non-hierarchical co-occurrence with other markers with similar meanings.

As I will show in Chapter 2, the Latin modal domain has been object of a fair amount of studies, although not numerous compared to other extensively studied languages, English above all. The study of the Latin modal system has wide margins for improvement. Moreover, a preliminary study on the co-occurrences in Latin can enable future diachronic studies on modal and argumentative pathways from Latin to Romance languages. For instance, among Romance languages, French seems to be the one for which this phenomenon has been studied more extensively and in different perspectives. As I will show in Chapter 3, existing works on French modality range from systematic studies on specific French modal markers, often verbs, and their semantics (e.g. Sueur 1975; Chu 2008), to the use of modal markers in argumentative discourse (see e.g. Rossari 2020 on the argumentative uses of *pouvoir* 'can, be able' in co-occurrence with *mais* 'but'). The goal of a future diachronic study in this regard would be to trace patterns of co-occurrence between markers and types of modality, including the ones enabling rhetorical-argumentative uses, from Latin to Romance languages. This would show if such patterns have been preserved and, if so, how they are lexicalised in the various diachronic stages.

From a methodological viewpoint, I also aim at showcasing how quantitative and qualitative approaches can be combined for the analysis of the co-occurrences and similar phenomena. With some exceptions such as Hütsch (2020) and, to a certain extent, Narrog (2009), most of the existing studies do not employ quantitative methods to analyse this phenomenon. This methodology can be applied to study the co-occurrence of modal categories not only in Latin but also in other languages. Furthermore, it can be extended to studies that encompass other qualifying categories that are closely linked to the modal domain, but are not specifically targeted in this study, such as tense, mood or negation, to allow for a better comparison to the previous studies on modal hierarchies mentioned earlier.

This study aims at answering the following questions. Firstly, it will determine the extent to which this phenomenon is present in the corpus, in order to establish whether the co-occurrence is a rare or widespread phenomenon for the stage of the language and the genres represented in the corpus. After answering this preliminary question, I will proceed to examine the markers and types of modality in co-occurrence. I will determine to what extent the markers targeted for the analysis and the types of modality in the corpus tend to appear in co-occurrence in the corpus. Furthermore, a separate type of analysis will be applied specifically to the study of the co-occurrences, in order to measure the attraction or repulsion between specific markers in co-occurrence. The same type of analysis will be applied to the

types of modality annotated for each marker in co-occurrence.

As already mentioned, almost all studies carried out so far focus more or less exclusively on scope hierarchies, which have a relevant role in the study of this phenomenon, but do not cover all possible paths for the analysis of the co-occurrence of modal markers. A closer qualitative analysis of the cases of co-occurrence, informed by the results of the quantitative analysis, will show that this phenomenon has additional facets that have remained hidden in previous studies. Modal markers can present different combinatorial possibilities, and based on the type of interaction observed different paths of analysis can be pursued, revealing i) hierarchical relations and scope properties of Latin modality both at the semasiological and at the onomasiological level, and ii) the argumentative use of different types of modality or degrees of modality in contrastive co-occurrences.

1.4 Outline

This work will be structured as follows. In Chapter 2 I will give a brief introduction to the domain of modality and to the complexity of the theoretical discussion with respect to the definition of the modality and its internal organisation. I will then describe the theoretical framework on which I relied for the analysis and the previous studies on the expression of modality in Latin. Furthermore, I will provide an overview of the markers that will be targeted in this study, their meanings and their possible modal values.

Chapter 3 will give an overview of the studies on the co-occurrence of modal markers and/or modalities performed so far, highlighting, when pertinent, in which ways they have been relevant for this study.

Chapters 4 and 5 will be dedicated to data preparation and annotation. In Chapter 4 I will describe the corpus and the steps followed for its construction: data collection, pre-processing, format conversion and automatic annotation. I will also illustrate the methodology used for extracting the co-occurrences from the corpus. Once having described the partially automated processes of data preparation and collection, in Chapter 5 I will describe the manual annotation of the sentences and in particular the annotation scheme used for the description of co-occurrences.

Chapters 6, 7 and 8 will be devoted to the illustration of the quantitative and qualitative analyses. Chapter 6 will illustrate the methodology employed for the quantitative analysis, and will give a quantitative assessment of the co-occurrences in the corpus. Chapter 7 will be dedicated to illustrating the co-occurrences observed in cases of scope hierarchisation. I will describe what types of modality can interact with which others in such cases, and

the hierarchical relations observed between them. Finally, Chapter 8 will focus on the co-occurrences in cases of absence of scope hierarchies, and on the description of the semantic and rhetorical-argumentative relations observed between the co-occurring markers.

In Chapter 9 I will summarise all the work results illustrated throughout this study. After a brief outline of the main outcomes of this research, I will devote a section to the contribution of my work to research in this field, particularly emphasising the added value of the quantitative tool in the service of qualitative study. I will also discuss the methodological issues that I have encountered during the research work, offering possible alternative solutions for the future. A section will also be devoted to further perspectives of research. I will illustrate how the study on the co-occurrence of modal markers in Latin could be expanded to include different stages of the language, in order to add the diachronic dimension; I will identify different paths of analysis on other markers and types of co-occurrence that for a matter of time could not be included in this study.

All supplementary material not included in the chapters listed above will be found in the Appendix (A) at the end of this work. This section contains i) a summary table for the main technical terms and definitions used throughout this study ii) another summary table for the technical terms used during quantitative analysis iii) additional information about the quantitative analysis i.e., the data used for the visualisations shown in the chapters 6, 7 and 8.

2 An introduction to modality

The notion of modality has been and still is widely debated in the research community. The first issue concerns the definition of modality as a category. The second issue, and perhaps the one with respect to which theoretical approaches differ the most, concerns the internal organisation of the category of modality i.e., the distinction of different types of modality, their definition and labelling.

In this chapter, I will go through different approaches to the definition of modality. I will eventually provide the definition adopted in this study, and which better fits its goals. Subsequently, I will illustrate the theoretical framework adopted in this study, providing a thorough description of the modal system, the different types and subtypes of modality, and the criteria used to identify and define them. After having provided a definition of modality and an overview of the theoretical framework which underlies this study, I will outline the main studies on the expression of modality in Latin.

2.1 Towards a definition of modality

Any study that aims to investigate the modal system of one or more languages has an obligation to provide a definition of modality that helps framing their work and results within a more or less defined domain. This is due to the fact that the notion of modality, its definition, and even its internal organisation have been highly debated in the literature, up to the present day. To this day in fact, the discussion around the concept of modality and possible systematisations of the modal domain is rich and far from being closed. In this respect, Nuyts (2016, 48) observes that the category of modality itself is by its nature much less coherent and blurred in contours compared to other qualificational categories such as time and aspect. Due to this debated status, the notion of modality has been described and used in different ways in the research community.¹

A broader definition of modality identifies it with any type of semantic qualification performed by the speaker on the state of affairs. This definition includes in the modal domain

¹ This section is largely based on the rich overview on different definitions and approaches to modality offered by Nuyts (2016).

other categories that the speaker can use to qualify the state of affairs, such as negation, tense, mood and aspect (see e.g. Fillmore 1968). Along the lines of this conceptualisation, Givón (2001, 13) introduces the concept of the TAM category, defined as a complex grammatical subsystem populated by the categories of Tense, Aspect and Modality (TAM). However, the definition of modality that is now most commonly used in linguistics is a narrower one, which describes modality as a semantic subfield of other qualificational categories, next to the categories of tense and aspect (Nuyts 2016, 32). On the definition of modality as a category, Narrog (2005, 166–168) defends the choice of building a cross-linguistically valid definition of modality based on semantic criteria rather than morphosyntactic or pragmatic ones. Numerous studies on the expression of modality in English have identified the morphosyntactic features of modal expressions by referring to those of the English modal auxiliaries *must*, *should*, *can*, *could* etc. (Lyons 1977; Coates 1983; Palmer 1990[1979]). Some of these criteria are the following: negation can scope directly over a modal auxiliary e.g. *can't*; modal auxiliaries form interrogatives by inverting their position with their subject's and without using the form *do* e.g. *can I?*; modal auxiliaries cannot co-occur e.g. **may will* (Coates 1983, 4). However, modal verbs in other languages may not share these properties. Moreover, parts of speech other than verbs can convey modal notions in English and in other languages. Therefore, a definition based on such criteria seems somewhat limited. The experiences and needs of the speakers, on the other hand, are shared across communities and languages. Therefore, defining modality in terms of the expression of such experiences and needs seems to be a more cross-linguistically valid option. An example is Nuyts (2016, 42), who conceives the domain of modality as a semantic supercategory: the concept of modality is used as an umbrella term to cover different categories studied in literature which qualify different types of possibility and necessity with respect to the subject and the situation.

Another topic that has been highly debated in literature is the distinction between the semantic category of modality and the grammatical expression of verbal mood. Some authors consider mood as part of the category of modality (Bybee, Perkins, and Pagliuca 1994; Palmer 2001). Nuyts (2016, 40), on the other hand, maintains the more frequently shared view that the two categories should remain separate.² Languages can express modality by using both modal systems (not only verbs, but also nouns, adjectives and adverbs) and verbal mood (Palmer 2001, 4). As stated by Narrog (2005, 167), these two dimensions can coincide, but they are not necessarily co-extensive. Sometimes grammatical markers of mood serve to the expression of qualificational categories other than modality. For instance, subjunctive mood in Spanish can be used in constructions that qualify the representation in terms of the mental state of the speaker (Narrog 2005, 185). This occurs with expressions

² The problem of the distinction between modality and mood is also a terminological one: sometimes the label 'mood' is used to indicate the grammatical coding of modality on the verb. In other cases, it is used as a partial synonym for modality (Nuyts 2016, 31).

of wishes and fears, such as in the sentence *Me alegra que sepas la verdad* 'I am glad that you know the truth' (Narrog 2005, 185).

On the other hand, English for instance has developed a full set of modal verbs, and the notion of non-factuality (or irrealis, or non-factivity as it is also defined) in conditional clauses is expressed by using the past verb form—which refers to the category of tense, and not mood. In other languages e.g. Latin, both modal verbs (together with other markers, as I will show when illustrating the theoretical framework) and the mood system can convey modal notions.

Having defined modality as a semantic category, and clarified its relationship with the category of verbal mood, it is important to determine the type of notions that characterise the category of modality. The categories that are supposed to be part of the modal domain have been described by using different semantic criteria. According to van der Auwera and Plungian (1998), the modal domain is constituted at its core by the opposition between the two notions of possibility and necessity. However, in order to provide a complete description of the modal domain, it is also necessary to include the notions of volition and evidentiality. The core opposition of necessity and possibility draws on the theoretical frameworks of modal logic and formal semantics (Kratzer 1978; Portner 2009), which consider the duality of the notions of necessity and possibility as fundamental for the description of the modal domain. Such duality excludes, in principle, the possibility of having a scalar dimension in the definition of the modal domain. However, Nuyts (2016) points out that scalarity is a defining feature for the description of the notions that are subsumed under the umbrella term 'modality'. A scale is a group of expressions that belong to the same category, and are arranged in a linear order which is based on the strength of their semantic value (Bertocchi 1999, 163). Many modal values can be arranged in such scales e.g. something can be higher or lower in the scale of epistemic possibility depending on the judgment of the speaker on the truth-value of the modalised state of affairs. It should be clarified that formal semantics does not exclude the property of scalarity altogether, because it assigns a stronger or weaker value to the notions of necessity or possibility, depending on the context or on the type of modal e.g. *must* expresses a stronger necessity than *should* (Portner 2009, 32–33).

Modal categories have also been defined in literature as attitudinal categories, because they reveal something about the attitude of the speaker towards the event or situation described in the state of affairs (Lyons 1977; Bybee, Perkins, and Pagliuca 1994; Palmer 2001). The attitude can be described along different dimensions, which determine the type of modality being used e.g. epistemic modality describes the attitude of the speaker with respect to the truth-value of the event described in the state of affairs (Palmer 2001, 86). Narrog rejects the notion of the attitude of the speaker to define the category of modality as, he claims, such

notion can be expressed also by other categories, such as voice and aspect, which are not concerned with modality. The main issue is that the notions of subjectivity and of attitude of the speaker are not well-defined, in fact, they are rather vague and leave too much room for interpretation. It is indeed a matter of defining clearly when a particular expression is conveying the subjectivity of the speaker, and, if that is the case, if it should be included in the modal domain. Provocatively, Narrog presents potentially subjective uses of voice in Japanese. Voice is never indicated as a possible expression of modality. But by interpreting the concept of subjectivity more or less broadly, some uses of intransitive verbs in the passive form in Japanese can convey a subjective evaluation on the part of the speaker regarding the representation being modalised e.g. using the passive constructions **I was fled by the others* to express *the others fled me* (translated in English), supposedly conveys the negative attitude of the speaker towards the event described (Narrog 2005, 172). Given the vagueness of the concepts of subjectivity and attitude, Narrog claims that the notion of factuality is best suited to describe the category of modality (2005, 185). More precisely, he defines modality as a (semantic) linguistic category that is concerned with the factual status of a state of affairs: a state of affairs is modalised if it is neither positively nor negatively factual. A state of affairs that is undetermined with respect to its factuality is a state of affairs that exists only in the realm of thought, and which is not presented as factual i.e., actually existent in the frame of time referred to in the sentence (Narrog 2012, 7). Narrog gives the example of a non-modalised state of affairs *The cats are happy now* and a modalised one *The cats **must** be happy now*. The first state of affairs is presented as existent in the time frame represented in the sentence, whereas the second one is conceived within the realm of thought, and as such, it is not factual. The opposition between factuality and non-factuality reminds of some other popular oppositions that have been used to describe the modal domain, namely *realis* and *irrealis* (Palmer 2001), *factivity* and *non-factivity* (Lyons 1977, 794–795). Narrog claims that all these notions conceptually overlap, because they all point to the realisation or non-realisation of the state of affairs. However, he chooses the notion of factuality over the others due to a lower tendency of the term factuality to be misleading, and be associated with other notions, as it could happen with the other terms.³

Van der Auwera and Plungian (1998, 80) underline that, given the multiplicity of definitions and the theoretical confusion regarding the internal organisation of the modal domain, it is difficult to identify an unambiguous and comprehensive definition of what modality is. However, they also stress the importance of clearly stating one's own definition before conducting a study in this field. In order to overcome the difficulties given by the quest for

³ For instance, the notion of *realis* and *irrealis* can be confused with an everyday use of the concepts of 'real' and 'reality'. The notion of reality is philosophically related to the pure existence of a certain state of affairs, which has nothing to do with the human judgment, and consequently with modality (Narrog 2012, 6)

foundational semantic properties that would help defining modality precisely and unequivocally, Nuyts (2005, 2006, 2016) proposes a definition of modality as a supercategory, which works as a qualificational category next to other qualificational categories such as tense and aspect, and which is characterised by a higher level of abstraction with respect to them⁴. Within the supercategory of modality it is necessary to define other basic modal categories, to bring order to the complexity of the modal domain.

The internal structure of the category of modality is another matter of debate. The first distinction among types of modality is due to von Wright (1951, 1–2), who distinguishes four types of modality in modal logic: alethic, epistemic, deontic, and existential. Alethic modality refers to the ‘modes of truth’: a proposition can be necessarily, possibly or contingently true. Epistemic modality on the other hand is the ‘mode of knowing’: a proposition can be verified (known to be true), falsified (known to be false) and undecided (neither known to be true nor known to be false). Deontic is the ‘mode of obligation’ and refers to obligatory, permitted or forbidden propositions. Finally, existential modality defines the ‘modes of existence’ and corresponds to quantification concepts e.g. *some, many, all*. In addition to these, von Wright also identifies a fifth type, dynamic modality, which is apt to cover the notions of ability and disposition.⁵ Palmer (2001, 89) considers the work made by von Wright in the domain of modal logic as pioneering, and translates it into the linguistic domain, retaining the main categories of dynamic, deontic, and epistemic modality. These three categories are traditionally considered to be the core categories of modality (Palmer 2001; Nuyts 2006; Narrog 2009), and Nuyts (Nuyts 2016) uses them in the systematisation of the modal domain that lays the foundation for the theoretical framework adopted in this study and that will be described in the next section. The boundaries of these categories and the notions they gather and describe are not equally shared by the members of the research community, so I will try to provide a general overview without delving into the specific distinctions of each approach and author.

The category of dynamic modality is usually identified with the expression of the abilities or the needs (Palmer 2001, Hengeveld 1988) of the participant. Consider examples 8 (ability) and 9 (need).

(8) He **can** stand on his head without using his hands. (Nuyts 2016, 34)

(9) I **must** find something to eat or I’ll starve. (Nuyts 2016, 34)

⁴ Palmer (1986, 2–4) already recognises modality as a category with vaguer contours than e.g. tense, hence the difficulty of finding a precise definition, and of defining distinct modal categories.

⁵ The notion of disposition in philosophy is defined as a property, state or condition that makes possible a certain behaviour, called manifestation, but which is not actual e.g. something can be disposed to break although it is not broken now (Mumford 1998).

However, as I will show in the next section, the category of dynamic modality can also include, in Nuyt's systematisation (Nuyts 2016, 35), notions of possibility and necessity that are not ascribed to the participant, but are inherent to the representation described in the state of affairs. Consider examples 10 and 11.

(10) It **can** rain here every day in winter. (Nuyts 2016, 35)

(11) The driver was so drunk that this car accident **had to** happen. (Nuyts 2016, 35)

Deontic modality is traditionally identified with expressions of permission and obligation (Lyons 1977; Palmer 1986; van der Auwera and Aguilar 2016; Palmer 2001; Narrog 2009), as the one illustrated in example 12.

(12) You **may** go now. (Nuyts 2016, 37)

However, some other modal notions have been discussed to also be part of the deontic modal domain. Among them there are expressions concerning the moral desirability of the state of affairs, which refer to societal, ethical or personal criteria of acceptability and can be illustrated in example 13. According to Nuyts (2016, 36), these types of expressions are also part of the modal domain.

(13) We **cannot** fire him like that, he's been our best employee for years. (Nuyts 2016, 36)

The status of the notions of volition (example 14) and intention (example 15) with respect to the modal domain is highly debated.

(14) I **want** to hear the whole story. (Nuyts 2016, 37)

(15) I **will** never do it again, I promise. (Nuyts 2016, 37)

In some cases these notions have been included in the domain of dynamic modality (Palmer 2001, 10), whereas other approaches have regarded them as marginal notions at the periphery of modality, if not included at all (Nuyts 2006, 12; Palmer 1990[1979], 2,25).

Epistemic modality is by far the most studied type of modality in the literature. It expresses the degree of commitment of the speaker to the likelihood of the representation described in the state of affairs (Narrog 2009, 10; Nuyts 2016). An illustration is given in example 16.

(16) That's **probably** the postman bringing today's newspaper. (Nuyts 2016, 38)

The literature on modality, starting with Lyons (1977) often presents a distinction between objective and subjective epistemic modality. This distinction builds on the notions of contingent possibility and contingent necessity pertaining to the category of alethic modality, which, as mentioned earlier in this chapter, is one of the categories introduced in modal logic. Lyons (1977) relies on this notion to build the distinction between subjective and objective epistemic modality, adopted also by e.g. Coates (1983) and Palmer (1986). Subjective epistemic modality corresponds exclusively to a subjective evaluation of the speaker on the truth-value or the likelihood of the state of affairs. In subjective epistemic modality, the speaker is assessing his/her own personal level of confidence that a certain event described in the state of affairs has occurred (or will occur) or not. The sentence presented in example 16 can be assigned, in Lyons' framework, to the category of subjective epistemic modality: it is a subjective judgment of the speaker that there is a high probability that it is the postman at the door. The notion of subjective epistemic modality corresponds, in Nuyt's framework, to epistemic modality (see next section). Objective epistemic modality on the other hand describes the contingent possibility or necessity of the state of affairs. In other words, this notion, inherited from the category of alethic modality, describes a situation in which there is a 50% chance of an event occurring and a 50% chance of it not occurring. This type of possibility is not attributable to the evaluation of the speaker uttering the statement but is inherent to the situation itself. Example 10 shown above presents a case of objective epistemic modality (in Lyons' framework): in winter, there is an objective possibility that, in the place from which the speaker is uttering this statement, it rains everyday. This possibility does not depend on the speaker's judgment, nor it is related to any participant in the state of affairs. It is, in the framework devised by Nuyts (2016) (and later adopted in the WoPoss project, see the next section), a case of dynamic situational possibility. It is important that the reader keeps the distinction between objective and subjective epistemic modality in mind because some works on epistemic modality in Latin adhere to this framework (see in particular Bertocchi and Orlandini 2001; Orlandini 2001; Fruyt and Orlandini 2003). These concepts will therefore return in the next section, for the introduction of some epistemic markers e.g. *possum* and *oportet*.

Different types of systematisation have been proposed in literature for the organisation of modal notions and categories. Besides the organisation of the modal domain into the two modal notions of possibility and necessity, van der Auwera and Plungian (1998) also propose a distinction between participant-internal and participant-external categories. This distinction depends on the attribution of the notions of possibility or necessity to the main participant (for participant-internal modality) or to the situation described in the state of affairs (participant-external modality). Participant-internal modality concerns the expression of ability or necessity inherent to the main participant, as well as any possibility or necessity

that can be ascribed to the main participant (it corresponds e.g. to example 8). Participant-external modality describes a situation of possibility or necessity that arises either from the situation described in the state of affairs, or from a source of authority (see e.g. example 12).

Another popular way of organising the modal space is by distinguishing root modality and epistemic modality. The definition of root modality changes according to the authors. Sometimes it is identified exclusively with deontic modality, that is with the expressions of notions of permission and obligation (e.g. Chafe 1971; Lyons 1977; Bolkestein 1980). In other approaches it is identified with both deontic and dynamic uses—abilities or necessities that can refer to the participant of the state of affairs or to the state of affairs itself (e.g. Coates 1983; Núñez 1991). Other approaches, along the lines of distinction between root and epistemic modality, divide the modal domain into event modality and propositional modality. This conceptualisation was first introduced by Palmer (2001). In this case, the category defined as event modality includes deontic and dynamic modality, whereas propositional modality includes types of modality that qualify the attitude of the speaker concerning the proposition as it is intended here⁶ i.e., epistemic and evidential modality. Evidential modality will not be part of the analysis in this work. However, it is important to introduce it to orient the reader and prepare the ground for the discussion of previous studies on the co-occurrence of modal markers, which will be presented in the next chapter. Evidential modality, as epistemic modality, expresses the attitude of the speaker towards the factuality of the proposition. The difference with epistemic modality is that while epistemic modality is expressed as a judgment of the speaker, evidential markers indicate the piece of evidence based on which the speaker elaborates his judgment (Palmer 2001, 8) e.g. *she is said to be funny*.

Narrog (2005, 2012) has recently proposed a new model for the internal organisation of the category of modality, which is based on the distinction between the volitive and the non-volitive domain. The volitive domain includes all modal notions that are based on an element of will or force. This covers volition, the notions of permission and obligation by a source of authority, and the notions of possibility and necessity according to moral, societal and/or ethical rules. Non-volitive modality includes all the types of modality that do not refer to such notion of will or force, and therefore epistemic modality and situations of possibility or necessity ascribed to the participant of the state of affairs such as the notion of ability. Although the distinction between the various categories is not always entirely clear, the system proposed by Narrog certainly has the merit of better defining the place and role of the modality expressing volition within the supercategory of modality.

⁶ Narrog (2005, 184) observes that the use of the term ‘proposition’ can be problematic: in linguistics this term can be applied to a variety of concepts. Moreover, different types of modality may have scopes of different length. Namely, types of modality that do not belong to the epistemic domain do not operate on the proposition, but rather within the proposition. In a more recent contribution, Narrog (2012, 6) suggests a loose use of the term proposition, to refer to units of meaning located at different levels of the clause structure.

As mentioned above, Nuyts (2016) builds his modal system on the three main categories that make up the domain of modality: dynamic modality, deontic modality and epistemic modality. Nuyts' systematisation of the modal domain represents the foundation of the WoPoss theoretical framework, which I have adopted in this study, and will be described in the next section.

2.2 Theoretical framework: modality in the WoPoss project

As described in the Introduction, the type of analysis performed in this study is largely based on the WoPoss project and the *Guidelines for annotation* of the WoPoss corpus (Dell'Oro 2023b). The WoPoss theoretical framework is based on a functional-cognitive approach to modality, and in particular to the systematisation proposed by Nuyts (2016). Modality as it is defined in the WoPoss project and in this study, concerns the expression of notions of necessity, possibility, probability and volition with respect to a representation.⁷ The notions of necessity, possibility or probability are expressed by using specific lexical or morphological items, called modal markers. The project targets a list of markers of both types, belonging to different parts of speech. Lexical markers are modal verbs e.g. *possum* 'I can' or *debeo* 'I have to/I must'; modal nouns e.g. *facultas* 'possibility' or *necessitas* 'necessity'; modal adjectives e.g. *dubius* 'doubtful' or *certus* 'certain'; modal adverbs e.g. *dubie* 'doubtfully' or *certe* 'certainly'; modal constructions e.g. *necesse est* 'it is necessary' or the auxiliary verbs *habeo* 'I have' or *sum* 'I am' followed by the infinitive e.g. *habeo facere* 'I have to do'. Morphological modal markers can be the verbal adjectives: in *-bilis* such as *amabilis* 'that can be loved/which is worth loving'; the gerundive e.g. *amandus* 'that must be loved'; the future participle *amaturus* 'which will love', which can express intention or capacity depending on the context.

The modal marker refers to a portion of text, which is defined as its scope. As anticipated in the Introduction, the scope is defined based on a combination of syntactic and semantic criteria: it includes the range of semantic elements affected by the marker in the clause. The scope may or may not describe a state of affairs, that is, a representation. Let us consider example 17.

(17) Five years with them and he must have learned an awful lot.

In this sentence, the modal verb *must* expresses a modal notion of epistemic necessity (I have briefly introduced the modal categories earlier in this chapter, I will elaborate about them later in this section). The marker *must* scopes over the portion of text *have learned*

⁷ The annotation schema conceived within the WoPoss project concerns also markers of volition and intention. This study does not include the notions of volition and intention.

an awful lot. In this sentence, the semantic scope of *must* describes a state of affairs, that is, the representation according to which 'he has learned an awful lot'. The verb *must* is a modal marker of epistemic necessity which modalises the representation 'he has learned an awful lot', expressing the belief of the speaker that the participant of the semantic scope *he* has learned a lot during the past five years. In this case, the scope has a participant that is engaged in the state of affairs, which is *he*.⁸

The annotation schema used for the annotation of the WoPoss corpus is very fine-grained. The marker is annotated based on its modal, pre-modal or post-modal use; its polarity; the sentence function. If the scope of the marker contains a state of affairs, this is described in terms of its polarity; the sentence function; the presence or absence of the features of dynamicity and control, based on the semantic description of predications presented by Dik (1997). The state of affairs is also described in terms of the presence or absence of a participant, which is defined based on the feature of animacy and on its semantic macro-role in the sentence (agent or patient).

The modal meaning expressed in the sentence by the modal marker is defined in the WoPoss framework as the relation between the modal marker and the representation modalised by the marker. Based on Nuyts (2016) the WoPoss annotation schema builds on three main modal categories: dynamic modality, deontic modality and epistemic modality.

As mentioned in the previous section, the category of dynamic modality traditionally expresses the internal needs and capacities of the participant. Nuyts (2016, 35) keeps this definition as a sub-type of dynamic modality, and labels it participant-inherent modality. Dynamic possibility or necessity in the sub-type participant-inherent describe an ability or a need of the participant. Consider again examples 18 and 19.

(18) = (8) He can stand on his head without using his hands. (Nuyts 2016, 34)

(19) = (9) I had to snatch a cookie, I couldn't resist the temptation. (Nuyts 2016, 34)

However Nuyts (2016, 35), following van der Auwera and Plungian (1998), observes that dynamic modality should also include situations of possibility or necessity that "are determined by the external circumstances". This sub-type of dynamic modality is called participant-imposed. Dynamic possibility or necessity in the sub-type participant-imposed describe situations of possibility or necessity that are external to the participant. Consider examples 20 and 21.

⁸ Not all state of affairs necessarily have a participant e.g. in the utterance *It might rain tomorrow*, *might* expresses epistemic possibility i.e., the belief of the speaker that there is a possibility that tomorrow it will rain. In this case, the state of affairs 'it rains tomorrow' does not have a participant.

(20) The garage is free so you can park there. (Nuyts 2016, 35)

(21) To get into the garden you must pass through the patio. (Nuyts 2016, 35)

The third sub-type of dynamic modality is situational modality, where possibility and necessity are inherent to the situation described in the state of affairs, and not to the participant, which could also be completely missing. Dynamic possibility or necessity in the sub-type situational describe a situation of possibility or necessity that is inherent the state of affairs. Consider examples 22 and 23.

(22) = (10) It **can** rain here every day in winter. (Nuyts 2016, 35)

(23) = (11) The driver was so drunk that this car accident **had to** happen. (Nuyts 2016, 35)

The status of situational modality within the category of dynamic modality is the most debated one for this category, because situational modality is ascribed in other theories e.g. by van der Auwera and Plungian (1998) to the category of participant-external modality. In the WoPoss project dynamic modality preserves the distinction proposed by Nuyts into three sub-types participant-inherent, participant-imposed and situational. It is defined as the description of a situation of possibility or necessity that can be inherent or imposed to the participant, or which can be inherent to the situation described in the state of affairs.

I have introduced in the previous section the definition of the category of deontic modality in terms of expressions of permission and obligation. I have also mentioned that according to Nuyts (2016, 36) this definition is too restrictive and does not cover other cases in which the participant is subject to moral and ethical norms, or rules related to society. Therefore deontic modality, unlike dynamic modality, can be conceived as a scalar category, in which the modal expressions represent different degrees of the desirability of the state of affairs. The scale can have positive or negative orientation, if the notion goes towards respectively the concept of desirability or that of undesirability. In the WoPoss project, the two types of deontic modality are defined as deontic authority (where a person or a law represents the source of authority) and deontic acceptability (where the representation is qualified as more or less acceptable based on moral, ethical or societal rules)⁹. Deontic authority corresponds to a permission (possibility) or an obligation (necessity) which is imposed to the participant by some source of authority. It is also possible to have a third value of recommendation, that lies midway between the notion of permission and that of obligation. The source of

⁹ As mentioned in the previous section, Nuyts discusses also the status of the notions of volition and intention within the category of deontic modality. In the WoPoss framework, both notions are part of the deontic domain, but I will not discuss them further, as they will not be part of this study.

authority can identify with a person, but also social or ethical norms. Consider examples 24 and 25.

(24) You **must** go now. (Nuyts 2016, 37)

(25) = (12) You **may** go now. (Nuyts 2016, 37)

Deontic acceptability corresponds to the evaluation of the moral desirability of the state of affairs, according to moral norms. Consider example 26.

(26) = (13) We **cannot** fire him like that, he's been our best employee for years. (Nuyts 2016, 36)

Deontic acceptability is a gradable notion, which can take different values going from the negative to the positive pole of the scale. The values in the scale of acceptability in the WoPoss framework are: absolutely necessary, desirable, acceptable, not very desirable, unacceptable. The sentence illustrated in example 26 expresses a degree of acceptability corresponding to the value 'unacceptable': the modal verb *cannot* expresses the moral unacceptability of firing the best employee of the company.

Epistemic modality in our framework describes a subjective evaluation of the speaker on the truth-value or the likelihood of the state of affairs. As deontic acceptability, epistemic modality is also a gradable notion, which has a negative and a positive pole, and all the intermediate degrees describing the extent to which the speaker believes in the realisation of the state of affairs. In the WoPoss annotation schema, the degrees of the scale of epistemic modality are 'impossible', 'improbable', 'possible', 'probable' to 'absolutely certain'. Consider example 27.

(27) = (16) That's **probably** the postman bringing today's newspaper. (Nuyts 2016, 38)

In this sentence, the speaker expresses his belief that there are good chances that the person who is ringing the bell is the postman with the newspaper of the day. The degree of epistemic modality expressed in this sentence corresponds to 'probable'.

The guidelines for the annotation of the WoPoss corpus cover also other semantic elements that are extremely important for the analysis of a modal passage. These are the description of the state of affairs and of the participant, as well as other semantic features of both the marker and the scope, such as their polarity. However, as I will explain in Chapter 5, the analysis of the modal passages in this work will not cover these elements. Therefore I will not indulge on them.

2.3 Modality in Latin

The expression of modality in Latin has been the object of two important monographs authored by Bolkestein (1980) and Núñez (1991), and the collection of articles edited by Fruyt and Moussy (2002). Bolkestein (1980) provides an early description of some modal verbs and constructions in Latin, paving the way to the following works. Bolkestein does not explicitly define modality, but targets those expressions in Latin that can have "various shades of necessity and obligation... which may therefore be said to have a "modal" meaning" (Bolkestein 1980, 1). Such expressions count the modal verbs or constructions *oportet*, *debeo*, *necesse est* and the gerundive with *sum*. The study is especially focused on the formal properties of such expressions i.e., the syntactic constructions in which they occur, the type of semantic restrictions of the other sentence constituents, and how their modal value can be determined based on their formal properties in the sentence. For instance, Bolkestein observes that the "inferential value" (which would be annotated as epistemic in the framework adopted in this study) is only observed for *oportet*, *debeo* and *necesse est*, but not for the construction gerundive + *sum*, which only appears with a deontic meaning. This leads to a limited distribution of this construction in the corpus of texts used by Bolkestein with respect to other expressions of necessity such as *oportet*, *debeo* and *necesse est* (Bolkestein 1980, 137). Bolkestein declares that her study is based on a selection of texts going from Caton to Apuleius, whose passages were selected from the most comprehensive Latin lexicographic resource, the monolingual dictionary *Thesaurus Linguae Latinae* (ThLL, 1900–). However, as Tucker (1983, 146) points out, the author does not provide the full corpus of texts on which the results were drawn, but only a selection of passages at the end of the volume. Providing a clear description of the corpus used as a reference for the study would have been beneficial. It would have contributed to a clearer understanding of the quantitative significance of the results. By specifying the size and characteristics of the corpus, the reader could more accurately gauge the reliability and generalisability of the study's findings.

Núñez (1991) on the other hand provides first a thorough introduction to the definition of modality and to the theoretical framework of reference. The organisation of the modal domain in the framework adopted by Núñez is somewhat close to what has been described for the WoPoss corpus, with the tripartition of the modal domain into three main categories, though expressed with different labels—namely, the use of the label of root modality (Núñez 1991, 63) for notions that would be classified for the most part as dynamic modality in our framework. The study performed by Núñez covers also the expression of modality by grammatical moods. Besides moods, Núñez focuses his analysis on frequent verbs and constructions expressing necessity and possibility, such as *debeo*, *licet*, *necesse est*, *oportet*, *possum*. The only mention to other parts of speech concerns adverbs and adverbial constructions such as *certe*, *profecto*, *dubie*, *haud dubio*. However, these expressions are only quickly classified as

epistemic (Núñez 1991, 65), and mentioned only with respect to the possibility of combining with other epistemic (verbal) markers (Núñez 1991, 173, see section 3.3, in the next chapter).

The collection of contributions edited by Fruyt and Moussy (2002) provides insights on various theoretical issues and specific analyses of different types of modal expressions in Latin. The work by Bertocchi and Orlandini (2002) is particularly relevant to this study. The authors focus on two expressions of necessity and possibility, respectively *necesse est* and *fieri potest ut*, and analyse them by applying the aristotelian square of logical oppositions. Specific works on modal markers investigated in the framework of this study are also Moussy (2002b) on *nequeo*; Rodríguez (2002) on *debeo*; Núñez (2002) on *certe* (together with *profecto*). Other equally important contributions, although not concerned with the type of markers targeted in this study, but still within the type of markers analysed in the WoPoss framework, are Arial Abellán (2002) and Nadjo (2002) on the adjectives in *-bilis*¹⁰, and Joffre (2002) on the construction of the gerundive with *sum*.

Besides the main monographs on the subject, the expression of modality in Latin has been the object of a number of contributions. One of the most important ones is the work by Magni on the description of the modal system in Latin, and its possible diachronic pathways. Magni (2005;2010) gives an overview of the Latin modal system, including the use of grammatical mood as a mean to express modal notions. One of the main outcomes of the work performed by Magni is the outline of a diachronic map for some Latin modal verbs and expressions. The map is based on the cross-linguistic modal pathways described by Bybee, Perkins and Pagliuca (1994), and on the work by van der Auwera and Plungian (1998). Magni describes possible pathways of diachronic semantic evolution for the main modal verbs and expressions in Latin i.e., *possum*, *licet*, *necesse*, *oportet* and *debeo*. Drawing on previous work, in the framework of the WoPoss project we have drawn diachronic maps for 75 Latin lexical modal markers annotated in the WoPoss corpus (Marongiu and Dell’Oro 2022). The maps are based on the lexicographic description of each marker in the *Thesaurus Linguae Latinae* (ThLL) mentioned above, (1900–) or the *Oxford Latin Dictionary* (OLD, 1982), if the *Thesaurus* did not include the entry for the modal lemma in question yet. For each marker, we analysed the attestations provided by these two lexicographic source, and identified the passages where the marker was modal, and the type of modality expressed in the specific context.¹¹ Once the analysis was conducted, we identified the first attestations of the sense(s) of the markers based on the evidence provided by the attestations. All the

¹⁰ See also Dell’Oro (2019) for a comparison between the adjectives in *-bilis* in Latin and the *-ιμος* adjectives in Ancient Greek.

¹¹ It is important to clarify that the results of this study are based solely on lexicographic data and, in some cases, on previous studies on Latin lexical modal marker. A further analysis on manually annotated data, namely the dataset provided by the WoPoss corpus, might provide new insights on the modal senses expressed by the markers and their diachronic development.

collected material was then organized chronologically and transposed into freely accessible visualisations on the WoPoss website, which can be consulted at the following address <https://woposs.unine.ch/diachronic-visualisations.html#maps>.

The WoPoss project should also be mentioned with respect to the possibility of performing corpus-based studies on the expression of modality in Latin. All the studies presented so far, while valuable in their scientific contribution, lack a quantitative dimension that can only emerge by conceiving this type of research within the framework of corpus linguistics. Traugott (2011, 391) observes that, although historical studies can benefit nowadays of corpus linguistics resources, however, most of the corpus-based studies on the diachrony of modality have been performed on English (Krug 2000; Facchinetti, Krug, and Palmer 2003; Leech et al. 2009). The diachronic pathways of evolution of modality have been the object of numerous studies, as mentioned in the previous section (Bybee, Perkins, and Pagliuca 1994; Bybee and Fleischman 1995; van der Auwera and Plungian 1998 for cross-linguistic models). The literature offers also studies on the diachrony of specific Latin modal markers (see e.g. Purnelle 1998, 2001; Bolkestein 1980, 120–133; and the aforementioned studies by Magni on a semantic map for modality in Latin). A diachronic corpus of Latin annotated with modality represents an important contribution both to the theoretical studies on modality in general and to the studies on the expression of modality in Latin. The WoPoss corpus, with an extremely rich annotation scheme, will be able to contribute to these studies by providing an annotated corpus on which quantitative and qualitative analyses can be performed on a multi-varied perspective—synchronic or diachronic, by author or by genre. In particular, it aims at filling a gap in the domain of resources available for Latin, quite rich with respect to other historical languages, but which can still be improved, especially concerning historical semantics.

Other important contributions, related to the aforementioned article by Bertocchi and Orlandini (2002), are Orlandini (2001), Bertocchi and Orlandini (2001) and Fruyt and Orlandini (2003). In these works, Latin verbs, adverbs, and constructions are analysed in order to determine if they can be used with an epistemic meaning, and in which syntactic and/or semantic contexts. The analyses presented in these articles build on the distinction mentioned above between subjective and objective epistemic modality, which can be understood in our terms as the distinction between epistemic modality i.e., the expression of the subjective judgment of the speaker on the veracity or likelihood of the state of affairs and situational modality i.e., the expression, in this specific context, of a possibility inherent the situation described in the state of affairs. The expressions targeted in the analysis are adverbs such as *fortasse* and *certe*, expressing two different degrees of certainty of the speaker; the construction *fieri potest*; modal verbs such as *potest*, *debeo*, *oportet*. In Orlandini and Poccetti (2012) this distinction is applied to a study of the uses of *possum* and *debeo*, with a specific focus on

verb tense and mood. The authors discuss how the use of *possum* and *debeo* in the present indicative can range from the deontic notion of permission or obligation to the epistemic notion of probability or contingent possibility (dynamic-situational within the framework of WoPoss). As mentioned in the Introduction, Orlandini (2001) also applies and adapts the model of the square of modal oppositions to Latin, both for the distinction of objective and subjective epistemic modality and for the domain of deontic modality. Her main focus in this case is investigating how negation interacts with the modal notions expressed by the modal marker under the scope of negation. The notions of the square of modal oppositions, adapted to different domains, and of the interaction of the modal markers with the presence of a negative particle will be of interest for this work especially in the analysis of co-occurrences that do not instantiate a scope hierarchy (see Chapter 8).

2.4 Latin modal markers

As mentioned in the previous section, Latin can express modal notions through different types of markers. Latin modal markers include lexical units such as verbs, adverbs, nouns, and adjectives; copular constructions formed by a noun or the neuter form of an adjective with the verb *esse*; morphological elements such as the adjectival suffix *-bilis* or the gerundive in *-ndus*. Other semantic categories encoded at the morphological level such as verbal mood can also be used to convey some types of modality (Magni 2010). In this section, I will provide an overview of the markers that I have considered for this study. In order to detect the co-occurrences, I compiled a list of lexical markers (adjectives, adverbs, nouns, verbs and verbal constructions) that can express notions of necessity or possibility in Latin across various modal categories. The list is based on the one elaborated within the framework of the WoPoss project (refer to section 2.2 in this chapter). The list of modal markers used for this study makes no claim to be exhaustive. I have aimed at including as many lexical markers as possible, covering various parts of speech. I discarded the morphological markers e.g. adjectival suffix *-bilis*, the suffix of the gerundive *-ndus*, the future participle in *-turus* and the constructions with an infinitival complement and the auxiliaries *sum* and *habeo* e.g. *aliquid facere habeo* ‘I have to do something’. The list includes nouns (e.g. *necessitas* ‘necessity’, *possibilitas* ‘possibility’), adverbs (e.g. *certe* ‘certainly’, *fortasse* ‘maybe, perhaps’), adjectives (e.g. *dubius* ‘doubtful’, *necessarius* ‘necessary’), and modal constructions (e.g. *ius est* ‘it is lawful, it is right’, *necesse est* ‘it is necessary’).

The markers chosen to be included in the study were selected for various reasons. As I will show in the following chapter, the co-occurrence of modal markers has been proven to be a cross-linguistically rare phenomenon. Therefore, I chose to include all the lexical markers

from the WoPoss list, in order to be able to gather a sample of co-occurrence as large as possible. Additionally, since the research project aims at observing the relationships between expressions of possibility and necessity within the sentence, I have selected all the markers from the WoPoss list that express one (or both) of these concepts, excluding volitional markers such as *volo* 'I want' and *nolo* 'I do not want'. Lastly, I constructed the list in such a way that potentially interesting semantic relationships could emerge from the co-occurrence retrieval. For instance, the list includes pairs of markers with opposite polarities e.g. *aequus* and *iniquus*. As will be shown later, especially in Chapter 8, some non-hierarchical co-occurrences build upon oppositional relationships. In the Introduction, I mentioned the modal square and the relationships among its different poles. Similarly, in non-hierarchical co-occurrences, markers that occur in two separate clauses can oppose each other based on i) the type of expressed modality (possibility and necessity e.g. *possum* and *debeo*), or ii) their polarity (positive or negative). Opposition in terms of polarity can be achieved through the use of external negation over the same marker (e.g. *licet... non licet*) or through the use of another lemma with a negative prefix (e.g. *aequus* and *iniquus*).¹²

In the following sections, I will describe the markers targeted for this study in more details. For each marker, I will provide its meaning(s) and its possible modal readings, followed by an example for each modal reading.¹³ The following lemmas do not appear in the following summaries, though they were originally part of the WoPoss list of annotated markers: *indubitate*, *indubitanter* 'without any doubt', *illicitus* 'not allowed, prohibited' and the construction *illicitum est* 'it is not allowed, it is forbidden', *possibilis* 'possible', *possibilitas* 'possibility', and *possibiliter* 'according to what is possible'. The work carried out for the creation of the aforementioned diachronic maps of Latin modality (Marongiu and Dell'Oro 2022) has shown that, at least according to the lexicographic sources at our disposal, the markers mentioned above are attested later, compared to the time span taken as a reference in this study. As anticipated in the Introduction and as it will be explained more extensively in Chapter 4, this work focuses on Classical Latin, specifically on the period going from 90 BC to 14 CE (Cuzzolin 2019, 20). However, *illicitus*, *indubitate*, and *possibilis* are attested starting from the I century CE; *possibilitas* from the II century CE; *indubitanter* and *possibiliter* from the IV century CE.¹⁴ To confirm the lexicographic data and ensure that these markers indeed do not appear in my corpus of Classical Latin, I nonetheless included these lemmas in the queries

¹² It will emerge from this study that *aequus* and *iniquus*, in particular, co-occur only with each other i.e., *aequus* co-occurs with *iniquus*.

¹³ The translations of the examples presented throughout this work are mine, unless a reference translation is specified.

¹⁴ For the map of *illicitus*, see <https://woposs.unine.ch/maps/map-illicitus.html>; for the map of *indubitanter*, see <https://woposs.unine.ch/maps/map-indubitanter.html>; for the map of *indubitate*, see <https://woposs.unine.ch/maps/map-indubitate.html>; for the map of *possibilitas*, see <https://woposs.unine.ch/maps/map-possibilitas.html>; for the map of *possibiliter*, see <https://woposs.unine.ch/maps/map-possibiliter.html>.

for the co-occurrences. The results confirm that none of them occurs in my corpus, either alone or in co-occurrence with other markers. For this reason, they will not be described in the subsequent sections.

Prior to describing each modal marker in the list, it is crucial to introduce two important features, in order to ensure a comprehensive description of their semantics and syntax. As it emerges from the overview on modality presented in the previous sections, modal markers are often polyfunctional: the same marker can be associated with more than one type of modality, depending on the syntactic and semantic context in which the marker occurs, as well as on the context in which the utterance is produced (semantic and pragmatic polyfunctionality, van der Auwera 1999, 62). This property has been proven to be cross-linguistically valid (van der Auwera 1999), and Latin makes no exception. Many of the Latin modal markers that will appear in this chapter are indeed polyfunctional (see e.g. Magni 2010, 212). For instance, as it was mentioned above and will be shown shortly with examples, the Latin modal verbs *debeo* 'I have to' and *possum* 'I can' can express dynamic, deontic (authority or acceptability) or epistemic modality, depending on the context of the utterance. Nonetheless, there are also examples of modal markers typically associated with only one specific type of modality. This is the case of the epistemic adverbs e.g. *certe* 'certainly'¹⁵, or the epistemic construction *dubium est* 'it is doubtful'.

Another point worth dwelling on to introduce the markers studied in this work is the syntactic relation between the markers and the concept of argument structure. Each marker is associated with one or more argument structures i.e., it can occur in multiple syntactic construction patterns within which one or more slots must be obligatorily filled for the utterance to be grammatical. The nuclear predication of a simple clause consists of the main predicate and its arguments i.e., constituents that are mandatory for the clause to be grammatical or for the predicate to have a specific meaning. The number and type of arguments required by the main predicate is specified by its valency (Dik 1997, 78–79; 86–90 for a general overview in Functional Grammar; Pinkster 2015, 19–22 and Ottink and Schrickx 2019, 4 for Latin). For instance, the verb *dico* with the meaning 'to tell' has a 3-slot valency frame. Consider example 28.

- (28) *ego=ne istuc dixi tibi?*
 I=Q this say you

¹⁵ It should be noted however, that these and other markers can be used for other purposes than expressing the epistemic judgement of the speaker on the propositional content of the utterance. They can be used, for example, as focalisers to highlight specific constituents of the sentence. They can also be used in argumentative concessive constructions in co-occurrence with an adversative conjunction e.g. *certe... sed* 'certainly/sure..., but' (refer to the sections of the epistemic adverbs *certe*, *fortasse* etc. for examples). It is important to note that concessivity falls within the post-modal categories as defined in van der Auwera and Plungian (1998, 98).

I said that to you? (Plautus, *Bacchides* 806) (from Pinkster 2015, 20)

In this sentence, *ego* 'I', *istuc* 'this' and *tibi* 'to you' are the mandatory constituents to fill the valency frame of the verb *dico* with the meaning 'to tell' i.e., to tell (*dixi*) something (*istuc*) to someone (*tibi*). Valency is not a prerogative of verbs. Adjectives and nouns are also be associated with valency frames e.g. *similis* 'alike' has a bivalent valency frame as it requires a referent and a term of comparison to complete its meaning. Consider example 29.

- (29) *sic* *dicitur* ***similis*** *homo* *homini*
 in_this_way say alike man man

Thus a human being is said to be **like** a human being (Varro, *De lingua latina* 10, 4) (from Pinkster 2015, 21)

In this example, the two constituents *homo* (in nominative) and *homini* (in dative) fill the two obligatory slots of the valency frame associated with the adjective *similis* i.e., the two terms of comparison.

Other constituents that are not mandatory in the valency frame of a verb, a certain construction or an adjective, but that can be added to the predication in order to provide further information are called satellites. For instance, the clause in example 28 could be enriched with an indication of time: *egone istuc dixi tibi noctu?* 'I said that to you at night?'. In this case, *noctu* is a satellite constituent.¹⁶ This constituent adds an important piece of information to the predication, but it is not obligatory for the clause to be grammatical.

In some cases, if a polyfunctional modal marker can occur with different patterns, each pattern can correspond to different modal values and, therefore, may be related to the polyfunctionality of the marker (Bolkestein 1980; Núñez 1991). The argument structure with which the markers are associated and their syntactic role within the sentence are crucial to determine the syntactic relationship between the co-occurring markers. In particular, this plays a significant role in determining the presence or absence of scope hierarchisation in the co-occurrence (refer to examples 6 and 7 in the Introduction for, respectively, hierarchical and non hierarchical co-occurrences). The types of syntactic relationship that can be observed between co-occurring markers will be extensively described in Chapter 5. In this chapter, I will specify for each marker the different syntactic patterns with which it can occur.

In the following sections I will present the markers targeted in this study. When possible, I will present the types of modality and construction patterns associated with each marker

¹⁶ It is worth mentioning that the notion of valency and the distinction between arguments and satellites is debated. For some scholars this distinction is too neat, and the notion of valency should be scalar, as in some cases a constituent could be more or less obligatory than another one (Dik 1997, 87; Pinkster 2015, 21).

included in my list by referring to the literature about Latin modality. I will also refer to the aforementioned diachronic maps of modal markers produced within the WoPoss project and described in Marongiu and Dell'Oro (2022). I will provide a link to the map published on the WoPoss website for each marker. When necessary due to a lack of (unambiguous and/or simple) examples in the literature or in the diachronic maps, I will present passages from the ThLL, to which I have applied my own analysis. For all the examples shown in the following sections I will mention the source.

2.4.1 *Aequus*, -a, -um and *Iniquus*, -a, -um

The adjective *aequus* is one of the least studied markers among the ones presented in these sections. It is mentioned only marginally in broader studies on the expression of modality in Latin (e.g. Fruyt and Orlandini 2003, 104; Thomas 2002, 104–105; Magni 2010, 210; Viti 2018); however it has not been the subject of specific research so far, as it has been the case instead for other markers such as *debeo* and *possum* among others. The diachronic development of *aequus* and all the associated meanings and constructions can be visualised in the WoPoss diachronic map online (Marongiu and Dell'Oro 2021a).¹⁷

The ThLL lists for this adjective a primary concrete sense that expresses to the notion of flatness referred to some type of surface: 'flat, that does not show unevenness'. According to Ernout and Meillet (2001, *s.v. aequus*), from this concrete meaning derived more abstract meanings, in particular 'propitius, advantageous', especially referred to a battle field; and 'right, equal', describing a moral, ethical quality, often found in co-occurrence with the adjective *bonus* 'good' (*aequum et bonum*).

From this last mentioned sense derives the most common modal use of *aequus*, which is specifically associated with the construction *aequum est* 'it is right'. This construction results from the combination of the neuter singular form of the adjective (*aequum*) and the copula *esse*. This construction is briefly mentioned in some reference works for Latin modality as one of the ways that Latin uses to express necessity (Fruyt and Orlandini 2003, 104; Thomas 2002, 104–105; Magni 2010, 210; Viti 2018). Bolkestein (1980, 153), Núñez (1991, 65) and Magni (2010, 210) exclude any possible epistemic reading of this construction, an analysis which is confirmed in Marongiu and Dell'Oro (2021a). For this reason, the construction *aequum est* is defined in these works as semi-modal. This concept will return in the descriptions of some other markers presented in this chapter that do not express epistemic modality. As it is observed in Thomas (2002, 104), the type of necessity conveyed by the construction *aequum est* predominantly builds on a moral or ethical evaluation on the part of the speaker part, which corresponds, in our reference framework, to deontic modality of

¹⁷ <https://woposs.unine.ch/maps/map-aequus.html>

the type acceptability. The construction with this modal value can be translated as ‘it is just, right, proper’ (Magni 2010, 210). The same observations hold for other similar constructions, such as *aequum videtur* ‘it seems right’. An illustration of the value of deontic acceptability is given in example 30.

- (30) *Vera dico; ad suum quemque hominem quaestum esse*
 true say to his_own each_one man advantage be
aequomst(= *aequum est*) *callidum*.
 be_right ingenious

I am telling the truth; **it is right** for any man to be ingenious regarding his own advantage (Plautus, *Asinaria* 186) (from Thomas 2002, 104)

The use of *aequum est* to express a non-evaluative type of modality is not entirely excluded by Thomas (2002, 105), who, however, dismisses it as a much less frequent use compared to the evaluative one, and does not provide any examples for this sense. In Marongiu and Dell’Oro (2021a), we confirm that *aequus* (but not *aequum est*) can be used to express a non-evaluative type of modality. In the diachronic map we present a passage from the ThLL entry for *aequus*, where the adjective alone, used with a predicative function, exhibits a dynamic value of possibility or suitability, which emerges when the adjective means ‘right, suitable’. To my knowledge, this modal value is not discussed in literature. Consider example 31.

- (31) *locum se aecum*(= *aequum*) *ad dimicandum dedisse*.
 place self right to fight assign

He had chosen a **suitable** place for fighting. (Caesar, *Commentarii de bello civili* 3, 73, 5)

Aequus is one of those markers for which a corpus-based study would certainly provide us with more knowledge about its modal (and non-modal) uses. Not only because, as mentioned earlier, it has not received particular attention in literature, but also because the modal uses of *aequum est* are attested already in Early Latin (see example 30), and sometimes even before the concrete senses from which they are supposed to originate (in the diachronic map, the senses ‘flat, level’ and ‘flat area’ are attested in the I century BC).

Argument structure. The impersonal construction *aequum est* is associated with a one-slot pattern. It is typically constructed with an accusative with infinitive clause, which functions as the subject of the impersonal expression (Viti 2018, 17; Pinkster 2021, 183). An illustration of an accusative and infinitive clause functioning as an argument to *aequum est* was given in example 30 (*ad suum quemque hominem quaestum esse ... callidum*).

When *aequus* conveys a dynamic possibility value with the meaning ‘apt, suitable’ it seems to occur as a predicative adjective with a two-slot construction pattern. This use was illustrated in example 31. The first argument is filled with a nominal constituent, which expresses the entity that is suitable (*locum*), and the second argument is filled with a prepositional gerundive (*ad* + gerundive in accusative case), expressing the type of activity or goal for which the entity is suitable (*ad dimicandum*).

The negative counterpart of *aequus* is the adjective *iniquus*, -a, -um. This adjective has not received any specific attention in the literature as a potential modal marker, to my knowledge. Therefore, for the description of its modal values I will rely entirely on the diachronic map from Marongiu and Dell’Oro (2021t).¹⁸ The lemma *iniquus* is formed by adding the negative prefix *in-* to the adjective *aequus*. The prefix *in-* in this case expresses a type of negation called privation, by which the quality indicated by the adjective *aequus* is neutralised in the resulting form *iniquus* (Cuzzolin 2021, 68–70) (*iniquus* = *non aequus*). In its modal uses *iniquus* behaves as *aequus*, both concerning the types of modality expressed and the syntactic patterns associated with them.

Used in the constructions *iniquum est* ‘it is not fair, unacceptable’ and variants *iniquum videtur* ‘it seems unfair, not right’ and similar, *iniquus* can express deontic acceptability with the value of undesirability. Consider example 32.

- (32) CHARINUS *iniquum est*, quia isti prius quam mihi dedit.
 CHARINUS unfair be because this_one before than me give

CHARINUS. **It is unfair**, because he gave it to him before me (i.e., the possibility to draw the lot from the urn). (Plautus, *Casina* 378) (from Marongiu and Dell’Oro 2021t)

In this passage, which belongs to the comedy *Casina* by Plautus, the two slaves Olympio and Charinus compete to marry the slave-girl Casina. To determine the outcome of the dispute, the two draw lots from an urn, one each. Fate favors Olympio, and in this verse, Charinus complains, saying that the outcome is unfair because his companion had the opportunity to draw first. The syntactic scope of the construction in this passage is implicit: the representation to which the speaker refers is explained in the subordinate clause introduced by *quia* i.e., it is unjust that his companion had the opportunity to draw the lot first. This passage is shown in the diachronic map for *iniquus* as the first attestation in the ThLL where we could find the modal use of *iniquum est* (Marongiu and Dell’Oro 2021t). However, to provide a clearer illustration of the deontic use of *iniquum est*, I propose another passage from one of

¹⁸ <https://woposs.unine.ch/maps/map-iniquus.html>

the texts included in the corpus used for this study, specifically the *Rhetorica ad Herennium*¹⁹. Consider example 33.

- (33) *quam nobis fortuna facultatem dedisset, iniquum erat in eorum*
 that us fate advantage give unfair be towards they
supplicium consumere.
 punishment lay_out

It was unfair to use the advantage that the fate had given to us to inflict punishment on them (i.e., referred to a king captured in war). (*Rhetorica ad Herennium* 4, 16, 23)

As for *aequus*, when *iniquus* is used as a predicative adjective it can also express dynamic modality with the meaning ‘not adequate, unsuitable’ (example 34).

- (34) *Gravis est rubrica, ut idem Atticus ait, et ad comprehendendum*
 heavy be red_ochre as himself Atticus say and to hold
radicibus iniqua.
 root not_suitable

Red ochre is heavy, as Atticus himself says, and it is **not suitable** for the roots to hold. (Columella, *De re rustica* 3, 11, 10) (from Marongiu and Dell’Oro 2021t)

Argument structure. *Iniquus* is associated to the same patterns as its positive counterpart. When it occurs in the impersonal construction *iniquum est*, expressing deontic acceptability, the construction governs a subject argument clause expressed by an accusative with infinitive clause (*quam ... facultatem ... in eorum supplicium consumere* in example 33) (see Pinkster 2021, 210 for another example of this construction).

The same applies to the dynamic uses of *iniquus* occurring as a predicative adjective. When it is modal and expresses dynamic possibility, the adjective is constructed with *ad* and gerundive in the accusative case (*ad comprehendendum* in example 34).

2.4.2 Aptus, -a, -um and Ineptus, -a, -um

As for *aequus*, the adjective *aptus* has not received much attention in previous studies on Latin modal markers. The only mention to this adjective and its modal use is found, to my knowledge, in Pinkster (2021, 462–470), whose focus, however, is on the syntactic construction of the adjective rather than on its modal uses. Therefore, the illustration of the modal

¹⁹ For a complete list of the texts included in the corpus, see Table 4.1 in Chapter 4 (page 137). See Chapter 4 for a more general discussion on the construction of the corpus.

senses found for *aptus* will be based on the diachronic map for this adjective (Marongiu and Dell'Oro 2021b)²⁰. Non-modal meanings associated with *aptus* refer to the concept of bond, connection: 'properly joined, joined together', 'connected' or 'closely associated'. From these meanings developed the two modal meaning of this adjective.

As *aequus*, *aptus* can be used in the impersonal construction *aptum est*, which expresses deontic acceptability with the degree desirable. When used with this modal meaning, *aptum est* expresses the sense 'apt, appropriate, conforming to'. Consider example 35.

- (35) *quam enim appellant εὐδοξίαν, aptius est bonam famam hoc*
 which indeed call εὐδοξίαν appropriate be good reputation this
loco appellare quam gloriam.
 place call than honor

what they (i.e., the Stoics) actually call εὐδοξίαν, **it is more appropriate** to call it here good reputation rather than honor. (Cicero, *De finibus bonorum et malorum* 3, 57) (from Marongiu and Dell'Oro 2021b)

In this context, Cicero is talking about which translation is the most appropriate one for the Ancient Greek term εὐδοξίαν, in a specific context. In this case, *aptum est* is used with the comparative form of the adjective, *aptius* 'more appropriate'. In this example, the value of deontic acceptability expressed by the construction is not exactly referring to moral or ethical rules, but rather to specific rules regarding the translation of a word in a particular context.

When used alone as a predicative adjective with the sense 'able to, suitable', *aptus* can express dynamic possibility, specifically indicating capability, ability. Consider example 36.

- (36) *cum te unum ex omnibus ad dicendum maxume natum*
 because you one among all to speak great born
aptum=que cognossem.
 suitable=and know

Since in you I saw the best and most **suitable** man among all for the study of eloquence (lit. to speak, make a speech). (Cicero, *De oratore* 1, 99) (from Marongiu and Dell'Oro 2021b)

In this context, *aptus* is used as a predicative adjective to *te* 'you', and indicates the ability of the subject in the art of eloquence.

²⁰ <https://woposs.unine.ch/maps/map-aptus.html>

Argument structure. Although the modal interpretations of *aptus* are not the focus of his chapter, Pinkster (2021, 462–470) provides specific examples of different constructions with which *aptus* can occur. *Aptus* is a two-place adjective indicating ability or suitability that can take a clause as one of its arguments. The other slot is filled with a nominal constituent to which the ability is attributed. The clause can be expressed by various syntactic structures. One of these structures is illustrated in example 36, where the syntactic scope of *aptus* is expressed by a prepositional gerundive (*ad* + *dicendum*, from *dico* ‘to speak’). In other cases, the gerundive can occur together with a nominal constituent e.g. *aptum ad animos conciliandos* (‘**suitable** to calm down an audience’ Cicero, *De oratore* 3, 204 from Pinkster 2021, 468). Alternatively, the adjective can scope over a gerund in the genitive or the dative case e.g. *apta natando crura* ‘legs **adapted** to swimming’ (Ovidius, *Metamorphoses* 15, 375–377 from Pinkster 2021, 466). The argument clause can also be expressed by an infinitive e.g. *colles silvaeque montanas occulere apta feras* ‘hills and a forest **suited** for hiding mountain animals’ (Ovidius, *Fasti* 2, 215–216 from Pinkster 2021, 465) or by a subjunctive introduced by *ut* e.g. *aptus es ut sis amicus noster* ‘you are **suited** to be our friend’ (*Vulgata, libri Macchabaeorum* 1, 10, 19 from Pinkster 2021, 465).

Pinkster does not discuss impersonal uses of *aptus* in the construction *aptum est*. However, as shown in example 35, when *aptus* is used in impersonal constructions such as *aptum est*, *aptum videtur* and similar, it occurs with a one-slot pattern. In such cases, as for *aequum est* and similar constructions, the argument slot is filled with an infinitive clause.

The negative counterpart of *aptus* is the adjective *ineptus*, formed, as *iniquus*, by the privative prefix *in-* and the adjective, in this case *aptus*. There are no studies mentioning modal uses of *ineptus*, and Pinkster (2021) does not discuss its syntactic construction specifically. However, its behaviour is comparable to the positive form *aptus*, in terms of both modal meanings and syntactic constructions associated with this marker. The examples will be drawn entirely from the diachronic map for *ineptus* (Marongiu and Dell’Oro 2021s)²¹. As it was the case for *aptus*, when used in the impersonal construction *ineptum est* ‘it is silly, foolish’ *ineptus* can acquire a deontic acceptability value, to qualify the representation as undesirable.

- (37) *Sed ineptum est de tam perspicua eius impudentia pluribus verbis*
 but silly be of so evident his shamelessness more word
disputare.
 discuss

But **it is silly** to further discuss his so blatantly shamelessness. (Cicero, *Orationes Verrinae* II 1, 148) (from Marongiu and Dell’Oro 2021s)

²¹ <https://woposs.unine.ch/maps/map-ineptus.html>

The adjective used alone with a predicative function can express dynamic possibility with the meaning ‘not suited for a given purpose, useless’.

- (38) *Sed nec ad philosophandum ineptum vel impar*
 but and_not to practice_philosophy unsuitable or inferior
servile ingenium fuit.
 pertaining_to_slaves cleverness be

But the cleverness of slaves has not been **unsuitable** for practicing philosophy, nor inferior. (Macrobius, *Saturnalia* 1, 11, 41) (from Marongiu and Dell’Oro 2021s)

In this sentence, the adjective refers to the nominal constituent *servile ingenium* ‘the cleverness of slaves’, and it is used to express the aptitude of certain slaves for the philosophical practice.

Argument structure. As illustrated in example 38, when *ineptus* is used in a predicative function with the meaning ‘incapable, unsuitable’, it can be constructed with the prepositional gerund (*ad* + *philosophandum*), which is one of the constructions associated with dynamic uses of *aptus*. Some of the other constructions described for *aptus* might also be associated with this use of *ineptus* e.g. gerund in genitive or dative, and subjunctive introduced by *ut*. But without a targeted corpus-based study on *ineptus* it is not possible to make these assumptions.

Similar to *iniquum est*, the impersonal construction *ineptum est* occurs with a one-slot pattern, and takes an infinitive clause as an argument (example 37).

2.4.3 Certus, -a, -um and Incertus, -a, -um

While the markers illustrated so far exhibit some degree of polyfunctionality in the modal domain, being able to express more than one type of modality, the adjective *certus* is associated quite exclusively to epistemic modality. *Certus* derives from the verb *cernō* ‘to distinguish, determine’, and from this verb it inherits the non-modal meanings ‘defined’, ‘decided’, ‘fixed, determined’ (Ernout and Meillet 2001, *s.v.* *certus*). From these meanings developed the modal meaning of epistemic modality: with the sense ‘sure, certain’ *certus* can be used by the speaker to convey his/her judgment of absolute certainty concerning the truth-value of a specific state of affairs. With this value, *certus* is often used in the constructions *certum sum* ‘I am certain’, *certum habeo* ‘I consider it certain’, *certum scio* and similar, and in the impersonal construction *certum est* ‘It is sure’.²² Compared to the derived adverbs *certe*

²² It should be noted that *certum est* and *certum habeo* depending on the context might also carry the meaning ‘it is decided’, ‘I have decided’, sometimes with a modal value of volition.

and *certo* (see below), the epistemic use of this construction has not been dedicated particular attention in the literature, although there are a few mentions in Pinkster (1985, 194) and Garassino (2010, 55). Example 39, which illustrates the epistemic value of the construction *certus sum*, is drawn from the diachronic map for *certus* (Marongiu and Dell’Oro 2021d)²³.

- (39) *hoc opinor: certi sumus perisse omnia.*
 this think certain be be_lost all

This is what I think: **I am certain** that everything is lost. (Cicero, *Epistulae ad Atticum* 2, 19, 5) (from Marongiu and Dell’Oro 2021d)

In this passage, the construction *certus sum* is used personally, to indicate the degree of absolute certainty of the speaker about the evolution of the future events. The subjective use of the epistemic expression is highlighted by the preceding verb *opinor*, which clearly refers to the sphere of subjectivity, referring to the expression of an opinion on the part of the speaker.

Argument structure. When used in the construction *certum est* and similar, the adjective occurs with a one-slot pattern, where the argument is filled with an accusative with infinitive clause. In the case of the impersonal construction, the non-finite clause functions as the subject of the construction, whereas in personal constructions as the one illustrated in example 39 it functions as an object complement.

The adverbs derived from the adjective *certus* are *certē* and *certō*. Both are epistemic adverbs expressing certainty, and can be translated with the meaning ‘certainly, surely’ (Pinkster 1985, 49,194; Núñez 1991, 172–173; Fruyt and Orlandini 2003, 718; Rosén 2009, 374; 2010, 210; Marongiu and Dell’Oro 2021d²⁴ among others). They are included in the category of ‘commitment markers’, as they refer to the degree of commitment of the speaker to the state of affairs (Schricks 2011, 211–213). *Certō* seems to have a more limited distribution compared to *certē* and to be used almost exclusively as a predicate modifier: *certō scio* behaves almost like a collocation, meaning ‘I know for sure’ (Ricca 2010, 117; Schricks 2011, 214)²⁵. Conversely, *certē* fully developed as a modal adverb, operating at the propositional level to indicate the speaker’s judgement on the truth-value of the proposition (Pinkster 2004, 192; Magni 2010, 210).

²³ <https://woposs.unine.ch/maps/map-certus.html>

²⁴ <https://woposs.unine.ch/maps/map-certe.html>. Please refer to the diachronic map of *certus* for the attestation of the adverb *certō*.

²⁵ The combination *certē scio* is of course possible, and it is found in literature (see Marongiu and Dell’Oro 2021c), but it is much less frequent compared to *certō scio* (Schricks 2011, 219).

- (40) *PINACIUM senex hic elleborosus est certe.*
 PINACIUM old_man this in_need_of_hellebore be certainly

PINACIUM. This old man is **certainly** out of his senses (lit. in need of hellebore²⁶).
 (Plautus, *Mostellaria* 952) (from Fruyt and Orlandini 2003, 697)

Nevertheless, *certē* is defined in Fruyt and Orlandini (2003, 710) as a polysemic and poly-functional adverb. This is due to the fact that, although *certē* can exclusively express epistemic modality in the strictly modal domain, however in certain contexts it can be used for slightly different purposes. One of these is the use of *certē* as an affirmative particle in dialogic texts, which is present since Plautus (Kühner and Stegmann 1962[1912], 531; Núñez 2002, 194–195; Pinkster 2005, 99; Ricca 2010), to the extent that Pinkster includes it among both modal adverbs and affirmative/negative adverbs (Pinkster 2005, 49). An illustration of this use is given in example 41.

- (41) *PISTOCLERUS estne hic meus sodalis? MNESILOCHUS estne hic*
 PISTOCLERUS be=Q this my friend MNESILOCHUS be=Q this
hostis, quem aspicio, meus? PISTOCLERUS certe, is est.
 enemy which see my PISTOCLERUS certainly he be
MNESILOCHUS is est.
 MNESILOCHUS he be

PISTOCLERUS. Isn't this my friend? MNESILOCHUS Isn't this my enemy, that I see? PISTOCLERUS. **Certainly**, he is. MNESILOCHUS. He is. (Plautus, *Bacchides* 534–535) (from Núñez 2002, 195)

This usage, common to other Latin modal adverbs such as *fortasse* (see below in the dedicated section), is nevertheless connected to the epistemic value of *certē*: in this context the adverb refers not only to a single constituent of the preceding interrogative clause but to its entire propositional content, expressing certainty and, consequently, agreement (Pinkster 2005, 140). In the cited example, the adverb appears with *is est*, which is the propositional content to which it refers. However, there are various cases in which the adverb appears alone as a short affirmative answer to a yes or no question (see Pinkster 2004, 193; Ricca 2010, 172 for examples of this use).

But *certē* can also be used as a focaliser, and scope on a specific constituent or a group of constituents of the clause (Núñez 2002, 196; Pinkster 2005, 99; Ricca 2010, 168). The use of *certē* as a focaliser is not necessarily modal, as the constituent being focalised can be e.g. a

²⁶ Hellebore is a plant known for its medicinal uses, especially to treat insanity, see OLD (Glare 1982) *s.v. elleborum*.

noun or an adjective and thus not describe a state of affairs: *aut falsa aut certe obscura opinio* ‘either a false or **certainly** an obscure opinion’ (Cicero, *De oratore* 1, 92; example from Núñez 2002, 196). Although the verb is implied from the previous context, the adverb as a focaliser is applied to the adjectival modifier *obscura*, and not to the entire predication. This use of *certē* as a focaliser is also called restrictive, as the adverb narrows the focus on a specific constituent of the proposition, to put it on the foreground and signal his/her commitment to its content. In these cases, the adverb can be translated with the expressions ‘at any rate’, ‘at least’ (Fruyt and Orlandini 2003, 196; Rosén 2009, 374): ‘either a false or, **at any rate**, an obscure opinion’ for Núñez 2002, 196. The restrictive function of *certē* is important in this context as it paves the way to the use of this adverb in argumentative patterns that are especially relevant to this study. The first one is this use of *certē*, when it modifies a state of affairs. In order to illustrate such patterns let us analyse example 42.

- (42) *in quo si non praesens periculum, at certe longinqua obsidione*
 in which if not be_present danger but certainly prolonged siege
fames esset timenda.
 famine be fear

In which if there was no present danger, however there was **certainly** famine to fear from a prolonged siege. (Caesar, *Commentarii de bello Gallico* 5, 29, 7) (from Kroon 2019[1995], 346)

In the passage illustrated in this example, *certe* is applied with a restrictive use to a state of affairs, specifically *longinqua obsidione famēs esset timenda*. In this passage, the restrictive use is even more evident because the proposition introduced by (*at*) *certē* opposes to a conditional clause introduced by *si non*.²⁷ This is a scalar use of *certe*: once the least preferable option is negated (the proposition introduced by *si non* i.e., an imminent danger), the following one is confirmed (the proposition marked with *certe* i.e., the famine) (Bertocchi 1998, 160). This use anticipates the use of *certe* in combination with concessive clauses, such as the one in example 43.

- (43) *ne sit sane summum malum dolor, malum certe est.*
 not be right great evil pain evil certainly be

Right, pain may not be the greatest evil, but an evil it **certainly** is. (Cicero, *Tuscolanae disputationes* 2, 5, 14) (from Magni 2010, 256)

This type of construction works with a foreground-background alternation: the concessive clause marked with subjunctive *sit* (from *sum* ‘be’) is left on the background (i.e., the speaker

²⁷ The syntactic construction *si non... at certē* is particularly frequent in Latin (Kroon 2019[1995], 345).

shows lower commitment to its propositional content 'pain is not the greatest evil'); and the clause marked by *certe* is brought on the foreground, and the speaker signals endorsement by marking it with a restrictive use of *certē* ('pain is a great evil').

The second use of *certē* for argumentative purposes is the encoding of polyphonic discourse (Núñez 2002; diaphonic monological discourse in Kroon 1998, 214). The notion of polyphony in a monological discourse was first formulated by Roulet (Roulet et al. 1985, 69–84) based on French, and then applied to Latin by Kroon in her description of some Latin discourse markers (1998, 212). According to the polyphonic analysis of modality using modal adverbs, the speaker (or, in the case of Latin non-dialogic texts, the writer) presents, within the same stream of text, two voices: one from which they distance themselves, and the other one that they endorse.

On the polyphonic and the focalising functions illustrated in the previous examples build the concessive uses of *certe* (Núñez 2002, 198), where the epistemic adverb marks the proposition from which the speaker distances himself/herself (Fruyt and Orlandini 2003, 718; Magni 2010, 256). The interplay between a polyphonic monological discourse and a concessive use of *certe* is particularly evident in the passage in example 44.

- (44) 'At sic malo' inquires 'quam cum exercitu'. **Certe;** sed istuc ipsum
 but thus prefer say than with army certainly but this itself
 'sic' magnum malum putat aliquis, neque ei remedium est ullum;
 thus great danger consider someone and_not it remedy be none

'But I prefer this way' you will say 'than with an army'. **Sure;** but someone considers this 'this way' itself a great danger, and there is no remedy to it. (Cicero, *Epistulae ad Atticum* 7, 9, 3) (from Pinkster 2005, 139)

In this passage, the voice which is endorsed by the speaker, to which the speaker commits, is introduced by the adversative particle *sed* 'but', whereas the other one is marked by *certe* (postponed), and uttered as a counter-argument hypothetically raised by the addressee of the letter. This use of *certe* slightly differs from the other examples seen so far, because in this case it is *certe* that brings the concessive meaning, whereas the proposition to which the speaker is committed is introduced by an adversative particle (*sed* 'but').

Polyphonic and concessive uses of *certe* are especially relevant to this study because they can appear when *certe* is combined with other epistemic adverbs, often with *fortasse*. Since this chapter aims to provide an introduction to the modal senses of the markers under examination, I will not dwell on this now. However, I refer to Chapter 3 (page 122) where,

within the framework of studies on the co-occurrence of modals in various languages, I will present (the few) examples of co-occurrence in Latin discussed in the literature.

Negative counterpart of the adjective *certus*, the adjective *incertus* can also express epistemic modality, with the degree of uncertainty: ‘not sure, not known, not proven to be true’. It can be used in constructions such as *incertum est* ‘it is not sure’, *incertum habeo* ‘it is uncertain to me’ (Fruyt and Orlandini 2003, 712), *incertum an* ‘uncertain if’ and similar. Compared to the positive construction *certum est*, and more importantly to the adverb *certe*, the literature on *incertus* and associated constructions and derived adverbs is exiguous. Therefore, I will refer to the diachronic map for this epistemic adjective (Marongiu and Dell’Oro 2021r)²⁸. Example 45 shows the use of the construction *incertum constat* ‘it remains uncertain’ in context.

- (45) *nam si primordia rerum commutari aliqua possent ratione revicta,*
indeed if first_principle thing change some can manner refute
incertum quoque iam constet quid possit oriri, quid nequeat.
uncertain also already remain what can arise what cannot

If the first principles of things could be changed, refuted in some manner, **it would** also **remain uncertain** even what could arise, and what could not. (Lucretius, *De rerum natura* 1, 594) (from Marongiu and Dell’Oro 2021r)

Often, the construction *incertum est/habeo* and similar do not indicate a real evaluation on the truth-value of the proposition to which they refer, but rather a state of indecisiveness of the character(s) in taking a decision or picking an option. Consider example 46 with construction *mi (mihi) incertum est*.

- (46) *Nunc mi incertum est abeam an maneam an adeam an*
now me uncertain be go_away or stay or approach or
fugiam.
run_away

Now **I’m uncertain** whether I should go away or stay or go up to him or run away. (Plautus, *Aulularia* 729–730) (from Pinkster 2021, 123)

In this passage, the speaker is not expressing his uncertainty concerning the state of affairs described in the following clauses, but rather hesitation concerning different choices, listed in the verbs following the construction. Another example of this meaning is given in 47 with the construction *in incerto habeo*.

²⁸ <https://woposs.unine.ch/maps/map-incertus.html>

- (47) *Sed Allobroges diu in incerto habuere quidnam consili*
 but Allobroges for_long in uncertainty have which decision
caperent.
 take

The Allobroges for a long time **were in doubt** what course to pursue. (Lucretius, *De rerum natura* 1, 594) (from Kroon 2019[1995], 349)

In this case, the noun *incertum* together with the preposition *in* form an adverbial phrase constructed with the verb *habeo*. Again in this passage it indicates an hesitation on the final decision to be made. *Incertum est* can be combined with positive constructions such as *certum est*, or adverbs with positive polarity such as *certe*, to contrast different epistemic degrees. I will show examples on this types of co-occurrence on the dedicated section mentioned above, see section 3.3 in Chapter 3 (page 122).

Argument structure. As shown by the previous examples, the construction *incertum est*, *in incerto habeo* and similar with an epistemic value (or not stricly epistemic, but rather of indecisiveness) always occur with a one-slot pattern, which requires a subject or object argument clause. This can be expressed by *quid* or *quidnam* with the subjunctive (as in example 47), by a simple subjunctive or by subjunctive introduced by *an* (as in example 46). Pinkster (2021) also mentions the possibility of using an infinitive clause.

Adverbs derived from *incertus* are *incerte* (or *incerto*), *incertim* and *incerta*. The literature about the many complex uses of *certe* does not dwell into the uses of its negative counterpart, which seem to show less polyfunctionality compared to *certe*. As for *certo/certe scio*, the collocation with opposite polarity also exists: *incerte scire* 'to not know for certain' (from Plautus, *Epidicus* 505 in Pinkster 2005, 99).

- (48) *Postquam liberas(= libera est) ubi habitat dicere admodum incerte*
 after be_free where live say quite uncertainly
scio.
 know

Since when she is free I don't know exactly where she lives (lit. I know quite **uncertainly** to say where she lives). (Plautus, *Epidicus* 505) (from Pinkster 2005, 99)

However, as show in the example, and as was also noted for *certo scio*, in this collocation the epistemic value is derived from the combination of the adverb with the cognition verb *scio*, where both refer to the knowledge of the speaker. In general, the ThLL itself provides only a couple of examples for all the adverbs derived from *incertus*. The modal use of *incerte*,

incerta and *incertim* is not mentioned in other reference works, therefore I had to rely on the diachronic maps (Marongiu and Dell’Oro 2021o, 2021p, 2021q). From the analysis of the attestations provided by the ThLL, besides the specific use of *incerte scio*, none of them seems to show a modal value in any context.

2.4.4 Debeo, -es, -uī, -itum, -ēre

The verb *debeo* ‘have to, to be under an obligation’ is a highly polyfunctional Latin modal marker. Originally, *debeo* was used only with the pre-modal²⁹ meaning ‘to owe something to someone else’ (from the combination of the privative prefix *dē-* ‘from’ with the verb *habeo* ‘to have, own’³⁰). This meaning refers to the legal obligation that is imposed on a person who has previously received something from another. This person is in debt to the other one, and will have to give something else in exchange to pay off the debt (Núñez 1991, 75). When entering a society based on currency, this expression directly refers to the money owed by someone to someone else (Bolkestein 1980, 4–6; Bertocchi and Orlandini 2001, 714; see also the forms *debitor* ‘debtor’, *debitum* ‘debt’, in Ernout and Meillet 2001 *s.v.* *debeo*). When used as a full verb, with the pre-modal meaning ‘to owe’, *debeo* is associated with a three-slot pattern: the three arguments are filled by nominal constituents, indicating i) the subject ii) the thing that is owed by the subject iii) the person who is supposed to receive it (i.e., the beneficiary, expressed in the dative case) e.g. *debeo tibi pecuniam* ‘I owe you money’ (Bolkestein 1980, 154, note 2).

From the pre-modal meaning originate the modal uses of *debeo*. As mentioned earlier, this is a highly polyfunctional modal verb. The notion of necessity at the core of this modal verb can be expressed, depending on the context, by the following types of modality: deontic authority, deontic acceptability in the degree absolutely necessary, dynamic necessity, and epistemic certainty/high probability. The diachronic map of *debeo* shows all the pre-modal and modal meanings associated with this marker (Marongiu and Dell’Oro 2021e).³¹

Before presenting the modal uses of *debeo*, I should make a general remark about the interpretation of modal passages, especially concerning the distinction between deontic and dynamic uses. These observations hold not only for *debeo*, but also for all the other markers in the list that are highly polyfunctional. For starting, Núñez (1991, 144–150) comments on the difficulty of distinguishing deontic and dynamic modal uses, especially if the context does not mention a specific source of authority and/or moral norms. To this I should add two observations. Deontic and dynamic uses are not always distinguished in other reference

²⁹ Premodal meanings as defined in van der Auwera and Plungian (1998, 91) precede the rise of a modal meaning, following cross-linguistic modal pathways.

³⁰ The form *dehibuisti* survives in Plautus’ comedy *Trinummus*, verse 426 (Kronning 1990, 305).

³¹ <https://woposs.unine.ch/maps/map-debeo.html>

works e.g. Bolkestein (1980) conflates them under the notion of deontic modality. Moreover, in some works a specific passage is considered to be deontic only if it occurs within a directive illocutionary act e.g. in Núñez (1991), that is, if the speaker is clearly giving an order to the addressee. On the other hand, there are some cases in which the verb can still be interpreted as an expression of deontic authority or deontic acceptability, if there are contextual elements that encourage this interpretation. In the following examples, I present the attestations of the three uses.

In example 49, *debeo* expresses deontic authority, and it refers to (the absence of) an obligation imposed on the heirs of the damaged buildings mentioned in the passage.

- (49) *si aedes corruerint ... heres restituere non debet nec reficere ...*
 if house fall_down ... heir rebuild not have_to and_not repair

If the buildings have fallen down ... the heir **is not obliged** to rebuild them nor to repair them ... (Cicero, *Topica* 15) (from Martín Rodríguez 2002, 149)

The notion of deontic acceptability for *debeo* emerges very early: one of the first attestations of modal *debeo* in Plautus is an expression of deontic acceptability. This attestation is illustrated in example 50.

- (50) *debetis velle quae velimus: meruimus et ego et pater de vobis*
 have_to want that want deserve and I and father from you
et re publica.
 and state

You **should** wish for what we wish for: my father and I deserved it from you and the state. (Plautus, *Amphitruo* 39) (from Marongiu and Dell'Oro 2021e)

Fruyt and Orlandini (2003, 703–704) describe this use of *debeo* as a weak deontic (*déontique faible*), i.e., a notion describing something that is convenient, right to do.³² This interpretation in example 50 is guided by the presence of the verb *meruimus* from *mereor* 'to deserve', which suggests the reference to a moral obligation on the part of the hearer towards the speaker and his father.

The notion of dynamic necessity is illustrated by Danckaert (2017, 165) with example 51.

- (51) *Vena vulnerari non debet, ne sanguinem fundat.*
 vein wound not have_to lest blood emit

³² As opposed to a strong deontic (*déontique fort*), which expresses a notion of bounding obligation.)

A vein **should** not be wounded, for it not to emit blood. (Celsus, *De medicina* 119)
(from Danckaert 2017, 165)

The type of necessity expressed by *debeo* in this passage does not involve any type of evaluation. It also does not involve a source of authority that imposes the obligation onto a specific participant. Here, *debeo* simply defines a situation as necessary, in order to avoid the consequences introduced by *ne*. This is defined in Fruyt and Orlandini (2003, 693) as alethic modality. This notion was introduced in the previous section, in the overview of the different theoretical approaches to the modal domain. Alethic modality corresponds to a logical type of modality, possibility or necessity, that does not imply the subjective judgement of the speaker, but is objective and contingent, describing reality. This is illustrated in example 51.

Finally, *debeo* can be used with an epistemic value, to express the judgement of the speaker about the likelihood of the state of affairs (Bolkestein 1980, 129; Núñez 1991, 164–165). This verb is grouped by Bertocchi and Orlandini (2001, 17), together with *fortasse* and *oportet*, among the Latin markers of subjective epistemic modality, or unilateral possibility, and it tends towards the positive pole of the scale (i.e., certainty). Some authors (e.g. Núñez 1991, 164–165; Bertocchi and Orlandini 2001, 53; Bertocchi and Orlandini 2002, 16) mention the co-existence, within this category, of two notions, sometimes hard to distinguish depending on the context in which *debeo* occurs: i) a purely subjective judgement on the part of the speaker on the likelihood of the state of affairs, and ii) a judgement made by the speaker following on an inferential process, based on concrete contextual elements that lead to a certain conclusion.³³ The two are illustrated, respectively, by example 52 and 53.

- (52) *Plane - inquam - hic debet servus esse nequissimus.*
truly - say - this have_to slave be worthless

But truly - I say - this **must** be the most worthless slave. (Petronius, *Satyricon* 49, 7)
(from Bertocchi and Orlandini 2002, 16)

- (53) *etenim erat eo splendore qui ex clarissimis et pulcherrimis*
and_indeed be that brightness which from precious and beautiful
gemmis esse debebat.
gem be have_to

And indeed it (i.e., the chandelier) shone so much that it **must** have been made of the most precious and beautiful gems. (Cicero, *Orationes Verrinae* 4, 65) (from Bolkestein 1980, 128)

³³ The same distinction is applied to the analysis of epistemic *oportet*, see further in this chapter.

The difference between example 52 and example 53 lies clearly in the contextual elements that guide the speaker to their epistemic conclusion. While the first expresses a subjective judgement about the slave, the second expresses a more objective judgement about the material composing the chandelier. It is also true that the judgement expressed in example 52 still stems from the character's observations regarding the behaviour of the slave being referred to. However, the object of judgement changes: in the first example, it is both subjective and moral in nature; in the second example, it is a purely objective conclusion. It is important to clarify that epistemic modality and the so-called evidential modality, briefly presented in section 2.1, are grouped under the category of epistemic modality in the WoPoss theoretical framework (see also my annotation schema in section 5.1 Chapter 5, page 151 and following).

Differently from other modal verbs, *debeo* does not show almost any modal occurrences in Early Latin. In Plautus, it occurs with a modal meaning in only two passages out of 54 occurrences: *Persa* 160 (*dare debet*) and *Amphitruo* 39–40 (shown in example 50) (Magni 2010, 220). Both uses belong to the deontic domain. The epistemic use of *debeo* is the last one to emerge (Bolkestein 1980, 120; Núñez 1991; Magni 2010, 220; Viti 2018, 17). Epistemic occurrences are completely absent in Plautus (Magni 2010, 220), but are fully developed already in Classical Latin, though still rare, and become frequent starting from the I century CE (Kronning 1990, 304; Magni 2010, 220). The use of *epistemic debeo* is especially frequent in Lucretius.

Argument structure. As mentioned at the beginning of this section, the full verb *debeo* with the pre-modal meaning 'to owe' is associated with a three-slot construction pattern, in which all the three arguments are filled with nominal constituents.

As it can be evinced from the examples shown above, modal *debeo* is always associated with a two-slot construction pattern, in which the arguments are filled by a nominal subject and an infinitival complement, and the subject is coreferential between the two (see *esse* in example 52, with subject *servus*; *vulnerari* in example 51 with *vena* as subject, etc.).

Because of the two parallel uses of the same verb, Bolkestein (1980, 4–6) describes the semantics of *debeo* by hypothesising the existence of two verbs with the same phonological form that is, two homonyms, associated with two different constructions that have different semantic constraints. *Debeo*₁ corresponds to the full verb with the meaning 'to owe', which can be passivised and can govern an argument in the dative case (the beneficiary i.e., the person that receives the object owed). Moreover, the subject that owes something must be human. *Debeo*₂ corresponds to the modal verb. In the construction associated to this verb, the passivisation is impossible, the verb cannot govern an indirect object and the nominal

subject does not have specific semantic constraints as for *debeo*₁. This position has been criticised in many respects, first of all by Núñez (1991, 75–76), because it does not account for the diachronic development of the semantics of *debeo* from the pre-modal meaning to its deontic and then epistemic modal uses.

2.4.5 Decet, -uit, -ēre

The impersonal verb *decet* ‘it is proper, fitting’ is not extensively discussed in the literature about Latin modal markers, compared to other impersonal modal verbs such as *oportet* and *licet* (see further in this chapter). Therefore, some of the examples will be drawn from the diachronic map for *decet* (Marongiu and Dell’Oro 2021f).³⁴

This verb typically denotes a state of affairs as being appropriate according to social, moral or ethical norms i.e., it mainly expresses deontic acceptability (Thomas 2002, 103; Magni 2010, 210; Viti 2018, 18), as shown in example 54.

- (54) *Ego baiulabo, tu, ut decet dominum, ante me ito*
 I carry you as be_appropriate master before me go
inanis.
 empty-handed

I will carry the burden, you, as **it is appropriate** for a master, go before me empty-handed. (Plautus, *Asinaria* 660) (from Marongiu and Dell’Oro 2021f)

The state of affairs in this passage is for the most part implied: *dominum ante me ire inanem* i.e., it is befitting that the master goes before the slave empty-handed. In this sentence, the slave Leonida is addressing his master, saying that, according to the norms regulating Roman society, the slave is the one who has to carry the burdens for his master, while he proceeds walking empty-handed before him.

Another passage that illustrates the deontic acceptability value of *decet* is shown in example 55, where the verb refers to general ethical norms, holding in Roman society, according to which a young man should be humble.

- (55) *decet verecundum esse adolescentem, Argyrippe.*
 be_appropriate humble be young_man Argyrippus

It is appropriate for a young man to be humble, Argyrippus. (Plautus, *Asinaria* 833) (from Marongiu and Dell’Oro 2021f)

³⁴ <https://woposs.unine.ch/maps/map-decet.html>

Thomas (2002, 103) observes that in certain types of contexts, although the verb still refers to the notions of appropriateness and morality, however, the context might suggest a pragmatic interpretation of *decet* as being used to convey an order. Consider example 56.

- (56) *non decet superbum esse hominem servum.*
 not be_appropriate insolent be man slave

It is not appropriate for a slave to be insolent. (Plautus, *Asinaria* 470) (from Thomas 2002, 103)

In this case, the speaker is a merchant and as such he is a free man. The merchant is addressing the slave Leonida, reproaching him for his insolence towards him. To do so, he appeals to the same norms of Roman society that were previously mentioned in reference to example 54. Through the desirability value expressed by *decet* in this context, however, the merchant is implicitly urging Leonida not to adopt rude manners with him, as this does not befit his role in society as a slave. Thomas observes that in contexts such as the one illustrated in this example, the value of deontic authority implicitly lies behind the main value of deontic acceptability conveyed by the verb.

Decet is sometimes mentioned in some works among semi-modal verbs because it cannot express epistemic modality (see e.g. Bolkestein 1980, 153; Núñez 1991, 64–65; Magni 2010, 210). However, there are some passages in which this verb can express the notion of dynamic necessity. This value is never mentioned in literature, except for Núñez (1991, 65) who mentions possible uses of this marker to express root i.e., dynamic modality, but eventually does not present any example for this use. However, in our analysis of the passages listed in the ThLL for *decet*, we found an example of dynamic value for *decet*, with the meaning ‘it is necessary’ See example 57, where the main verb of the scope *propere hoc, non placide* is implied.

- (57) *consule, arripe opem auxilium=que ad hanc rem: propere hoc,*
 take_a_resolution get support help=and to this thing quickly this
non placide decet.
 not calmly be_necessary

Take a resolution, find support and help to do this thing: **it’s necessary** (i.e., to act) quickly, not calmly. (Plautus, *Miles gloriosus* 220) (from Marongiu and Dell’Oro 2021f)

Argument structure. As shown by the examples illustrated in this section, *decet* is always associated with a one-slot syntactic pattern. The argument position is filled with an accusative

and infinitive clause functioning as a subject (e.g. *verecundum esse adolescentem* in example 55). There is only one case of *debet* governing a simple subjunctive (example 58); in very rare cases in Late Latin texts the argument clause can be expressed by *ut* or *ne* with a verb in the subjunctive (see example 59) (Pinkster 2021, 149).

- (58) *diu qui domi otiosi dormierunt decet animo aequo*
 for_long who home unoccupied sleep be_appropriate mind even
nunc stent, vel dormire temperent.
 now stay or sleep moderate

The unoccupied, who have long slept at home **should** now stay quiet, or moderate their sleep. (Plautus, *Poenulus* 21–22) (from Pinkster 2021, 149)

- (59) *Hominem qui piraticum carcerem, qui praedonum vincla discusserat*
 man who of_pirates captivity who brigand chain shatter
decuerat ne voluisset aliter reverti.
 be_appropriate not_to want someone_else come_back

It would have been appropriate that a man who escaped the pirates' captivity and shattered the brigands' chains would not have wanted to come back as someone different. (Pseudo-Quintilian, *Declamationes* 5, 2) (from Pinkster 2021, 149)

Pinkster also notes personal uses of *decet*, although they are extremely rare. In example 60, *decet* is conjugated in the third person plural, in accordance with the subject (*omnia*) *quae*.

- (60) *Quae ab imperatore decuerint omnia suis provisae*
 which by leader be_appropriate all his provide

All the things that **should have been** (implied: provided) by a leader were provided for his troops. (Sallust, *Bellum Iugurthinum* 49, 2) (from Pinkster 2021, 201)

2.4.6 Dubius, -a, -um

The adjective *dubius* probably derives from an unattested ancient adjective, which was associated with the meanings 'of two forms, double' or 'divided between two options'. From this origin the adjective *dubius* derived the non-modal meanings 'doubtful', 'hesitant', to describe someone who does not manage to make a decision; but also 'unsteady, variable' referred e.g. to the weather or to the fate (see e.g. example 4; 'suspect', 'adverse' or even 'dangerous'. When expressing these meanings *dubius* is usually used with an attributive function i.e., as an adjective modifying a noun, and is therefore not modal. An example for this use was presented in the Introduction (example 4, page 4).

This adjective can express epistemic modality when it is used in constructions such as *dubium est* ‘it is uncertain’ or *dubium habeo* ‘I am uncertain’ (example 61). The use of this construction to express epistemic modality in Latin is hardly discussed in literature, and only marginally mentioned in a couple of works. The modal meanings of the adjective *dubius* and the modal constructions associated with it are described in the diachronic map (Marongiu and Dell’Oro 2021k).³⁵

- (61) *an dubium tibi est eam esse hanc?*
Q doubtful you be her be this

Do you have doubts that this is her? (Plautus, *Miles gloriosus* 419) (from Marongiu and Dell’Oro 2021k)

However, this construction is much more frequently found with the external negation *non* or *haud* and the subordinating particle *quin*, to convey epistemic certainty by effect of the litote and of the implicit negation inherent to the adjective *dubius* (‘it is not doubtful that’ > ‘it is certain that’) (Fruyt and Orlandini 2003, 697). Consider example 62 for the negative construction. The example was presented in the Introduction to present modal uses of a marker, I present it here again to facilitate the reader.

- (62) = (5) *Dicat... sibi non fuisse dubium quin nullo foedere a*
say himself not be doubtful that_not any treaty by
re publica bene gerenda impediretur.
state well rule hinder

Let him say that... he never doubted (lit. **it was not doubtful** to him) that he would not be hindered by any treaty from ruling the state successfully. (Cicero, *Pro Cornelio Balbo* 47) (from Pinkster 2021, 97)

Argument structure. This construction is associated with a two-slot pattern, and occurs with an argument clause that is usually expressed by an accusative with infinitive clause. The subject feeling doubtful, if specified, is encoded by a nominal constituent or a pronoun in dative.

When *dubium est* is negated it occurs with *quin* and the subjunctive, which functions as the subject of (*non/haud dubium est*) (Pinkster 2021, 97,165; Magni 2010, 246). The person expressing the doubt can be specified in dative case, as shown by *tibi* in example 61.

Epistemic adverbs or adverbial expressions derived from *dubius* are *dubie*, *dubio* and *dubium* (adverb) ‘doubtfully’, which, according to the ThLL, only appear in the collocations *haud*

³⁵ <https://woposs.unine.ch/maps/map-dubius.html>

dubie, *haud dubium*, *non dubium*, literally ‘undoubtedly’, and therefore ‘certainly’, ‘for sure’. From the noun *dubium*, derived from the neuter form of the adjective, originate the adverbial expressions *procul dubio*, *sine dubio* ‘without any doubt’ i.e., ‘certainly’. As for *dubium est*, the literature about the use of these adverbial phrases is not extremely rich. Therefore, I relied on the diachronic maps to describe their modal meanings and to retrieve the examples. These modal adverbs are described in separate diachronic maps, respectively in Marongiu and Dell’Oro (2021g)³⁶ for *dubie*; Marongiu and Dell’Oro (2021h)³⁷ for *dubio*; Marongiu and Dell’Oro (2021i)³⁸ for the adverb *dubium*; Marongiu and Dell’Oro (2021j)³⁹ for the noun *dubium*.

These adverbs are almost always found in negative contexts; occurrences with positive polarity are usually employed as focalisers and not as epistemic markers expressing epistemic uncertainty (see the discussion about *certe* above). According to Ricca (2010, 151), this behaviour seems to conform to a certain cross-linguistic reluctance for the lowest degrees of epistemicity to be lexicalised by modal adverbs.

The adverbial form *haud dubie* is particularly common in Livius (Ricca 2010, 151), see example 63.

- (63) *haud dubie aliquanto numerus maior hoc mulierum fuerit.*
not doubtfully considerably number great this woman be

Certainly (lit. ‘not doubtfully’ by litote), the number of women was considerably higher than this. (Livius, *Ab urbe condita* 1, 13, 7) (from Marongiu and Dell’Oro 2021g)

Pinkster (2004, 192; see also Schrickx 2011; 2014, 3, following Pinkster) classifies the adverbs and adverbial expressions derived from the stem *dub-* as commitment markers, together with *certe* and *fortasse*, among others (refer to the section dedicated to *certus* and further in this chapter to the section about *fortasse*). As *certe*, these expressions can be used in answers, do not occur in imperative sentences, and can combine with other adverbial phrases (third degree satellites) indicating manner such as *recte* ‘rightfully’ (Pinkster 2021, 192). They are also frequently found in co-occurrence, especially when expressing different degrees of commitment, in parallel structures e.g. *fortasse... non dubie* (see section 3.3 in Chapter 3 for examples) (Pinkster 2004, 194). Particular attention has received *sine dubio*, as it is the most frequently attested expression among them (Kühner and Stegmann 1962[1912], 792; Schrickx 2011, 212–213). Contrarily to *certe* and *fortasse*, *sine dubio* almost never appears in questions,

³⁶ <https://woposs.unine.ch/maps/map-dubie.html>

³⁷ <https://woposs.unine.ch/maps/map-dubio.html>

³⁸ <https://woposs.unine.ch/maps/map-dubium-adv.html>

³⁹ <https://woposs.unine.ch/maps/map-dubium-noun.html>

while both *certe* and *fortasse* can be used with an ironic intention, and *certe* can be used by the speaker to ask for confirmation of having correctly understood the interlocutor.⁴⁰ *Sine dubio* is rarely used as a focaliser. It usually modifies a proposition to express the commitment of the speaker towards the state of affair, and it is sometimes used in argumentative concession. It is not a concessive marker *per se*, but in co-occurrence with *sed* 'but' or similar particles it contributes marking a contrast between two clauses. The two uses are illustrated in example 64.

- (64) *qui sine dubio sunt pulchri ..., sed ad partus sunt steriliores.*
 which without doubt be beautiful ... but for birth be unfruitful

which are **undoubtedly** beautiful ..., but are more unfruitful for what concerns the offspring (Varro, *De re rustica* 3, 9, 6) (from Schrickx 2011, 227)

In this example, *sine dubio* scopes over the clause *qui sunt pulchri* and expresses epistemic certainty. However, the entire clause is contrasted with the second clause introduced by the conjunction *sed*. The role of *sine dubio* is that of an argumentative concessive marker which focalises the first argument. This is then downplayed by *sed*, which presents the second argument, which is presented as the winning one for the writer.

2.4.7 Facultas, -ātis

The use of the Latin noun *facultas* 'possibility, chance, opportunity' as a potential modal marker has been long overlooked in literature. This noun, used in a few different constructions, can express dynamic or deontic modality. The modal values of *facultas* are illustrated in the diachronic map (Marongiu and Dell'Oro 2021).⁴¹

The dynamic meaning emerges in constructions such as *facultatem habeo*, *facultas est* 'to have the possibility/chance'. It can be used to indicate e.g. an innate possibility i.e., a capacity, an ability of the participant. Lecaude (2010, 286, 298, 306), in a broader study on the possible Latin translations of the Ancient Greek noun δύναμις⁴², discusses the use of *facultas* in specific contexts to indicate an ability. A typical example is the phrase *facultas dicendi* (literally 'capacity of speaking'), frequently found in the *Institutio oratoria* by Quintilian to indicate the art of rhetoric. Furthermore, Lecaude (2010, 583–585) emphasises that *facultas*, combined

⁴⁰ Schrickx focuses her analysis on *sine dubio* as it is the most frequent of all the adverbial forms derived from *dubius*. However, it should be mentioned that *sine dubio* is never attested in Plautus and Terence and it is rarely attested in general, therefore the conclusions on this expression are based on a much lower sample of occurrences compared to *certe* and *fortasse* (Schrickx 2011, 78–79; 244–246).

⁴¹ <https://woposs.unine.ch/maps/map-facultas.html>

⁴² Other lexical parallels are *vis* 'strength, power' and *potestas*, see the relevant section below

with a gerundive in the genitive case is frequently used in Celsus' *De medicina* to refer to the senses, such as sight, and hence, an internal ability par excellence (see example 65).

- (65) *Sub his gutta humoris est, ovi albo similis; a qua videndi*
 below this drop liquid be egg white similar from which see
facultas proficiscitur:
 ability come

Below these (i.e., tissues) there is a drop of liquid, similar to the white part of the egg; from which originates the **ability** to see (Celsus, *De medicina* 7, 7) (from Lecaudé 2010, 585)

Facultas can also be used to indicate a participant-external possibility i.e., an opportunity, the chance of doing something that originates from the external circumstances, as shown in example 66.

- (66) *Pacideius suos equites exporrigere coepit in longitudinem, ut haberent*
 Pacideius his horseman deploy start in length to have
facultatem turmas Iulianas circumeundi et ... pugnare.
 possibility cavalry of_Julius_Caesar swarm_round and ... fight

Pacideius started deploying his horsemen wider at length, so that they **would have the possibility** to surround the Julian cavalry and... fight. (*Bellum Africanum* 78, 4) (from Pinkster 2021, 451)

Although this is never mentioned in other studies, *facultas* can also express deontic modality. In constructions such as *facultatem do, porro* 'to give/demand the possibility/permission', and sometimes *facultatem habeo* 'to have the right/permission' it can express deontic authority with the value of permission (example 67).

- (67) *quare ne perorandi quidem ei data est facultas et dicendi*
 therefore not defend indeed him give be permission and speak
causam.
 trial

(context: Phocion is sentenced to death) And therefore he was not given the permission to plead and to defend himself (*causam dicere* = defend oneself) (Cornelius Nepos, *Phocion* 4, 2) (from Marongiu and Dell'Oro 2021)

Argument structure. As shown by the examples presented above, *facultas* with a modal meaning usually occurs with another verb such as *habeo, sum, do*. These constructions govern

an argument clause that can be expressed by a gerund in genitive case (example 65); *ad* with gerund in the accusative case; an *ut* clause with a verb in the subjunctive; two coordinate predicates, one expressed with the gerund in genitive and the other one expressed with an infinitive (not an infrequent combination, according to Pinkster 2021, 450–451, see example 66).

2.4.8 Forsitan

The adverb *forsitan* ‘perhaps, possibly’, ‘maybe’ is a marker of epistemic modality. It probably derives from *fors sit an* i.e., a clause where *fors* ‘chance’ is the subject, *sit* is the verb ‘to be’ in the subjunctive mood, and the subordinative particle *an* introduces an indirect interrogative, roughly translated as ‘there may be a chance (whether)’ (Fruyt and Orlandini 2003, 717; Magni 2010, 241). It expresses the judgment of the speaker on the likelihood of the state of affairs, and qualifies it as possible. This value is briefly addressed in Bolkestein (1980, 172,175) and Núñez (1991, 85,175,187) in the context of possible combinations of this adverb with Latin epistemic verbs (see section 3.3 in Chapter 3 for examples). Other studies that mention *forsitan* are e.g. Orlandini (1997), Pinkster (2004, 2005), but they offer very few examples and, in my view, none of them is apt to show a purely epistemic use of *forsitan*. Therefore, I present example 68, taken from the diachronic map for *forsitan* (Marongiu and Dell’Oro 2021m).⁴³

- (68) *nam si altera illaec magis instabit, forsitan nos reiciat.*
indeed if other she more insist possibly us dump

Indeed, if the other one will get more insistent, he may **perhaps** dump us. (Terentius, *Phormio* 2, 2) (from Marongiu and Dell’Oro 2021m)

As an epistemic adverb of possibility, *forsitan* expresses a limited degree of commitment on the part of the speaker concerning the truth-value of the state of affairs (Fruyt and Orlandini 2003, 700). This leads to uses of *forsitan* in which the epistemic value is employed to mitigate an utterance, and distance the speaker from its propositional content (Orlandini 1997, 258; Schrickx 2011, 221). This is the use of *forsitan* that is best illustrated by the passages found in the studies mentioned in this subsection. An example is given in 69.

- (69) *Et forsitan in suscipienda causa temere impulsus adulescentia fecerim.*
and maybe in undertake case unwisely drive young_age act

And **maybe** in undertaking this case I have acted unwisely, driven by the young age. (Cicero, *Pro Sexto Roscio Amerino* 31) (from Orlandini 1997, 259)

⁴³ <https://woposs.unine.ch/maps/map-forsitan.html>

This sentence presents a justification offered by Cicero for finding himself so young in handling an important case. But Cicero's intent is not to plainly admit his inexperience: it is obviously a rhetorical device aimed at gaining the empathy of the audience. By using *forsitan*, he does not candidly admit to having taken the commitment of the cause lightly due to his young age, but presents this hypothesis to prepare the audience, at the same time mitigating it and distancing himself from it.

2.4.9 Fortasse

Among the modal adverbs of epistemic possibility, *fortasse* 'it may be, perhaps', 'possibly' is the one that the literature has focused on the most. As *forsitan*, it certainly has a relation with the noun *fors*, but in this case the development into the adverb *fortasse* is less clear (Fruyt and Orlandini 2003, 717). The diachronic development of *fortasse*, with information about its etymology, can be visualised in the diachronic map (Marongiu and Dell'Oro 2021n).⁴⁴ Contrarily to *forsitan*, the degree of epistemic modality expressed by *fortasse* is not commonly shared in literature. By some authors, it is either mentioned together with *forsitan* or simply translated as 'maybe', without distinguishing the two (Bolkestein 1980, 41; Núñez 1991, 172, 175, 187; Pinkster 2004, 192; Magni 2010, 241; Ricca 2010, 149). According to other studies e.g. Kühner and Stegmann (1962[1912], 812), Orlandini (1997) and Schrickx (2011, 220-222), *fortasse* expresses a higher degree of commitment of the speaker towards the likelihood of the state of affairs, and is therefore positioned at a higher degree on the scale of epistemicity, compared to *forsitan*. The behaviour of *fortasse* is explained in more detail in Bertocchi and Orlandini (2001, 51-52); Fruyt and Orlandini (2003, 700-701); Bertocchi and Orlandini (2002, 13-15). In these works, *fortasse* is described as an adverb that is positively oriented: the degree of commitment on the part of the speaker towards the likelihood of the state of affairs is less than certainty but more than possibility. This adverb can be rephrased as 'possible that *p*, if not necessary', where *p* is the propositional content of the utterance modified by *fortasse* (Bertocchi and Orlandini 2002, 14). The use of *fortasse* as a fully epistemic adverb is illustrated in example 70.

- (70) *Sed a me est de universo genere dicendum. In quo fortasse aliqui*
 but by me be of entire people say in which maybe some
suis moribus et humanitate stirpis ipsius et gentis vitia
 his_own custom and humanity lineage himself and clan flaw
vicerunt.
 win_over

⁴⁴ <https://woposs.unine.ch/maps/map-fortasse.html>

But I have to talk about the people in its entirety. In which **perhaps** some have won over the flaws of their own lineage and clan by means of their good customs and kind nature. (Cicero, *Pro Scauro* 44) (from Bertocchi and Orlandini 2001, 50)⁴⁵

An additional proof of the positive orientation towards the higher degree of epistemicity of *fortasse* is given by its co-occurrence with certain indefinite pronouns, and its concurrence with some others. *Fortasse* is found in utterances with indefinite pronouns that have positive orientation (tending towards the presupposition of existence), such as *aliquis* (as in example 70 with *aliqui*) and *quispiam* 'someone, somebody'. It is never found with *quis* 'someone', which has neutral orientation, nor with *quisquam* 'anyone, anybody', which is oriented towards a negative value (Bertocchi and Orlandini 2001, 50).

As all the other epistemic adverbs, *fortasse* cannot be under the scope of negation (Orlandini 1997, 253; Bertocchi and Orlandini 2001, 59; Orlandini 2001, 326; Ricca 2010, 150 among others). If the proposition to which *fortasse* refers is negative, this is expressed in the construction *fortasse non*. *Fortasse non* can be rephrased as 'possible that *non-p*, if not impossible', and with this expression the speaker commits to the truth value of *non-p* (in which *fortasse* still scopes over the propositional content of the utterance) (Bertocchi and Orlandini 2002, 14). This use is shown in example 71.

- (71) *alius dicat fortasse non veniet.*
 other say maybe not come

Another one may say 'maybe he will not come'. (Seneca, *Epistulae ad Lucilium* 13, 14, 2) (from Bertocchi and Orlandini 2001, 51)⁴⁶

The scalar nature of *fortasse* and its positive orientation towards the positive pole of the epistemic scale (notion of probability) enables its argumentative use (Anscombe and Ducrot 1983). *Fortasse* leads to a positive conclusion, *fortasse non* to a negative conclusion. The speaker therefore can use them to force the addressee towards a certain conclusion. This can sometimes end up in comedic or even provocative effects, especially when the speaker is taunting the addressee. Consider example 72 with *fortasse numquam* (equivalent here to *fortasse non*).

⁴⁵ Please note that Bertocchi and Orlandini translate *fortasse* in this passage with Fr. *probablement* 'probably'.

⁴⁶ Orlandini (1997, 259) also observes that the occurrences of *fortasse* scoping over a predicate in the past tense are rare in Latin, whereas this adverb has a strong tendency to occur with predicates in the future tense (in this case *veniet*, future simple from *venio*).

- (72) *iam id ipsum quantae divinationis est, scire innocentem fuisse*
 now it itself how_great divinatory_power be know innocent be
reum quem fortasse numquam viderat.
 accused who maybe never see

Now, what a great divinatory power it is, to know that the accused, whom he had **probably** never seen, was innocent. (Cicero, *Pro Cluentio* 131) (from Bertocchi and Orlandini 2002, 14)

In this speech, Cicero is defending the integrity of a conviction pronounced by Popilius against the accused, Oppianicus. Specifically, he is responding to the accusation made by Gellius that Oppianicus was innocent and that he was condemned by Popilius in exchange for money. Cicero expresses his opinion by delivering this witty statement. Gellius, having probably never seen the accused (*fortasse numquam viderat*), could not know whether he is innocent, unless through some (implausible) divinatory abilities. This also explains my choice to translate *fortasse* with 'probably' rather than 'maybe' (Bertocchi and Orlandini 2002 translate it with Fr. *peut-être* 'maybe'). In some cases, the positive orientation of *fortasse* can also be used to pragmatically mark an energetic affirmation, and in those contexts it behaves similarly to the reinforcing uses of *certe* (Orlandini 1997, 255-256; Pinkster 2005, 138). Consider example 73.

- (73) AMPHITRUO tu me heri hic vidisti? ALCMENA. Ego, inquam,
 AMPHITRUO. you me yesterday here see ALCMENA I say
si vis decies dicere. AMPHITRUO. In somnis fortasse.
 if want ten tell AMPHITRUO in dream maybe

AMPHITRUO. You saw me here yesterday? ALCMENA. I did, I say, if you want me to tell you ten times (lit. if you want ten times to say). AMPHITRUO. In your dreams, **maybe**! (Plautus, *Amphitruo* 725–726) (from Orlandini 1997, 255–256)

In this passage, *fortasse* is used in a strongly ironic manner to contradict the interlocutor's statement, which is then implicitly reformulated as follows: 'Certainly, you didn't see me here yesterday. **Maybe** you saw me in your dreams'.

Fortasse retains many of the other uses mentioned for *certe* and *forsitan* above. This adverb may be used to answer yes or no questions, with other constituents or alone (Orlandini 1997, 257–258; Pinkster 2004, 192; Pinkster 2005, 104), or to comment by expressing agreement or disagreement on the preceding words of the interlocutor (Pinkster 2005, 138). As *certe*, it can be used as a focaliser, to mark specific constituents of the clause (Ricca 2010, 168). The constituents might be nouns, adjectives or predicates. The focalising use of *fortasse* is

common especially in combination with *certe*, or another expression of epistemic certainty, for argumentative purposes. Specific examples for this use will be provided in section 3.3 (Chapter 3). Finally, as it was observed for *forsitan*, *fortasse* can also be used to mitigate an utterance, as shown in example 74.

- (74) *riserit aliquis fortasse hoc praeceptum; est enim non tam acutum*
 laugh someone maybe this precept be in_fact not that subtle
quam necessarium magis=que monitoris non fatui quam eruditi magistri
 than necessary more=and mentor not silly than learned master

Perhaps someone might have laughed at this precept; indeed, it is not so much sharp as it is necessary, and even more it comes from a clever mentor, rather than a learned teacher. (Cicero, *De oratore* 2, 99) (from Fruyt and Orlandini 2003, 701)

In this case, the value of possibility given by *fortasse* is cumulative, as it often happens, with the value of the potential subjunctive (*riserit*). With the use of both, Cicero anticipates a possible criticism or mockery of the precept that he will give out shortly and seizes the opportunity to explain its importance.

2.4.10 Forte

The adverb *forte* is an epistemic marker expressing possibility. Among the epistemic adverbs, *forte* is perhaps the least studied, compared to *fortasse* and *forsitan* and especially *certe*. Orlandini (1997) presents the most in-depth study on the senses of *forte* that we have available. Unlike *fortasse* and *forsitan*, this adverb can mark a single constituent of the clause, or scope over the entire proposition. The way in which the adverb is employed determines its use by the speaker. Three uses can be distinguished for *forte*. The first one is the use of *forte* as a manner adverb, with the sense 'by chance' (*par hasard* in French, *per caso* in Italian) i.e., to qualify some event as unexpected, exceptional. This use is not modal, even when the constituent modified by *forte* is a predicate. I usually do not present non modal uses of the markers in the list, but I will present all three uses of *forte* as they will emerge during the analysis of some of the co-occurrences. Consider example 75.

- (75) *Et pernox forte luna erat.*
 and continuing_throughout_the_night by_chance moon be

And **by chance** (i.e., unexpectedly) there was the moonlight throughout the night. (Livius, *Ab urbe condita* 32, 11, 9) (from Orlandini 1997, 252)

In this case, *forte* only qualifies the presence of the moon throughout the night as accidental, exceptional. The same use can be found with *forte* marking an adjective or an adverbial construction.

The second use of *forte* appears when the adverb is applied at the predicate level, where it often combines with *si*. Consider example 76.

- (76) PISTOCLERUS. *Ibo ut visam huc ad eum, si forte*
 PISTOCLERUS. go so_that see to_this_place to he if by_chance
est domi.
 be home

PISTOCLERUS. I will go see here at his house, if by any chance he is home. (Plautus, *Bacchides* 529) (from Orlandini 1997, 253)

In this passage, the clause where *forte* appears is a pseudo-conditional (Orlandini 1997, 253). The *si* in the pseudo-hypothetical does not introduce a real condition for the actualisation of the event described in the main clause; rather, it offers a justification for it, getting closer to the function of a purpose clause (Pinkster 2021, 334-335 translates it as 'to see if'). As all epistemic adverbs, *forte* cannot be under the scope of negation (Orlandini 1997, 253; Bertocchi and Orlandini 2001, 59; Orlandini 2001, 326 among others). The negative counterpart of the expression *si forte* is obtained by using the negation *nisi* with an exceptive value (Orlandini 1997, 254) i.e., which introduces an exception to the content of the main clause (Pinkster 2021, 351-352). This use has sometimes comedic effects, and it is employed with the intention of taunting the addressee, as shown in example 77.

- (77) PHANISCUS. *nisi forte factu's(= factus es) praefectus novus.*
 PHANISCUS. if_not by_chance make_be magistrate new

PHANISCUS. Unless perhaps you were nominated a new magistrate. (Plautus, *Mostellaria* 941) (from Orlandini and Poccetti 2019, 265)

In this passage, the character is advising his interlocutor to mind his own business. In order to do this, he uses a clause with a subjunctive introduced by *nisi forte* to present an absurd exception: unless he was recently appointed a magistrate, which would explain why he has to constantly deal with others' affairs. The use of *nisi forte* contributes in giving to the utterance the comedic and derisive tone.

In this study, cases of *forte* co-occurring with another modal marker and being combined with *si* or *nisi* have been considered modal. I will comment more thoroughly on the use of *si*

forte and *nisi forte* in the analysis chapters (Chapters 7 and 8), referring to specific passages extracted from the corpus.

Finally, the use of *forte* as a proper epistemic adverb emerges when *forte* is applied to the propositional content of the utterance, and expresses epistemic possibility, with the sense ‘maybe, perhaps’ (Orlandini 1997, 254-255). Compared to *fortasse*, at least for Orlandini, *forte* expresses pure doubt i.e., it does not tend towards the notion of probability (Orlandini 1997, 254, 256-257; Schrickx 2011, 220). The epistemic use of *forte* is very rare in Latin, which perhaps explains the lower number of studies compared to the other epistemic adverbs. These uses seem to be confined to specific cases, namely indirect questions that prompt a positive answer (example 78) or rhetorical questions (Orlandini 1997, 255).

- (78) *Hic pauca primo atque ea percontantibus nobis ecquid forte Roma*
 here few firstly and it question us whether maybe Rome
novi;
 news

Here he said first a few things (lit. here first a few things), and that as we were questioning him whether **maybe** there were any news in Rome (with verb implied). (Cicero, *Academica* 1, 2) (from Orlandini 1997, 255)

As it was mentioned for *certe*, *forsitan* and *fortasse*, *forte* can also be used alone to reply to yes/no questions (Orlandini 1997, 256, but she does not provide any examples for *forte*).

2.4.11 *Ius est*

The noun *ius* alone can express the non-modal meanings ‘legal right, law, justice’, but also related meanings such as ‘court’, ‘lawsuit’, ‘good principle’. It is often found in the deontic construction *ius est*. This impersonal construction can never express epistemic modality. For this reason, it is grouped together with *decet* (see the section above) *meum est*, *opus* and *usus est*, as well as *queo* and *nequeo*, among the semi-modal markers i.e., forms that cannot express epistemic modality (Bolkestein 1980, 153; Núñez 1991, 65; Magni 2010, 210). The diachronic map for *ius* includes the modal construction *ius est* and all its modal readings (Marongiu and Dell’Oro 2021u).⁴⁷

Depending on the context, *ius est* can express deontic authority with a value of permission ‘it is lawful, it is allowed’ or deontic acceptability with the degree desirable or absolutely necessary ‘it is right’ (Orlandini and Poccetti 2012, 308; Viti 2018, 17).

⁴⁷ <https://woposs.unine.ch/maps/map-ius.html>

This construction is only marginally mentioned in other studies about Latin modality, and has not been the focus of a specific work so far. Therefore, in order to illustrate its modal meanings, I will resort to the examples shown in the diachronic map for *ius est*.

The value of deontic authority is illustrated in example 79.

- (79) *si istuc ius est ut tu istuc excusare possies, luci claro deripiamus*
 if this right be that you this excuse can light clear steal
aurum matronis palam, postid si prehensi simus, excusemus ebrios nos
 gold woman openly then if catch be excuse drunk us
fecisse amoris causa.
 do love because_of

If it is **lawful** for you to use that excuse (i.e., that you did it because you were drunk and in love), then we could steal gold from women openly in clear daylight, and if we get caught, we could excuse ourselves by saying that we did it for love while we were drunk. (Plautus, *Aulularia* 747) (from Marongiu and Dell'Oro 2021u)

The value of deontic acceptability is illustrated in example 80.

- (80) *ius=que fas=que est: nemo alienus hic est.*
 proper=and right=and be nobody stranger here be

It is **proper** and right (*fas* i.e., right according to divine law) (implied: to talk about it here): there are no strangers here. (Plautus, *Cistellaria* 20) (from Marongiu and Dell'Oro 2021u)

In this passage, the scope *loqui* is implied. The interpretation as a modal deontic marker is guided, as it often happens, by the presence of other contextual elements, specifically the word *fas*, which primarily refers to something that is in concord with the divine law, which is proper and befitting.

Argument structure. As some other impersonal constructions in this section, *ius est* occurs in a one-slot pattern. The obligatory slot is filled with an infinitive complement or an accusative with infinitive clause, which function as the subject of the construction.

2.4.12 Licet, -uit/-itum est, -ēre

The modal verb *licet* 'to be allowed' but also 'it is possible' is an impersonal form derived from the verb *liceō* 'to be for sale' (Fruyt and Orlandini 2003, 715). This verb can express various types of possibility in the deontic, dynamic and epistemic domain. The diachronic map

for *licet* illustrates all its meanings in chronological order (Marongiu and Dell'Oro 2021v)⁴⁸

The notion of deontic authority is found already in Early Latin. *Licet* is employed with the meaning 'it is allowed, permitted', and expresses the notion of permission (*déontique faible* 'weak deontic' in Fruyt and Orlandini 2003, 702). Consider example 81.

- (81) TYNDARUS *Quem syngraphum?* HEGIO *Quem hic ferat se cum*
 TYNDARUS what written_pass HEGIO that he bring himself with
ad legionem, hinc ire huic ut liceat domum.
 to army from_here go he so_that be_allowed home

TYNDARUS What written pass? HEGIO A written pass to bring with him to the army, so that from here he **would be allowed** to go home. (Plautus, *Captivi* 451) (from Marongiu and Dell'Oro 2021v)

The deontic value of *licet* can be used pragmatically to express a polite request to obtain something, as shown in example 82.

- (82) *licet me id scire quid sit?*
 be_allowed me it know what be

Am I allowed to know what it is? (Plautus, *Pseudolus* 16) (from Magni 2010, 229)

The notion of external possibility expressed by *licet* can be observed also in the dynamic domain, when the verb is used with the meaning 'to have the possibility, chance, opportunity of doing something' (Núñez 1991; Fruyt and Orlandini 2003; Magni 2010; Viti 2018). This value is illustrated in example 83.

- (83) *quoi numquam unam rem me licet semel praecipere furi,*
 which never one thing me be_possible once give_an_order thief
quin centiens eadem imperem
 without a_hundred_times same_thing order

I **can** never give an order to this thief once, without having to order the same thing a hundred times. (Plautus, *Captivi* 451) (from Marongiu and Dell'Oro 2021v)

In a few cases, *licet* can also express epistemic possibility with the meaning 'it is possible'. According to our analysis, the ThLL does not provide attestations in which *licet* conveys an epistemic meaning (Marongiu and Dell'Oro 2022, 10). However, previous studies (Núñez

⁴⁸ <https://woposs.unine.ch/maps/map-licet.html>

1991, 77–81; Fruyt and Orlandini 2003, 700; Magni 2010, 228) have identified this value in passages such as the one in example 84.

- (84) *Illud item non est mirandum, qua ratione tantulus ille queat tantum*
 that also not be admire which way so_small he can so_much
sol mittere lumen, quod maria ac terras omnis caelum=que rigando
 sun emit light that sea and land all sky=and flood
compleat et calido perfundat cuncta vapore. Nam licet
 fill and warm overspread all heat in_fact be_possible
hinc mundi patefactum totius unum largifluum fontem scatere
 from_here world throw_open entire one copious fountain flow_out
atque erumpere lumen, ex omni mundo quia sic elementa
 and burst light from all world because in_such_way elements
vaporis undique conveniunt et sic coniectus eorum
 heat from_all_places gather and in_such_way confluence their
confluit, ex uno capite hic ut profluat ardor.
 flow_together from one source here so_that flow_out warmth

Another thing also should not raise wonder, how can such a small sun emit so much light, that when it floods it fills the seas and the lands and the whole sky, and it over-spreads everything with warm heat. In fact **it is possible** that from here one copious fountain of the whole world, thrown open, flows out and bursts light, because the elements of heat gather together from all parts of the world in such a way, and their confluence flows together in such a way, that the warmth flows out here from one single source. (Lucretius, *De rerum natura* 5, 597) (from Núñez 1991, 81)

Licet expresses mainly deontic modality in Early Latin. The epistemic occurrences of *licet* are still rare in Classical Latin (Núñez 1991, 184–186; Magni 2010, 228).

It is worth mentioning that *licet* also shows a post-modal⁴⁹ concessive value when it is constructed with the subjunctive (Magni 2010, 228), which originates from epistemic uses of *licet*. The development of concessive *licet* 'although', its status as a full verb with a concessive value or as a subordinating concessive particle, as well as its construction have been the object of numerous works (Purnelle 1998; Purnelle 2001; Spevak 2002 among others). The concessive value originates from the use of epistemic *licet* as an hedge, to put some distance between the speaker and his/her statement and to avoid to fully commit to the propositional content of the utterance. An emblematic use of *licet* as an hedge is in the parenthetical *si ita*

⁴⁹ This meaning is post-modal according to van der Auwera and Plungian (1998).

licet dicere ‘if it is possible to say that’ (Núñez 1991, 185). Therefore, it frequently occurs in contrastive passages where the concessive value emerges, building on the possibility value of *licet*. Consider example 85.

- (85) *licet laudem Fortunam, tamen ut ne Salutem culpem.*
 be_possible praise Fortune however that not Salvation reproach

I **may** (= although) praise Fortune, however I do not find any fault with Salvation.
 (Plautus, *Asinaria* 718) (from Núñez 1991, 186)

In this passage, the concessive reading is given by the contrast between *licet* that expresses what could be interpreted as an epistemic value, and *saltem*, a discourse adversative adverb that creates the oppositional relation between the two clauses.

Argument structure. As shown in the examples presented so far in this section, *licet* can be associated with two different syntactic patterns (Magni 2010, 209). The first one is a one-place pattern, where the obligatory slot is filled by a non-finite clause (accusative with infinitive) or a finite clause (*ut* with the subjunctive or simple subjunctive). This construction pattern was illustrated e.g. in example 84. The other construction pattern has two obligatory slots, which are filled by a nominal constituent in the dative case and by an infinitival complement. This pattern is illustrated e.g. in example 81.

2.4.12.1 Licitus, -a, -um

Derived from the perfect participle of *licet* (*licitus* ‘allowed, lawful’), the copular construction *licitum est* can express deontic authority with the value of permission ‘it is permitted’. This value is illustrated in example 86. This impersonal construction is included in the map for *licet*, indicated in the main section (Marongiu and Dell’Oro 2021v).

- (86) *quin intro ire in aedis numquam licitum est.*
 that inside go in house never allowed be

It was never permitted to enter the house (i.e., another character forbade the speaker to enter the house). (Plautus, *Amphitruo* 617) (from Marongiu and Dell’Oro 2021v)

2.4.13 Meum est

The possessive adjective *meus* ‘my’ when used in the construction *meum est* can express dynamic modality. This construction, together with e.g. *ius est*, and, as we will see, *opus* and *usus est*, is listed among the semi-modal markers, as it cannot express epistemic modality (Bolkestein 1980, 153; Núñez 1991, 65; Magni 2010, 210). Besides a few marginal mentions

in broader studies on Latin modality, this construction has not received specific attention, to my knowledge. Therefore, in this section I will present examples from the diachronic map for the adjective *meus*, which includes meanings and uses of the modal construction *meum est* (Marongiu and Dell’Oro 2021w).⁵⁰ The construction *meum est* is particularly interesting because it can express both dynamic necessity with the meaning ‘I have to’ and dynamic possibility, with the meaning ‘it is in my power, I have the ability to’.

The use of *meum est* with a dynamic necessity value is shown in example 87.

- (87) *enim olim arbitrabar esse meum libere loqui, cuius opera esset in*
indeed once think be my freely speak which work be in
civitate libertas.
community freedom

Indeed, once I thought I **had to** to speak freely, as freedom in the community was my doing (e.g. I brought freedom to the community). (Cicero, *Epistulae ad familiares* 7, 3, 6) (from ThLL 1900–, s.v. *meus*, with my analysis)

Especially interesting is example 88, which seems to suggest the possibility of using the same construction with the possessive adjective *tuum*.

- (88) *meum erat, non tuum, eas novisse volucres.*
my be not your it know winged

It was my duty, not yours, to know these winged creatures. (Varro, *De re rustica* 3, 16, 3) (from Marongiu and Dell’Oro 2021w)

The value of dynamic possibility is shown in example 89.

- (89) *cum sim rapta, meum quid nisi nolle fuit?*
when be seize my what if_not not_want be

But as I got seized, what **could** I do (lit. ‘what was mine’) but to oppose myself to it? (Ovidius, *Heroides* 16, 24) (from Marongiu and Dell’Oro 2021w)

Even though this study does not focus on volitive expressions, it is worth mentioning for the sake of completeness that *meum est* can also express deontic volition ‘it is my will’.

⁵⁰ <https://woposs.unine.ch/maps/map-meus.html>

Argument structure. As shown by the examples above, the construction *meum est* always occurs with a one-slot syntactic pattern, where an infinitive complement functions as a subject. The person to which the possibility or necessity refers is encoded by the possessive adjective *meum* (Viti 2018, 17).

2.4.14 *Necesse*

Necesse is a marker that, used in constructions such as *necesse est* ‘it is necessary’, *necesse habeo* ‘I consider it necessary’, ‘I have the necessity to do something’ and similar, can express a variety of modal meanings. From *necesse* derive various other markers that hold the same notion of necessity and/or inevitability at the core of their modal usage: the adjective *necessarius*, -a, -um; the associated adverbs *necessarie*, *necessario* and *necessarium*; the noun *necessitas*, -atis; the noun *necessitudo*, -inis. As they all derive from *necesse*, I will treat them in this section. I will first describe the uses of *necesse* and how it has been analysed in the literature. Then, I will dedicate different sub-sections to each of the other markers derived from *necesse*, in the same order as they are presented above.

The impersonal construction *necesse est* results from the combination of the uninflectable noun *necesse* and the copula *esse*. It is attested already in Early Latin texts, and it can occur in the unverbated form *necessest* or in the variant *necessus est* (Viti 2018, 16) and *necessum est*. The diachronic map for *necesse* describes the diachronic evolution of *necesse* and all the modal meanings and constructions associated with it (Marongiu and Dell’Oro 2021y).⁵¹ There is general consensus in literature on the expression, by means of *necesse est*, of dynamic necessity with the notion of inevitability (sometimes defined as objective modality, alethic modality e.g. in Bolkestein 1980, 73; Bertocchi and Orlandini 2001, 48; Fruyt and Orlandini 2003, 693), participant-external dynamic necessity and deontic authority (as a reminder, Núñez 1991, 96–97 underlines the issue of distinguishing the two types of modality in absence of a clear source of authority in specific contexts).

The value of dynamic necessity expressed by *necesse est* is illustrated in example 90, where *necesse est* refers to a general necessity that is inherent to the situation described in the state of affairs. This use of *necesse est* is defined contingent necessity in Fruyt and Orlandini (2003, 693) i.e., a type of necessity that is related to the knowledge about the world (alethic modality). It is a very common use of *necesse est*, and especially typical of medical texts.

⁵¹ <https://woposs.unine.ch/maps/map-necesse.html>

- (90) *nam taetri odoris esse necesse est omne, quod natura fuerit*
indeed horrible smell be necessary be all which nature be
mutatum.
altered

and indeed it **is necessary** (i.e., inevitable) that all that has been altered in its nature has an horrible smell. (Caelius Aurelianus, *De morbis acutis et chronicis* 2, 199) (from Fruyt and Orlandini 2003, 694, footnote 6)

Necesse est can also express participant-related dynamic necessity, as shown in example 91 (participant-inherent).

- (91) *nihil necesse est mihi de me ipso dicere.*
nothing necessary be me about me self say

I **don't need** to say (lit. it is not necessary for me to say) anything about myself. (Cicero, *De senectute* 30) (from Viti 2018, 16)

Participant-related dynamic modality can also be expressed by the construction *necesse habeo*. Although it can sometimes be used with the meaning 'I hold as necessary, I consider (something) to be necessary', this construction can also express the imposition of some type of necessity onto the participant, with the meaning 'I have the necessity, it is necessary for me (to do something)'. Consider example 92 for this use.

- (92) *si id apertum sit, non habebimus necesse semper concludere.*
if it evident be not have necessity always conclude

if it is clear, we will not **have to** (lit. we will not have the necessity to) always lay down a conclusion. (Cicero, *De partitione oratoria* 47) (from Marongiu and Dell'Oro 2021y)

In this passage, the discussion revolves around how to embellish a discourse: when the conclusion is obvious to everyone because the argument has been well articulated, it is not always necessary to state it explicitly. In this case, the verb *necesse habeo* expresses a type of necessity that is imposed onto the participant who wants to deliver a strong argumentation.

The notion of deontic authority (obligation) is explicitly expressed in example 99, and indicated by the presence of the adverbial phrase *ex lege* 'according to the law'.

- (93) *deinde, ex lege utrum statim fieri necesse sit, utrum habeat*
 then from law which immediately do necessary be which have

aliquam moram et sustentationem.
 some delay and postponement

Then (implied: it will be investigated) what action, according to the law, **is necessary** that is carried out immediately, and which one could have some delay and postpone-ment. (Cicero, *De inventione* 2, 4) (from Marongiu and Dell'Oro 2021y)

The deontic meaning of *necesse est* with an evaluative value i.e., deontic acceptability is often ignored in works about *necesse*, with the exception of Thomas (2002, 102), who refers to the use of this construction to express moral obligation. The same notion of deontic acceptability can be observed in example 94.

- (94) *necesse est iste, qui amicum, socium, affinem fama ac fortunis*
 necessary be this who friend ally partner reputation and wealth

spoliare conatus est, vanum se et perfidiosum et impium esse
 rob try be deceptive himself and dishonest and ungodly be

fateatur.
 confess

It is necessary for the one who has attempted to rob a friend, an ally, a partner of their reputation and wealth, to confess to being deceptive, dishonest and ungodly. (Cicero, *Pro Publio Quinctio* 26) (from Marongiu and Dell'Oro 2021y)

Finally, *necesse est* (and associated variants) can express epistemic modality, with the degree of absolute certainty. This value, variously called subjective or inferential modality, is usually mentioned in the majority of the contributions about *necesse* (Bolkestein 1980; Núñez 1991 Magni 2010; cf. Fruyt and Orlandini 2003 who only mention alethic and deontic modality). This value is shown in example 95.

- (95) *Quis hoc credet, tantam amentiam quemquam tenuisse ut imperium*
 who this believe so_much madness anyone have that power

populi Romani temptare auderet nullis copiis fretus? Ergo
 people Roman challenge dare none troops relying_on therefore

aliquid *fuisse* *necessum* *est*. *Quid* *aliud* *nisi* *id* *quod* *dico* *potest*
 something be necessary be what other if_not it that say can
esse?
 be

Who will believe this, that someone was that crazy to dare challenge the power of the Roman people without any troops to rely on? Therefore there **must** have been something (i.e., a reason). What else can it be if not what I am saying? (*Rhetorica ad Herennium* 4, 9, 13) (from Marongiu and Dell’Oro 2021y)

Argument structure. As it emerges from the examples presented so far, *necesse est* can be associated with different constructions. Magni (2010, 209), following Bolkestein (1980), distinguishes two different construction patterns for *necesse est*. The first one is a one-slot construction pattern, where the argument is filled by a non-finite clause (an accusative with infinitive clause) or a finite clause (a verb in the subjunctive optionally introduced by *ut*).

The second construction is a two-slot pattern with i) a nominal constituent in the dative case, which indicates the recipient of the necessity expressed by the predicate, and ii) a finite clause (*ut* with subjunctive) or a non-finite clause (accusative with infinitive clause). Bolkestein (1980, 104–119) hypothesises the existence of two different markers, *necesse est*₁ and *necesse est*₂, following the model of the two *debeo* (see the relevant section). *Necesse est*₁ occurs with the one-slot construction pattern and *necesse est*₂ with the two-slot pattern. Consequently, *necesse est*₁ is capable of expressing both deontic (participant-external dynamic in our framework) and inferential modality, while *necesse est*₂ only expresses deontic modality. Nunez (1991), applies the same criticism formulated for the two instances of *debeo*, addressing this as an overcomplicated and unnecessary reading of *necesse est*, which, when the dative constituent is expressed obviously cannot express epistemic modality (the notion of necessity in the case of epistemic modality is applied onto the proposition and the participant).

The two-slot construction pattern is illustrated in example 91, where *mihi* is the nominal constituent in the dative case and the argument clause is expressed by the accusative with infinitive (*nihil... de me ipso dicere*). All the other examples illustrate the use of *necesse est* in the one-slot pattern with the non-finite subordinate clause.

In the following sections I will describe the adjectives, nouns and adverbs derived from *necesse*. As far as I know, there are no studies that focus on their use as modal markers. Therefore, the illustration of their modal values and constructions will be almost exclusively based on the data collected during the creation of the diachronic maps for these markers

(Marongiu and Dell’Oro 2022), and on marginal mentions found in broader studies on Latin modality.

2.4.14.1 *Necessarius*, -a, -um

The adjective *necessarius* is described in the diachronic map in Marongiu and Dell’Oro (2021x).⁵² As the noun *necessitas* and the other markers, this marker shares with *necesse* the capacity of expressing the notion of necessity and, sometimes, inevitability (Fruyt and Orlandini 2003, 712). In constructions such as *necessarium est* ‘it is necessary’ or *necessarium videtur* ‘it seems necessary’ it can express dynamic modality, as shown in example 96.

- (96) AMPELISCA *sicine hic cum uvida veste grassabimur?* PALAESTRA
 AMPELISCA. so.Q here with wet clothes move_around PALAESTRA.

hoc quod est, id necessarium est perpeti.
 this which be it necessary be endure

AMPELISCA. So are we going to wander around here with wet clothes? PALAESTRA. **It is necessary** to endure the situation as it is. (Plautus, *Rudens* 252) (from Marongiu and Dell’Oro 2021x)

Fruyt and Orlandini (2003, 694) point out that the construction *necessarium est* can also be used to indicate the notion of contingency in alethic modality (i.e., dynamic necessity situational), as shown in example 97.

- (97) *Si enim, inquit, alterutrum concessero necessarium esse, necesse*
 if indeed say one_of_the_two admit necessary be necessary

erit cras Hermarchum aut vivere aut non vivere.
 be tomorrow Hemarcus or live or not live

In fact, he says, if I will admit that one of these two things **is necessary** (i.e., will necessarily happen), it is necessary that tomorrow Hemarcus either lives or dies.⁵³ (Cicero, *Academica* 2, 97) (from Fruyt and Orlandini 2003, 694)

According to our study of the attestations provided by the ThLL, *necessarius* can also express deontic acceptability and deontic authority. The value of deontic acceptability, with

⁵² <https://woposs.unine.ch/maps/map-necessarius.html>

⁵³ This example is quite complex. The direct scope of *necessarium esse* is *alterutrum*, but a verb such as *evenire* or *fieri* ‘to happen’ can be inferred. Moreover, the construction co-occurs with *necesse est*. For the presentation of the markers used in the study, I avoided including examples with co-occurrences as much as possible. The influence of co-occurrence itself on the interpretation of the passage is indeed one of the objects of study in this work. However, I made an exception here as this is the only case I could find in the literature where *necessarium esse* is used to express a notion of contingency as the one described by Fruyt and Orlandini.

the degree absolutely necessary, emerges especially in constructions such as *necessarium existimo/iudico* ‘I consider necessary’. Consider example 98.

- (98) *Necessarium ergo iudico, id quod tibi scripsi magnos viros saepe*
 necessary therefore consider it which you write great man often
fecisse: aliquos dies interponere, quibus nos imaginaria paupertate exerceamus
 do some day introduce which we fictitious poverty practice
ad veram.
 to true

I **consider** it **necessary** what I have written to you that the great men have often done: to introduce some days in which, by means of a fictitious poverty, we get ready for the true one. (Seneca, *Epistulae* 20, 13) (from Marongiu and Dell’Oro 2021x)

The construction *necessarium est* can also express the value of deontic authority, as shown in example 99.⁵⁴

- (99) *Atque inveniri quidem omnis ex his locis argumentatio poterit: inventa*
 and find indeed all from this place argument can find
exornari et certas in partes distinguere et suavissimum est et
 embellish and certain in part distinguish and beautiful be and
summe necessarium.
 extremely necessary

And indeed from these sources, one can find all kinds of arguments: it **is** very rewarding and extremely **necessary** to embellish the argument found and to distinguish it into well-defined parts. (Cicero, *De inventione* 1, 50) (from Marongiu and Dell’Oro 2021x)

Argument structure. As shown by the examples above, the constructions *necessarium est*, *necessarium habeo* and similar occur in one-slot patterns, where the slot is usually filled with an accusative with infinitive clause.

The adverbs *necessarie*, *necessarium* and *necessario* ‘necessarily’ are derived from the adjective *necessarius* and are described each in its own diachronic (*necessarie* in Marongiu and Dell’Oro 2023a; *necessario* in Marongiu and Dell’Oro 2023b; *necessarium* in Marongiu and

⁵⁴ I should mention that the value of deontic authority is quite doubtful because this is the only unambiguous example for this type of modality among the passages in the ThLL. The modal interpretation was given based on the type of text to which the sentence belongs, in which the author represents a source of authority with respect to the teaching of rhetoric, rather than the linguistic context in which the marker occurs.

Dell’Oro 2023c).⁵⁵ Based on the analysis of the attestations, the types of modality expressed by these three adverbs are actually much narrower compared to those expressed by *necesse* and even compared to *necessarius*. Pinkster (2004, 195) only mentions *necessario* as a second level satellite to express the notion of inevitability, but does not present a modal passage for this use. All three adverbs usually express dynamic necessity. This also explains why they are never mentioned among Latin commitment adverbs and particularly among Latin epistemic adverbs (e.g. Pinkster 2005; Schrickx 2011; Kroon 2019[1995]). An illustration of the dynamic use of *necessarie* is given in example 100.

- (100) *non unum aliquod proposuimus exemplum cuius omnes partes,*
 not one_single anything set_out example which all part
*quocumque essent in genere, exprimendae nobis **necessarie** viderentur.*
 whatever be in type imitate us necessarily seem

I did not set one single example that I felt I had to **necessarily** follow in all its parts, whatever type they may be. (Cicero, *De inventione* 2, 4) (from Marongiu and Dell’Oro 2023a)

Occasionally, *necessarie* might express deontic acceptability (but this meaning emerges later, around the II century CE, as the first attestation of *necessarie* with this value is found in Tertullian, see the map in Marongiu and Dell’Oro 2023a).

2.4.14.2 Necessitas, -atis

The noun *necessitas* ‘necessity’ is described in the diachronic map in (Marongiu and Dell’Oro 2021z).⁵⁶ This noun can be used in the constructions *necessitas est* ‘there is need, it is needed’, *necessitatem habeo* ‘I have the necessity (of doing something)/I must (do something)’, but also in combination with other verbs such as *impono* ‘to impose’, *subigo* ‘to put under’ and similar. *Necessitas* can express dynamic necessity (example 101) and deontic authority with the value of obligation (example 102).

- (101) *exeundi non causa solum, sed etiam **necessitas** fuit.*
 go_away not reason only but also necessity be

He **had** not only a reason but also **the necessity** to go away. (Cicero, *Pro Milone* 45) (from ThLL 1900– s.v. *necessitas*, with my analysis)

⁵⁵ <https://woposs.unine.ch/maps/map-necessarie.html> for *necessarie*; <https://woposs.unine.ch/maps/map-necessario.html> for *necessario*; <https://woposs.unine.ch/maps/map-necessarium.html> for *necessarium*.

⁵⁶ <https://woposs.unine.ch/maps/map-necessitas.html>

- (102) *non habeo necessitatem implere condicionem, utpote cum, etiamsi*
 not have necessity satisfy condition namely as even_if
condicio defecerit, pars quam vindicaturus eras mihi adcrecat.
 condition miss part that reclaim be me increase

I will not **have the obligation** to satisfy this condition, given that even if the condition is not met, the part (i.e., of the estate) that you would have wanted to reclaim would pass to me. (*Iulianus libro primo ex Minicio in Iustiniani Augusti Digesta* 35, 1, 30) (from Marongiu and Dell'Oro 2021z)

In example 103, *necessitas est* occurs with a non-modal meaning of *necessitas*, which expresses the notion of 'shortage (of something)' i.e., poverty.

- (103) *in necessitate vivere necessitas nulla est.*
 in shortage live necessity none be

There is no **need** to live in poverty. (Cicero, *Pro Milone* 45) (from Marongiu and Dell'Oro 2021z)

Argument structure. When used with a modal meaning, *necessitas* can occur with a gerundive in the genitive case, as shown in example 101 (Pinkster 2021, 455); or with an infinitive, as in example 102. From the analysis of the attestation provided by the ThLL, two other constructions emerged: *ut* with subjunctive and *ad* with gerundive in the accusative case (Marongiu and Dell'Oro 2021z).

2.4.14.3 Necessitudo, -inis

The noun *necessitudo* 'necessity' has various non-modal meanings. It denotes a close connection between things or people ('association of similar things'), and extends to indicate a bond of kinship ('bond between two people e.g. by family, friendship'). In its modal uses, it can express dynamic necessity (example 104) or deontic acceptability in the degree absolutely necessary, which however seems to emerge quite late (see example 105). The modal uses of *necessitudo* are described in the diachronic map (Marongiu and Dell'Oro 2021aa).⁵⁷

- (104) *neve nobis eam necessitudinem inponatis, ut quaeramus quonam*
 and_not us this necessity impose so_that seek which
modo maxume ulti sanguinem nostrum pereamus.
 way great avenge blood our die

⁵⁷ <https://woposs.unine.ch/maps/map-necessitudo.html>

And do not impose on us **the necessity** of seeking a way in which, once our blood has been avenged to the fullest, we die. (Sallust, *De coniuratione Catilinae* 33, 5) (from Marongiu and Dell'Oro 2021aa)

- (105) *Quod si quid est in nobilitate bonum, id esse arbitror solum, ut*
 as if something be in nobility good it be think only that
inposita nobilibus necessitudo videatur ne a maiorum virtute
 impose noble necessity seem that_not from great virtue
degeneret.
 degenerate

As, if there is anything good in nobility, I think it is only this, that there seems to be **the necessity**, imposed onto the nobles, that it does not deviate from the virtues of the ancestors. (Boethius, *De consolazione philosophiae* 3, 6, 9) (from Marongiu and Dell'Oro 2021aa)

Argument structure. As show by the examples above, when it is used with a modal meaning *necessitudo* can occur with different types of syntactic structures, depending also with the support verb that governs the noun. The scope can be expressed by a subordinate clause introduced by *ut* (example 104) or *ne* (example 105) with a verb in the subjunctive mood; by an accusative with infinitive clause (Pinkster 2021, 450); or by a gerundive in the genitive case (ThLL 1900–, *s.v.* *necessitudo*).

2.4.15 Oportet, -uit, -ere

The marker *oportet* is an impersonal Latin modal verb characterised by a high polyfunctionality (Thomas 2002, 96; Magni 2010, 212). According to the studies produced on this marker, *oportet* can express deontic acceptability in the degrees of desirability or necessity; dynamic necessity; epistemic necessity (Bolkestein 1980; Núñez 1991; Bertocchi and Orlandini 2001; Thomas 2002; Fruyt and Orlandini 2003; Magni 2010; Viti 2018). The labels used in the various cited works to indicate different types of modality have been adapted to the theoretical framework adopted in this study, as it will be show later in this work. The same values appear in the diachronic map for *oportet* (Marongiu and Dell'Oro 2021ab).⁵⁸

The high polyfunctionality of *oportet* is not its only feature. In certain cases this verb is challenging to the analysis of the modal value that it expresses, as it is characterised also by a certain degree of vagueness. That is to say, that determining the modal value of *oportet* in the context in which it occurs is not always straightforward (see e.g. Bertocchi and Orlandini

⁵⁸ <https://woposs.unine.ch/maps/map-oportet.html>

2001, 16 and Núñez 1991, 144). The results of the annotation task described in McGillivray et al. (2022) confirm it. In this study, the annotators had to manually annotate the sense of 40 Latin target words in different contexts according to a graded system. They could assign to each of the senses offered for each word in each passage a value from 1 to 4, going from ‘completely unrelated’ to ‘identical’. Intermediary values were ‘distantly related’ and ‘closely related’, and more senses could receive the same value for the same passage. The marker *oportet* recorded the highest vagueness score i.e., it was annotated multiple times with a combination of 4 and 3, showing that the annotator was most times unsure on the most appropriate sense expressed by *oportet* in each specific passage provided in the annotation task. In this section, I will present examples that are as unambiguous as possible in order to show the various modal meanings that can be expressed by *oportet*. I will also discuss the contexts in which this verb can be ambiguous and I will anticipate how the co-occurrence can help overcoming this issue (see section 3.3, Chapter 3 for details).

The verb *oportet* essentially indicates a type of necessity invested with a certain moral value (Ernout and Meillet 2001, 463; Magni 2010, 222). It is generally translated as ‘it ought, it is proper’ (Pinkster 2015, 94), *es gehört sich* in German (Viti 2018, 16), *il convient, il faut* in French (Bertocchi and Orlandini 2001, 694). It indicates a moral duty, something that is appropriate to do, rather than a generic necessity or an imposition from above. This concept constitutes the core of the meaning of *oportet*, and corresponds to the value of deontic acceptability, in the degree of desirability (or absolute necessity, depending on the context) in the theoretical framework referenced in this work. This sense is illustrated in example 106.

- (106) *virtute ambire oportet, non favitoribus.*
 value strive should not favourer

One **should** strive for their ends by leveraging on their values, not on their favourers (Plautus, *Amphitruo* 78) (from Magni 2005, 333)

Oportet is often used in the context of maxims and proverbs, where the deontic use of desirability based on moral norms gets closer to the value of deontic authority. This modal value occurs when the suggestion comes from a person who is a source of authority, or directly from laws (*usus iudicialis*, Magni 2010, 224, see also the deontic authority examples for *oportet* in the diachronic map in Marongiu and Dell’Oro 2021ab). Prescriptions coming from a source of authority and from laws refer to a duty which is everlasting and that applies to everyone.⁵⁹ The context is particularly important in these two cases, as it should

⁵⁹ Magni (2010, 224–225) here refers to the following passage from Cicero’s *De oratore*: *oportere, perfectionem declarat officii, quo et semper utendum est, et omnibus; decere, quasi aptum esse, consentaneumque tempori et personae* (Cicero *De oratore*, 22, 74) ‘*Oportere* expresses the fulfillment of a duty that must be carried out always, and which applies to everyone; *decere*, like *aptum esse*, denotes a duty that applies to a specific occasion and person’.

be determined what is the source of the imposed necessity, in order to determine the type of modality. For this reason, in prescriptive treatises included in my corpus, such as the *Rhetorica ad Herennium*, I have interpreted *oportet* with the value of deontic authority whenever it indicates an instruction given to the reader by the author, who is, in that specific circumstance, a source of authority. Consider example 107.

- (107) ... *ut consulam qua lege nunc me essurire oporteat.*
 ... so_that ask which law now me starve must

... so that I could ask by which law I **must** starve now. (Plautus, *Stichus* 503–504)
 (from Magni 2005, 328)

In these verses, *oportet* is used with a sense of deontic authority, as it is explicitly declared that the source of necessity imposed on the participant (in this case, the speaker), is the law (*lege*, see also Núñez 1991, 91 for other contextual cues).

In certain contexts, *oportet* can also express dynamic necessity. As already mentioned in the previous sections for other markers, it is not always easy to determine the distinction between deontic authority and dynamic necessity for *oportet* (Núñez 1991, 60, 96, 144–146). Bertocchi and Orlandini (2001, 694) consider this meaning quite rare in the occurrences of *oportet*, and indeed, there are not many examples in literature that can be considered unambiguous. One of them is illustrated in example 108, from Marongiu and Dell’Oro 2021ab.

- (108) *nasci prius oportere, quam emori.*
 be_born before be_necessary than die

It is necessary to be born, before dying. (Cicero, *De oratore* 1, 243) (from Marongiu and Dell’Oro 2021ab)

In this context, the reference to any source of authority is obviously absent. *Oportet* expresses a type of necessity that is inherent in the state of affairs, and that refers to a natural law that is unavoidable for all beings. As I will show in the next chapter (section 3.3), the issue of distinguishing between dynamic and deontic uses, as well as assigning *oportet* a fixed degree on the deontic scale is a challenging task. As I will show in the following chapter however, its co-occurrence with other markers, especially *licet* and *necesse est*, can help disambiguating its value in context.

Lastly, *oportet* can express epistemic modality, with a value of probability ‘it is likely’. Among the modal senses of *oportet*, the epistemic sense appears to be the most frequent, along with

the sense of deontic acceptability (Fruyt and Orlandini 2003, 694; Magni 2005, 232; 2010, 222).⁶⁰ The epistemic reading is illustrated by the following example.

- (109) *ut demonstratae sunt mihi, hasce aedis esse oportet Demaenetus ubi*
 as describe be me this house be must Demaenetus where
dicitur habitare.
 say live

From how it has been described to me, this **must** be the house where Demaenetus is said to live. (Plautus, *Asinaria* 381) (from Magni 2005, 328)

It is worth mentioning that Bertocchi and Orlandini (2001, 16–17; but the same line of reasoning is found already in Bolkestein 1980, 165–166) draw a distinction between the epistemic use of *oportet* to express an opinion based on a subjective evaluation, and its inferential use, where the speaker reaches a conclusion on the likelihood of the state of affairs based on a logical, deductive process (the same distinction has already been introduced for *debeo*, refer to the relevant section). To illustrate the inferential use of *oportet* they present example 110 (but reference can be made also to the previous example 109 from Magni 2005), while the subjective evaluation expressed with *oportet* is illustrated in example 111.

- (110) *si multus erat in calceis pulvis, ex itinere eum venire oportebat.*
 if much be in shoe dust from journey he come must

If there was so much dust under his shoes, he **must** have returned from a long journey. (Cicero, *De inventione* 1, 47) (from Bertocchi and Orlandini 2002, 17, also in Bolkestein 1980, 89)

- (111) *servum hercle te esse oportet et nequam et malum.*
 slave by_Hercules you be must and worthless and bad

By Hercules! You **must** be such a worthless and bad slave. (Plautus, *Asinaria* 381) (from Bertocchi and Orlandini 2001, 16, also in Núñez 1991, 164)

As already mentioned in the section dedicated to *debeo*, in this study I will not draw a distinction between these two interpretations. Again, I do not find a real difference in the type of modality expressed by *oportet* in examples 110 and 111: the speaker expresses their own

⁶⁰ But Bolkestein (1980, 86–87) observes the exact opposite: inferential meanings are way less frequent compared to deontic meanings (this category in Bolkestein collapses both categories of dynamic necessity and deontic authority as defined in our framework). Her observations are based on the analysis of the attestations of the lemma in the ThLL, whereas Magni refers to an analysis of all attestations in Plautus (84 attestations out of 144 were epistemic), and Fruyt and Orlandini do not mention their sources.

judgement based on the elements at their disposal, be it more or less explicit and/or tangible (their impression on the slave vs. the dust on the person's shoes). This procedure always involves a subjective assessment of the truth-value of the state of affairs, and this is at the core of the definition of epistemic modality in our framework. Nevertheless, it is interesting to note that for Bertocchi and Orlandini, there also seems to be a difference in degree between *oportet* in example 110 and *oportet* in example 111. In the former, expressing a subjective evaluation, *oportet* is placed on a higher degree of the epistemic scale compared to *fortasse*. It is thus oriented towards the pole of absolute certainty. However, in example 111, as it describes a logical deductive process, *oportet* is interpreted as being closer to *necesse est* (in its epistemic interpretation) rather than *fortasse*. In sum, the epistemic degree expressed by *oportet* in example 111 is higher than in example 110. This is one of those cases where the co-occurrence between *oportet* and *fortasse*, and *oportet* and *necesse* could clarify the status of this verb on the epistemic scale. However, the few examples proposed in the literature regarding co-occurrences with *oportet* i) primarily relate to its deontic and dynamic interpretations, and ii) do not result from quantitative studies but are rather presented to illustrate certain values of *oportet* within broader discussions on modality in Latin. I will leave the discussion on this point to section 3.3 in Chapter 3 (page 122), and to section 8.4 in Chapter 8 (page 284) with examples provided by the corpus.

Argument structure. Bolkestein (1980, 85) is the first one to provide an analysis on the syntactic construction of *oportet* (but see also Núñez 1991, 72; Magni 2010, 209; Viti 2018, 22): this impersonal verb has a one-slot construction pattern, filled by a complement clause. The complement clause may be finite or non-finite. In the first case it is expressed by an accusative with infinitive clause. If *oportet* expresses deontic authority or dynamic types of modality, this verb is associated with a two-slot construction pattern. The person on which the value of necessity is imposed is expressed in the accusative case, as in example 107 (Viti 2018, 22; Pinkster 2015, 94). If the complement clause is a finite clause it is usually expressed by a subjunctive, optionally introduced by *ut*. The type of complement clause (finite or non-finite) used in the one-slot pattern with *oportet* does not influence the modal interpretation of this verb. The modal meaning of this verb is only determined by the context in which it occurs (at least in Classical Latin, further developments can be observed in later stages of the language, see Bolkestein 1980). That is to say, the same type of construction can occur both with an epistemic, a deontic or a dynamic value, depending on the context.

2.4.16 Opus est

The noun *opus*, meaning in general 'work', 'activity', can express modal values when used in constructions such as *opus est*, *opus fit* 'it is necessary', 'it is convenient'; *opus habeo* 'I need', *opus existimo* 'I consider necessary'; *mihi opus est* 'It is my task, my duty'. *Opus est* is

mentioned in literature among the semi-modal expressions, as it cannot express epistemic modality (Bolkestein 1980, 153; Núñez 1991, 64; Fruyt and Orlandini 2003, 710). The constructions in which *opus* occurs can express either dynamic necessity (example 112) or deontic acceptability with the value of desirability or absolute necessity (example 113).

Magni (2010, 228; see also Viti 2018, 17) observes that, compared to *necesse est*, *opus est* is more typically used to express internal necessity i.e., a type of necessity related to the participant, as shown in example 112.

- (112) *nam mihi vicino hoc etiam convento est opus, ut quod*
 in_fact me neighbour this also meet be necessary so_that which
mandavi curet.
 charge take_care

In fact, I also **have to** meet a neighbor, so that he can take care of what I have asked him. (Plautus, *Casina* 502) (from Marongiu and Dell’Oro 2021ac, see also Moussy 2002c, 147)

As mentioned elsewhere, it is often hard to distinguish dynamic and deontic authority uses if the context does not make the source of authority explicit. In example 113 *opus est* is used in a dialogue, and the speaker pronounces it within a directive act, so that the notion of necessity is used to give an order to the addressee.

- (113) EUTYCHUS. *tempus non est intro eundi.* CHARINUS. *enicas.*
 EUTYCHUS time not be inside go CHARINUS kill
 EUTYCHUS. *non opus est, inquam, nunc intro te ire.*
 EUTYCHUS not convenient be say now inside you go

EUTYCHUS. It is not a good time go in. CHARINUS. You are killing me. EUTYCHUS. I am telling you, **it is not convenient** for you to go in right now. (Plautus, *Casina* 502) (from Marongiu and Dell’Oro 2021ac)

Finally, *opus est* can be used to convey deontic acceptability, with the meaning ‘it should, it would be necessary’ with an evaluative value. This modal value is almost never mentioned in literature, with the exception of Moussy (2002c, 155), but it has been confirmed also by the analysis of the attestations provided by the ThLL to build the diachronic map. The deontic acceptability value of *opus est* is shown in example 114.

- (114) *Aut plus aut minus quam opus fuerat dicto dixeram.*
 or more or less than necessary be say say

I did not say anything less or more than what **had been necessary** to say. (Plautus, *Menaechmi* 592) (from Moussy 2002c, 156)

Argument structure. The construction *opus est* shares the main syntactic patterns with *possum*, *debeo*, *necesse est* and *oportet*, probably because of the influence of these more frequent markers on its syntax (Moussy 2002c, 152). When it is modal, it is associated with a one-slot pattern where the obligatory argument is filled with i) an infinitive complement or an accusative with infinitive clause ii) a paratactic subjunctive, or iii) *ut* with subjunctive (Viti 2018, 16). But *opus est* also has other syntactic patterns that are specific to this construction and to *usus est* (Moussy 2002c). One of them is the construction with the past participle in the ablative case, optionally with a noun or a pronoun (as *hoc homine convento opus est* in example 112). The other construction occurs with a supine in the ablative case, but is very rare. There are also examples of personal constructions of *opus*, as shown in example 115.

- (115) *quae opus sint locatur locentur.*
 that necessary be rent rent

That the things that **need to** be rented may indeed be rented. (Cato, *De agricultura* 2, 6) (from Moussy 2002c, 149)

In this passage, instead of the impersonal construction *opus est*, we find a personal construction where the verb *opus sint* agrees with the subject *quae*.

2.4.17 Possum, -es, potuī, posse

The verb *possum* ‘I can’, ‘to be able’, ‘it is possible’, along with *debeo*, *licet*, and a few others, is one of the most studied modal verbs in Latin and also one of those with the highest degree of polyfunctionality.

The modal meaning of possibility probably originated from the pre-modal meaning ‘to be strong, powerful’ (related to the adjective *potens* ‘strong, powerful’, both derived from the adjective *potis* ‘capable, possible’), following a cross-linguistically attested modal pathway that goes from the notion of physical strength to the expression of mental abilities and then capacity (Bybee, Perkins, and Pagliuca 1994, 190). Starting from the notion of ability originates the sense of participant-related possibility, followed by generic possibility (dynamic situational) and epistemic possibility (Fruyt 2005; Magni 2010, 267–268). All of these meanings are already attested in Early Latin. The diachronic map for *possum* shows the diachronic development of *possum* (Marongiu and Dell’Oro 2021ad).⁶¹

⁶¹ <https://woposs.unine.ch/maps/map-possum.html>

This verb can express dynamic possibility, specifically referring to an ability or capability internal to the participant. This value is illustrated in example 116.

- (116) *comesse panem tris pedes latum potes.*
eat bread three foot wide can

you **can** eat a three feet wide loaf. (Plautus, *Bacchides* 580) (from Magni 2010, 214)

As mentioned for other markers previously presented, in some approaches (e.g. Núñez 1991; Magni 2010) external possibility (participant-imposed dynamic modality) is sometimes conflated together with deontic authority, and the distinction of dynamic and deontic uses is not always straightforward, highly depends on the context and most importantly on the presence of the source of authority (Núñez 1991, 145–146). The notion of deontic authority with the value permission ‘it is allowed’ emerges quite clearly in example 117, flagged by the presence of *lege*, from *lex* ‘law’, used with an adverbial function.

- (117) *non potes tu lege vendere illam.*
not can you law sell her

By law, you **cannot** sell her. (Plautus, *Mercator* 450) (from Núñez 1991, 87)

When used in questions, in certain contexts dynamic *possum* can pragmatically express a request for a permission or a right (Núñez 1991, 149). The same use was mentioned for *licet* above. More specifically, in example 118 it is used as a form of politeness (sometimes ironically) to ask for information.

- (118) *possum scire quo profectus, quous sis aut quid veneris?*
can know where go who be or why come

Can I know where did you go, who do you belong to, and why did you come here?
(Plautus, *Amphitruo* 346) (from Núñez 1991, 87)

From the literature about the modal uses of *possum* and the analysis of the attestations in the ThLL, this verb does not seem to express deontic acceptability values.

To conclude, *possum* can express both dynamic situational and epistemic modality. I chose to present these two categories last, as they are strongly interconnected. In section 2.1 I have introduced the notions of objective and subjective modality (Lyons 1977), which have been repeatedly mentioned for the description of some of the markers listed above (e.g., *oportet*, *certe*, *fortasse*). With respect to the expression of possibility in Latin, several works (Bertocchi and Orlandini 2001, 2002; Orlandini 2001 among others) distinguish between the notions of

unilateral (subjective) and bilateral (objective) possibility (*possibilité unilatérale* and *possibilité bilatérale*, Bertocchi and Orlandini 2002, 20). Bilateral possibility expresses contingent possibility, a type of possibility that does not entail the commitment of the speaker but is referred to the reality (*possibilité ontique* in Bertocchi and Orlandini 2001, 47–48; see also Orlandini 2001, 314; Fruyt and Orlandini 2003, 695), a 50/50 chance for the event described in the state of affairs to be verified or not (this notion corresponds to the notion of dynamic situational possibility). On the contrary, unilateral possibility (subjective modality) tends towards the poles (positive or negative depending on the polarity of the epistemic expression) of the oriented epistemic scale, and expresses the commitment of the speaker to the likelihood of the state of affairs. As shown in the previous sections, subjective epistemic modality can be expressed in Latin by (some of) the so-called commitment adverbs (Pinkster 2005; Schrickx 2011) e.g. *certe*, *fortasse*, *forsitan* and the modal verbs and constructions *debeo*, *oportet*, *certum est* or *dubium est* (Bertocchi and Orlandini 2001, 696; Bertocchi and Orlandini 2002, 13). Orlandini, in her various works mentioned so far on the expression of possibility in Latin, focuses in particular on bilateral (objective) possibility as it is expressed in Latin with *possum*.

Situational possibility is usually expressed by the impersonal form *potest* or in constructions such as *fieri potest ut* ‘it could be’, *il se peut* in French. The use of these constructions is illustrated in example 119.

- (119) *quod potest fieri ut homo homini simile sit, non sit.*
 as can happen that man man alike be not be

As it **can** happen that a man is similar to another, or not. (Varro, *De lingua latina* 16, 6) (from Bertocchi and Orlandini 2002, 20)

In this example, the notion of bilateral possibility emerges clearly. The two options are explicitly mentioned: *ut... simile sit* and *(ut... simile) non sit*. The notion of possibility expressed by *potest fieri ut* in example 119 is not scalar, but ambivalent between these two options i.e., there is a 50/50 chance for both options to be true. The negative counterpart of this construction is *fieri non potest ut/quin* or *non potest fieri ut/quin* or simply *non potest*.

The epistemic readings of *possum* (i.e., subjective or unilateral possibility) are rarely mentioned in the literature. As described above, many studies focus on the expression of situational (objective) possibility. It should be mentioned that the passages where *possum* expresses undoubtedly epistemic modality are not numerous. Núñez (1991, 175) in particular highlights the difficulty of distinguishing dynamic, deontic and epistemic uses of *possum*. Moreover, the fact that objective and subjective modality might be hard to tell apart is already mentioned in Lyons (1977). Example 120 shows the epistemic use of *possum* ‘it is possible’.

- (120) *unum aliquid aut alterum potest in istum casum cecidisse*
 one something or other can in this case fall
suspiciose.
 suspiciously

It is possible that one or the other thing suspiciously happened on this occasion.
 (*Rhetorica ad Herennium* 4, 41, 53) (from Núñez 1991, 86)

Núñez (1991, 86) presents this passage as one of the few examples of an unambiguous epistemic use of *possum*, as it occurs with a perfect infinitive i.e., it refers to a past event. Therefore, the speaker is making an hypothesis about something that has happened in the past.

Argument structure. As shown in the examples presented so far, *possum* can be associated with two different construction patterns (Magni 2010, 209). The first one is a two-slot pattern, where the two argument positions are filled by a nominal constituent and by an infinitival complement (e.g. example 116). The second pattern has only one slot, and corresponds to the epistemic/dynamic situational uses of *possum*, in the impersonal form *potest* or in the construction *(non) potest fieri ut/quin*. In this case, the modal verb occurs with an infinitival complement or an infinitive with accusative (see e.g. example 120).

2.4.18 Potestas, -ātis

The noun *potestas* is another of the markers on the list that has not been the subject of numerous studies. Together with *facultas* (see above) it is one of the words targeted in the study by Lacaudé on the translations and the equivalents of the Ancient Greek word δύναμις. This noun shares the same root as *possum* from the adjective *potis*, and therefore has some of the non-modal and modal values expressed by the verb. When used with a non-modal value, *facultas* can indicate power, as a synonym of *vis*, and can be referred to political, divine or military power (Lecaude 2010, 362–364, 384); especially in medical contexts it can be used to refer to the properties e.g. of medical herbs; in general, it refers to the notion of strength.

For what concerns its modal values, this noun shares some similarities with *facultas*. As *facultas*, it is constructed with the auxiliaries *habeo, est* or with support verbs such as *do* ‘give’, *facio* ‘make’ (Pinkster 2015, 437), and it can express dynamic possibility (to indicate a ‘chance, opportunity’ or the ‘capacity, ability’ of doing something, see example 121) or deontic authority in the value of permission (‘permission, right to do something’, see example 122). The diachronic map for *potestas* (Marongiu and Dell’Oro 2021ae) shows all the meanings and the associated constructions.⁶²

⁶² <https://woposs.unine.ch/maps/map-potestas.html>

- (121) *Quoi male faciundi est potestas, quae ne id faciat temperat.*
 who badly do be possibility who not it do refrain

The one who **has the possibility** to behave badly, but who refrains from doing it.
 (Plautus, *Stichus* 117) (from Lecaudé 2010, 495)

- (122) *Unum hunc diem perpetere, quoniam tibi potestatem dedi cum*
 one_single this day bear_patience because you permission give with
hac annum ut esses, atque amanti argenti feci copiam.
 this year to be and lover money do abundance

Bear with patience for this single day, as **I gave** you **permission** to be with her for this year, and I gave you plenty of money for your lover. (Plautus, *Asinaria* 847–848) (from Lecaudé 2010, 497)

In our diachronic map we also shown another construction for *potestas*, which is not mentioned in other works. The construction is *in potestate (alicui) esse* ‘it is possible (for someone)’, and it can be used to express dynamic possibility. This use is shown in example 123.

- (123) *Ergo in potestate est abicere dolorem, cum velis, tempori*
 so in possibility be push_away grief when want time
servientem.
 respect

So, one **can** push away the grief, when desired, while respecting the circumstances.
 (Cicero, *Tusculanae disputationes* 3, 66) (from Marongiu and Dell’Oro 2021ae)

Argument structure. The construction *potestas* + support verb occurs with a two-slot pattern. The argument clause can be expressed by a subjunctive introduced by *ut* (example 122), or by the gerundive in the genitive case (example 121) (Lecaudé 2010, 499; Pinkster 2021, 354,437). The recipient of the possibility/permission or the owner of the internal ability are expressed in the dative case. Lecaudé attempts to distinguish the modal uses of *potestas* based on the syntactic construction in which it occurs, but at the end of the corpus-based study, she eventually concludes that it is not possible to draw such a neat distinction.

2.4.19 Probabilis, -e

The deverbal adjective *probabilis* derives from the verb *probō* ‘to find good, to approve’ and also ‘to test, to try’, whence ‘to demonstrate, to prove’ (Ernout and Meillet 2001 *s.v. probabilis*), combined with the modal suffix *-bilis*. From the presence of the suffix, this adjective

inherits the modal meanings of deontic acceptability ‘worth of approval’ (Fruyt and Orlandini 2003, 699, shown in example 124) and dynamic possibility ‘demonstrable, that can be proven’ (example 125). These two meanings are not frequently discussed in literature, therefore I will show examples from the diachronic map for *probabilis* (Marongiu and Dell’Oro 2021af).⁶³

- (124) *sic tot malis tum vinctum, tum fractum studium*
 in_this_manner so_many illness now defeat now break passion
scribendi quid dignum auribus aut probabile potest
 write what deserving ear or worthy_of_approval can
adferre?
 bring_forth

What can my passion for writing, now defeated, now broken in this manner by so many illnesses, bring forth that deserves to be listened (lit. deserving of the ears) or is **worthy of approval**? (Cicero, *Epistulae ad familiares* 6, 7, 3) (from Marongiu and Dell’Oro 2021af)

- (125) ... *autem concessisse Galbae disputationem sibi probabilem et*
 ... but admit Galba argument himself demonstrable and
prope veram videri.
 almost true seem

(implied subject: Crassus) ... but he admitted that the argument of Galba seemed **demonstrable** to him and not far from truth. (Cicero, *De oratore* 1, 240) (from Marongiu and Dell’Oro 2021af)

As shown in these two examples, based on the context and on its modal value the adjective *probabilis* selects the different meanings of the verb *probo* from which it derives (‘approve’ and ‘demonstrate’).

But *probabilis* is mentioned in the literature especially concerning its epistemic modal value (Bertocchi and Orlandini 2001, 53; Fruyt and Orlandini 2003, 699), although occurrences of *probabilis* with an epistemic value are not particularly frequent (Bertocchi and Orlandini 2001, 53). This adjective can be used in the constructions *probabile est*, *probabile videtur* ‘it is /it seems probable’ and similar, to express epistemic probability (with the meaning ‘plausible, apparently true’) i.e., located on the epistemic scale with a value in-between possibility and necessity. Consider example 126 with the construction *probabile videtur*.

⁶³ <https://woposs.unine.ch/maps/map-probabilis.html>

- (126) *Sed si iam ex hoc loco proficiscatur Puteolos stadia triginta*
 but if just_now from this place depart Puteoli stadium thirty
- probo navigio bono gubernatore hac tranquillitate, probabile videatur*
 proper ship good steersman this calmness probable seem
- se illuc venturum esse salvum.*
 himself there arrive be sound

But if he departs just now from here for Puteoli (i.e., now Pozzuoli) for forty miles (lit. thirty stadium, with stadium being a unit of measure) with a proper vessel, a good steersman, being this calm, **it seems probable** that he will get there safe and sound. (Cicero, *Academica* 2, 100) (from Bertocchi and Orlandini 2001, 53)

The adverb *probabiliter* derives from the adjective *probabilis*. According to the ThLL it can occur with the senses ‘in a manner worth of approval, according to justice or merit’ or ‘in a way that can be proven, plausible’. From the analysis of the attestations provided by the ThLL *probabiliter* never seems to be used as a modal marker with any of the two senses (see the diachronic map in Marongiu and Dell’Oro 2021ah⁶⁴). Pinkster (2004, 194) confirms the results of the analysis, by classifying *probabiliter* as a Manner adverb, meaning ‘in a convincing way, with convincing results’. According to him, the construction *probabile est* is the only way to express the notion of probability in Latin (see the example above). Ricca (2010, 149) aligns with Pinkster, although he presents example 127 as a possible context from which the modal meaning of epistemic probability later developed (but is not fully used as an epistemic marker yet).

- (127) *quod cum vitiosum sit, probabiliter concludi putant non omnia fato*
 which as false be probably conclude think not all fate
- fieri, quaecumque fiant.*
 happen whatever happen

As this is false, they think that it is **probably** inferred that, whatever happens, it happens by fate.⁶⁵ (Cicero, *De fato* 40) (from Ricca 2010, 149)

A noun *probabilitas* also exists, meaning ‘something judged to be good’ or ‘something likely to be true, believable’, but, as for *probabiliter*, it is never found in a modal passage in the

⁶⁴ <https://woposs.unine.ch/maps/map-probabiliter.html>

⁶⁵ The translation of this passage is challenging because of the ambiguity of the use of *probabiliter* in this context. Ricca adds *may* to the translation: *it may plausibly be inferred*, suggesting that *probabiliter* is still used with a sense close to ‘in a convincing manner’. The OLD presents this attestation below the meaning ‘with a degree of probability, probably’ (Glare 1982, s.v. *probabiliter*).

attestations provided by the ThLL (see the diachronic map for *probabilitas* in Marongiu and Dell’Oro 2021ag⁶⁶).

2.4.20 Queo, -is, -īvī/-īī, itum, īre and Nequeo, -is, -īvī/-īī, itum, īre

The couple of verbs *queo* and its negative counterpart *nequeo* derive from the motion verb *eo* ‘to go, to come’ (refer to Dell’Oro 2023 for a recent study on the etymological and diachronic development of *queo* and *nequeo* from *eo*). They are frequently listed among semi-modal markers as none of them can express epistemic modality (Núñez 1991, 64; Moussy 2002b, 134, 136, 146 for *nequeo*; Magni 2010, 210). However, both *queo* and *nequeo* are always modal (Moussy 2002a, 142; Dell’Oro 2023) and can express dynamic modality, and in very rare cases deontic modality (Dell’Oro 2023, 188, 192–193). Both *queo* and *nequeo* have been described in a diachronic map (see Marongiu and Dell’Oro 2023d for *queo* and Dell’Oro and Marongiu 2023 for *nequeo*).⁶⁷

Queo and *nequeo* are often considered in literature as an equivalent to (*non*) *possum*, albeit with a narrower range of modal senses (Moussy 2002a, 142; Moussy 2002b, 134). In fact, these two verbs can express dynamic possibility, in all the sub-types associated with it i.e., participant-inherent, participant-imposed and situational (Dell’Oro 2023, 188, 192–193; see also Fruyt and Orlandini 2003, 706). Consider example 128, where *queo* expresses dynamic possibility external to the participant.

- (128) *ille extemplo servolum iubet illum eundem persequi, si qua*
 he immediately slave order that same search if anywhere
queat reperire quae sustulerit.
 can find which take

He immediately ordered that same slave to search, if he **could** find anywhere the one who had taken her. (Plautus, *Cistellaria* 183) (from Marongiu and Dell’Oro 2023d)

It should be mentioned that *queo* occurs more frequently with negative polarity, which is usually given by the external negation *non*, although sometimes other types of lexical negation can be used e.g. *ne*, *nec*, *nihil* among others. The phrase *non queo* seems to be used as a variant for *nequeo*, usually for metrical reasons (Moussy 2002a, 143–145; Dell’Oro 2023, 190). This is the case in example 129.

- (129) *Quid, istae mutae sunt, quae pro se fabulari non queant?*
 what this dumb be who for himself speak not be_able

⁶⁶ <https://woposs.unine.ch/maps/map-probabilitas.html>

⁶⁷ <https://woposs.unine.ch/maps/map-queo.html> and <https://woposs.unine.ch/maps/map-nequeo.html>

What, are they dumb, that they **cannot** speak for themselves? (Plautus, *Rudens* 1113)
(from Moussy 2002a, 143)

Moussy categorically excludes the possibility for *queo* to express both epistemic modality (as mentioned before) and deontic modality (Moussy 2002a, 142). However, Dell’Oro (2023) pinpoints an extremely rare case in the Early Latin authors (perhaps only one?) in which *queo* does express deontic modality. This is illustrated in example 130.

- (130) *patri dic velle, ut, quom velit, tibi iure irasci non*
father say want so_that when want you rightfully get_angry not

queat.
can

Tell your father that you want to (i.e., to get married), so when he wants to he **can’t** be rightfully angry with you. (Terentius, *Andria* 394) (from Dell’Oro and Marongiu 2023, see also Dell’Oro 2023)

In this passage, the deontic interpretation of *queo* is suggested by the presence of the adverb *iure* ‘rightfully’.

The dynamic use of *nequeo* ‘to be unable’ is illustrated in example 131.

- (131) *Postremo, si dictis nequis perducit ut vera haec credas mea dicta...*
finally if word cannot persuade to true this believe my word

Finally, if you **cannot** be persuaded by words to believe that these words that I’m saying are true (lit. that these my words are true). (Plautus, *Mostellaria* 198–199)
(from Moussy 2002b, 138)

Contrary to *queo*, Moussy acknowledges, albeit with some reservations, the possibility of expressing deontic modality for *nequeo* (Moussy 2002b, 145–146). This reading is confirmed in Dell’Oro (2023) and Dell’Oro and Marongiu (2023), specifically regarding the passage in example 132.

- (132) *id nequitum exaugurari.*
it cannot desecrate

that one (i.e., the shrine of Terminus) **could not** be desecrated. (Cato, *Origines* 24)
(from Moussy 2002b, 145 and Dell’Oro and Marongiu 2023)

In this passage, the deontic value of *nequeo* is suggested by the context in which the verb occurs. The mention to the shrine, and the presence of the verb *exaugurari* suggest that the domain to which *nequeo* refers in this context is a set of moral and religious norms.

Both *queo* and *nequeo* usually occur in the active form (Dell'Oro 2023, 188). There are a few marginal attestations of *queo* and *nequeo* in the passive form that can be explained as passives "by contamination" (Flobert, 502, cited by Moussy 2002b and Dell'Oro 2023). In such cases, the verb is constructed with a passive infinitive and takes the passive form under the influence of the passive infinitive. It is a phenomenon frequently observed with *possum* when its infinitival complement is in the passive form. The only passive uses of *nequeo* are found in Early Latin in the forms *nequitur* and *nequitum*, and for both verbs the rare passive occurrences express situational dynamic and deontic modality (see example 132 for *nequeo*) (Dell'Oro 2023, 193). Contrarily to *possum*, there are no certain attestations of impersonal uses of *queo* or *nequeo* (Dell'Oro 2023, 188).

Argument structure. As shown by the examples above, both *queo* and *nequeo* are most frequently constructed with an infinitival complement as e.g. *possum* and *debeo* (Moussy 2002a, 145; Fruyt and Orlandini 2003, 706; Pinkster 2015, 212; Pinkster 2021, 219). One last mention should be made to the construction *nequeo quin*, which is used with the specific meaning 'I cannot restrain myself from (doing something)'. This use is illustrated in example 133.

- (133) *Eheu, nequeo quin fleam, quom aps ted abeam.*
 ah! cannot that_not cry as from you go_away

Ah! I **cannot** restrain myself from crying, as I am leaving you (lit. go away from you).
 (Plautus, *Miles gloriosus* 1342–1343) (from Pinkster 2021, 99)

2.4.21 Usus est

The construction *usus est* 'it is needed' does never express epistemic modality, and therefore it is another one of the markers that has been defined semi-modal in literature (Bolkestein 1980; Núñez 1991, 164; in Fruyt and Orlandini 2003, 710, 719 it is said to be at the edge of the modal domain). Just as the construction *opus est*, *usus est* is formed with the process noun *usus* 'practice, usage', and then 'value, utility' (derived from the verb *utor* 'to use'), combined with the copula verb *esse* (Fruyt and Orlandini 2003). This and similar constructions such as *usus venit* 'the need arises' or *opus habeo* 'I need' can take a modal value of dynamic necessity. As mentioned for *opus est*, the meaning 'it is needed' of the impersonal construction is probably linked to the fact that the noun *usus* indicates not only the concept of 'use', but also that of 'usefulness', whence the primary meaning 'it is useful to someone'. From this notion, the meanings 'need', 'to be needed' arise (Moussy 2002c, 142–143). The diachronic development

of *usus*, including the modal construction *usus est* and its associated modal meanings can be found in the diachronic map for this noun (Marongiu and Dell’Oro 2021ai).⁶⁸ The value of dynamic necessity expressed by *usus est* in context is illustrated in example 134.

- (134) *dico ut usus(= usus est) fieri.*
 say that be_necessary do

I am explaining how this **has to** be done. (Plautus, *Asinaria* 376) (from Moussy 2002c, 150)

In this passage, the slave character Leonida is about to explain to his fellow slave Libanus how to carry out a plan. The construction *usus est* is employed to indicate what is necessary to do for the plan to be successful. Dynamic possibility is the only modal meaning that emerged for *usus est* from the analysis of the attestations of the ThLL.

Argument structure. The construction patterns to which *usus est* is associated are various and similar to those mentioned for *opus est*. *Usus est* usually occurs in a one-slot construction pattern, and rarely in a two-slot one. As the other impersonal constructions e.g. *opus est*, *necesse est*, *usus est* can also be used with an accusative with infinitive clause, or with a subjunctive optionally introduced by *ut*. The construction with the infinitival complement is rare for *usus est* in Early Latin, but by analogy with the main modal verbs it becomes more common in later stages of the language (Moussy 2002c, 147–150). The passage illustrated in example 134 is the only example of this type of construction with the infinitive in Plautus. More common in early Latin (Plautus and Terence) is also the one-slot construction with the perfect participle.

Usus est can also occur with up to three slots construction. Consider example 135.

- (135) *quam subito argento mi usus inuento siet.*
 how_much rapidly silver_coin me use find be

How rapidly do I **need** to find the money! (Plautus, *Pseudolus* 50) (from Moussy 2002c, 151)

As shown in this passage *usus est* occurs with a three-slots construction. One slot is filled by a noun or pronoun in the ablative case (*argento*); the predicate is expressed by a participle in ablative (*invento*); optionally, the participant experiencing the need can be expressed in dative (*mi* = *mihi*) (Moussy 2002c, 150–151).

⁶⁸ <https://woposs.unine.ch/maps/map-usus.html>

2.4.22 Valet

The verb *valeo* is rarely mentioned in the studies on lexical modality in Latin. It usually expresses the following non-modal meanings: ‘to be in sound health’, ‘to be vigorous’, ‘to have some sort of power’, ‘to have some value’ or ‘to mean something’, the latter referred to the meaning of a word. Núñez (1991, 68-77) even defines it as a non-modal marker, synonym to the non-modal uses of *possum* or *pollo* ‘to be strong, powerful’ (see also Magni 2010, 210 and Viti 2018, 18). However, the analysis of the lexicographic sources performed in Marongiu and Dell’Oro (2021aj) revealed some modal uses of this verb, which can express dynamic possibility with the meaning ‘to have the ability (to do something)’ (consider example 136). The example is drawn from the diachronic map for *valeo* (Marongiu and Dell’Oro 2021aj).⁶⁹

- (136) *succus et porri valet eiusmodi necare animalia.*
 juice and leek be_able of_that_kind kill animal

Leek juice **can** also kill animals of this kind. (Columella, *De re rustica* 6, 25) (from Marongiu and Dell’Oro 2021aj)

In this passage, *valet* is used to refer to a specific property of the leek juice i.e., *necare animalia*, but it can also be used to indicate a human ability. However, at least based on the analysis of the attestations in the ThLL, it does not seem to express other modal meanings besides participant-related dynamic possibility.

Argument structure. When *valet* is used as a modal marker, it occurs with a two-slot pattern. One of the slots is filled with a nominal constituent (*succus porri* in example 136); the other one with an infinitival predicate (*necare*).

2.5 Concluding remarks

This chapter has been devoted to the introduction of the main fundamental concepts for this study. Firstly, I presented the notion of modality, discussing the main theoretical approaches to this complex semantic category. I provided an overview of the reference literature on modality as a semantic category and its status, the different systematisations proposed to organise modal notions within the modal domain, and the labels used to refer to such notions.

Then, I illustrated the theoretical framework that will be used for this study, namely the functional-cognitive approach elaborated within the WoPoss project. I focused on the main studies on the expression of modality in Latin and provided the list of the modal markers

⁶⁹ <https://woposs.unine.ch/maps/map-valeo.html>

on which this study is based. For each modal marker, I provided information about the reference literature, its modal uses and its argument structure(s), drawing examples from reference works and/or the diachronic maps of Latin lexical modal markers developed in the framework of the WoPoss project (Marongiu and Dell'Oro 2022).

The main concepts to keep in mind throughout this study are the following. One point concerns the main modal categories annotated within the WoPoss project, which will be used in a less fine-grained version for the annotation of the markers in co-occurrence (see Chapter 5). Furthermore, it has been shown that while some (few) markers are essentially associated with only one type of modality (e.g. *certe* with epistemic certainty), many others are polyfunctional and can express up to all the types of modality (dynamic, deontic authority, deontic acceptability and epistemic). The expression of a certain type of modality heavily depends on the use of the marker in the linguistic context and on the words surrounding it within the utterance. The modal interpretation is also partially linked to the argument structure associated with which the marker occurs, to the extent that in some works, two different lemmas have been hypothesised, to be associated with different syntactic structures and modal and non-modal values (e.g., non-modal *debeo* and modal *debeo*). The argument structure with which the marker can be associated will be particularly relevant for the analysis of co-occurrences, especially hierarchical ones, which depend on whether or not the co-occurrence appears within the argument structure of one of the two markers (see Chapter 5 and the annotation of the syntactic relation).

The next chapter will be dedicated to the co-occurrence of modal markers in other languages. I will provide a cross-linguistic overview of the existing studies on this phenomenon, with the aim of highlighting what has already been said about it, and what has remained less explored.

3 The co-occurrence of modal markers

3.1 Defining the co-occurrence of modal markers

In this work, the expression ‘co-occurrence of modal markers’ is used to refer to all cases in which two (or more) modal markers are found in the same sentence. Defining the type of phenomenon to which this study refers is important because in the majority of the early literature the terms ‘co-occurrence’ and ‘modal marker’ are intended in a narrower sense.

Halliday (1970) appears to be the first linguist to have discussed the co-occurrence of modal markers from a theoretical point of view. In his work, as well as in Lyons (1977), Palmer (2001) and Coates (1983) among others, the first (and few) references to the possibility of combining two or more modal markers refer in particular to the co-occurrence of two adjacent modal auxiliaries. These mentions have the purpose to show, within the context of a broader description of the morpho-syntactic properties of modal auxiliaries, that their combination is never possible. Nevertheless, these authors discuss some concepts that will be of great relevance for the analysis of the co-occurrences of modal markers within this work.

Although the co-occurrence of modal markers is not the main subject of Halliday’s article, the author briefly refers to the case of ‘double modals’, first studied by Labov et al. (1968, 260–263), as an exception to the general rule mentioned above, according to which modal verbs cannot be combined with each other. In these constructions two modal verbs are used together in the same sentence to form a single verbal unit. Labov et al. (1968) first describe double modals in their survey on some southern varieties of American English, mentioning combinations produced by the speakers such as **might can*, **might could* and **might would*. The authors analyse the first two combinations as non-standard forms of the more common expression *might be able to*. The interpretation of the combination of *might* and *would* is left unclear, although they hypothesise the use of *would* as a simple reinforcement of *might*. Example 137 illustrates one of the combinations produced by the subjects interviewed by Labov et al. (I include the rendition in standard American English proposed by the authors of the study for better clarity).

(137) I **might would** let him go. = I **might** let him go. (Labov et al. 1968, 261)¹

Halliday builds on the examples of double modals described in the survey by Labov et al. (1968) to introduce the wider concept of 'double modality' i.e., combinations of modals in which a modal verb combines with a modal adverb. In fact, Halliday clarifies that double modality is only allowed between a verbal and a non-verbal modal marker,² as in the examples 138 and 139.

(138) **Perhaps** he **might** have built it. (Halliday 1970, 331)

(139) **Certainly** he **might** have built it. (Halliday 1970, 331)

In both sentences, the double modality is construed with the modal verb *might*, preceded by the adverbs *perhaps* in example 138, and *certainly* in example 139. In this type of combinations, the two markers can develop two opposite semantic relations: (i) they can mutually reinforce each other or (ii) they can be cumulative in meaning. An illustration of mutual reinforcement is shown in example 138, where both co-occurring markers *perhaps* and *might* express the modal notion of possibility: Halliday (1970, 331) defines this combination as a case of 'concord', as the two modal markers 'are felt to be equivalent'. On the contrary, example 139 shows a combination of markers that are not felt to be equivalent, as they do not reinforce each other, but rather express two different modal concepts in the sentence: the marker of epistemic certainty *certainly* precedes the marker of epistemic possibility *might*, meaning 'I grant that it is possible'. This type of combination is said to be cumulative in meaning.

The analysis of the cases of double modality and the possible interactions between the two modals is later picked up by Lyons (1977, 807), who introduces the concept of 'modal harmony'. This concept will prove to be particularly important for this study, and will therefore be revisited several times and placed in a broader perspective later in the next chapters dedicated to the analysis of the co-occurrences in the corpus. As Halliday, Lyons focuses on combinations of the type 'modal adverb + modal verb', therefore the term initially refers specifically to combinations between these two types of constituents.³ Following on from Halliday's analysis, Lyons distinguishes 'modally harmonic' and 'modally non-harmonic'

¹ Emphasis in the examples of this section is mine.

² Halliday (1970, 331) considers as verbal markers only the modal auxiliaries i.e., *will, would, can, could, may, should, must, ought to* and *need*. Verbal constructions with modal adjectives e.g. *it is possible that* are regarded as non-verbal.

³ Later on, the notion of modal harmony has been referred to a wider range of constructions and modal categories. For instance, Vincent and Bentley (1995) used it to describe the alternate use of the subjunctive and conditional mood in conditional clauses in the dialect from Palermo, Italy.

combinations. It is important to mention that in Lyons' framework the notion of modal harmony is applied exclusively to the categories of objective and subjective epistemic modality. These notions were introduced earlier in Chapter 2 (section 2.1, page 15). Therefore, I will just briefly sum up the main concepts here to frame the analysis proposed by Lyons. In the theoretical framework adopted in this study, the notion of objective epistemic modality corresponds to the category of dynamic modality, in the sub-type called 'situational': an objective epistemic possibility refers to a 50/50 chance of the state of affairs described in the scope to be verified or not. This term expresses a type of possibility which does not entail the commitment of the speaker. Subjective possibility, on the other hand, corresponds to our epistemic modality, and describes an evaluation of the speaker on the veracity or the likelihood of the state of affairs. This type of distinction is also addressed in some studies about Latin modal markers (Fruyt and Orlandini 2003, 695)⁴.

An harmonic combination defines the co-occurrence of an adverb and a verb that express the same degree of epistemic modality and therefore reinforce each other; in a non-harmonic combination, the two markers express two different degrees of epistemic modality, and therefore are cumulative in meaning. An illustration of a modally harmonic co-occurrence between an epistemic verb and adverb is given in example 140.

(140) He **may possibly** have forgotten. (Lyons 1977, 807)

In this case, the two markers *may* and *possibly* express the same degree of epistemic modality, and therefore convey one single type of modality altogether i.e., epistemic possibility: "[...] there is a kind of concord running through the clause, which results in the double realisation of a single modality" (Lyons 1977, 808). Cases of modally non-harmonic combinations are illustrated in examples 141 and 142.

(141) He **may certainly** have forgotten. (Lyons 1977, 808)

(142) **Certainly** he **may** have forgotten. (Lyons 1977, 808)

In these two sentences, the co-occurring markers express two different degrees of epistemic modality, referring respectively to certainty (the adverb *certainly*) and possibility (the modal auxiliary *may*).

⁴ As mentioned earlier in Chapter 2, it is defined e.g. for the possibility marker *possum* as the expression the 'ontic notion' of possibility (Bertocchi and Orlandini, 2001, 48), or as *possible contingent* or *possibilité bilatérale* (Orlandini, 2001, 314). It is perhaps important to mention that Lyons, as well as the other authors mentioned above, specifies that it is sometimes difficult to draw a neat distinction between objective and subjective possibility or necessity.

In example 142, the modal auxiliary *may* is expressing the epistemic possibility that the participant has forgotten, and the sentence can be paraphrased as ‘It may be the case that he has certainly forgotten’ (Lyons 1977, 808). Concerning example 141, Lyons observes that its interpretation may not be as straightforward as it was for the other examples: the adverb *certainly* might refer either to the possibility that the subject has forgotten (‘It is certainly the case that he may have forgotten’) or to the fact itself that the subject has forgotten (‘It may be the case that he has certainly forgotten’, as it has been said for example 142).⁵ Building on the different possible interpretations of example 141, Lyons introduces another topic which will be crucial to this work, in particular for the analysis presented in Chapter 7 on hierarchical co-occurrences in the corpus. This concerns the type of relation that is established between the scopes of two co-occurring modal markers, and the way the respective scopes can combine together in a hierarchy. The scope boundaries of a marker within the sentence are sometimes blurred and might change depending on how the sentence is interpreted, as shown by the discussion on example 141. As it was illustrated in Chapter 2, different theoretical approaches have devoted specific attention to the position of the different types of modality in the clause structure, elaborating modal hierarchies, more or less comparable depending on the theoretical framework to which they refer. The co-occurrence of modal markers is therefore an important tool for studying the differences and scope properties between different types of modality.

In this respect, Lyons uses the examples presented above to illustrate the scopal differences between the two types of epistemic modality, objective and subjective, in his framework. He asserts that whereas combinations of two markers of objective epistemic modality are possible, the contrary is never observed: if one of the markers expresses subjective epistemic modality, the other one will necessarily express objective epistemic modality. Moreover, subjective epistemic modality always has a wider scope than objective epistemic modality, due to the fact that subjective epistemic modality always operates on the entire content of the utterance. This is clear in example 142, which can only be interpreted as ‘it is certainly the case that he may have forgotten’, where *certainly* expresses subjective modality (epistemic certainty in our framework), and *may* an objective possibility that the person has forgotten (dynamic possibility in our framework). If we interpret example 141 as ‘It is certainly the case that he may have forgotten’, the adverb *certainly* is expressing epistemic certainty on the existence of the objective possibility (*may*) that he has forgotten. On the other hand, if we interpret the same example as ‘It may be the case that he has certainly forgotten’, the modal verb *may* expresses the subjective epistemic possibility that the participant has definitely forgotten.

⁵ This problem will be discussed and redefined in Rossari’s framework (2020) as the *mode d’application de la contribution sémantique*, that is, the object to which the modal value of the marker applies (see section 3.2).

Leaving aside differences in terminology and theoretical frameworks, the early observations by Lyons on the interaction between co-occurring modal markers are especially relevant for this study because he introduces for the first time the idea of the organisation of the markers' scopes in a hierarchical structure. This discussion over scopal differences of co-occurring markers will be further developed in later studies (e.g. Narrog 2009, illustrated in this chapter, section 3.2, page 107), especially within the theoretical framework of Functional Grammar. As for my study, for the qualitative analysis of the sentences I paid particular attention to the differences in scope between the co-occurring markers, making sure to indicate their hierarchy, whenever applicable (see Chapter 4 for a description of the qualitative annotation schema). What will emerge from my analysis could complement the observations made by Lyons in two respects: i) co-occurrences with scope hierarchisation can be observed with other types of modality than just epistemic and dynamic (objective epistemic in Lyons' framework); ii) besides the cases of double modality (adverb + modal verb) traditionally mentioned in literature, scope hierarchisation is also enabled by other types of syntactic structures, namely a modal predicate and an argument clause (e.g. *ut, quin* followed by another modal predicate in subjunctive) or the use of verbs such as *debeo* or *possum* with modal infinitival complements (in general, whenever the co-occurrence is observed within the construction pattern of a modal predicate; see Chapter 5 for a detailed discussion of the syntactic structures that can host the co-occurrence; see Chapter 7 for the types of syntactic structures observed in hierarchical co-occurrences found in the corpus).

The concept of modal harmony introduced by Lyons (1977) has been used as a parameter of analysis for the description of co-occurrence of modal markers in English by Coates (1983). Coates observes and describes this phenomenon in a corpus-based study, providing a thorough analysis of the English modal system. Her corpus consists of both spoken and written records. The spoken material (545,000 words) was gathered from the corpus of the Survey of English Usage (Quirk 1961); the written material (1,000,000 words) from the Lancaster corpus (Johansson 1978). Throughout the analysis, she dedicates particular attention to the combination of epistemic modal auxiliaries such as *must, need, should* (epistemic necessity), *may, might, could* (epistemic possibility) together with other expressions that convey epistemic modality such as epistemic adverbs e.g. *perhaps, probably*, but also expressions of the type *I think, I suppose*. The epistemic marker *must* is described by Coates as conveying "the speaker's confidence in the truth of what he is saying, based on a logical process of deduction from facts known to him" (Coates 1983, 41). Consider example 143, taken from the corpus used by Coates (Lancaster portion).

- (143) His teeth were still chattering but his forehead, when I felt it, was hot and clammy. He said, "I **must** have a temperature". (Coates 1983, 41)

In this statement, the speaker consolidates all the information at his disposal, leveraging this knowledge to arrive at the conclusion that he has a temperature.

Epistemic possibility markers such as *may*, *might* and *could*, on the other hand, convey “the speaker’s lack of confidence in the proposition expressed” (Coates 1983, 131) as in example 144.

- (144) - Have you got a pen? I’ll leave a message.
 - I **may** have one. (Coates 1983, 103)

Based on the co-occurrences retrieved by Coates in her corpus, the degree of confidence expressed by the speaker concerning the propositional content of the utterance can be challenged or reinforced by one of the co-occurring epistemic expressions listed above, producing harmonic or non-harmonic combinations. Possible harmonic forms for epistemic *must* found in the corpus are *I’m sure*, *surely*, *certain*. These expressions reinforce the degree of confidence of the speaker expressed by *must*. However, the logical process of deduction which leads to a high degree of confidence expressed by the marker of epistemic necessity *must* is challenged in example 145 by the presence of the expression *I think*.

- (145) – Is it nice getting it sort of settled?
 – (laughs) I think it’s nice to have a few sort of pinpoints in the future..
 – I **think** it **must** be very nice..⁶ (Coates 1983, 41)

It is in this type of combinations that Coates (1983, 46) introduces the notion of hedge. Hedges were first defined by Lakoff (1973, 471) as “words whose job is to make things fuzzier or less fuzzy”. Examples of hedges in English are *sort of*, *more or less* (fuzzier) or *typical*, *par excellence* (less fuzzy). Prince et al. (1982) develop this notion and further divide hedges into two main categories: ‘approximators’, which apply to the proposition content of the clause, and ‘shields’, which apply to the relation between the proposition content and the speaker. The two are illustrated in examples 146 and 147, respectively.

- (146) His feet were **sort of** blue. (Prince et al. 1982, 4)

- (147) I **think** his feet were blue. (Prince et al. 1982, 4)

In the example 146, the hedging device *sort of* indicates that the type of blue that is part of the proposition content is not a prototypical blue. In example 147 the fuzziness does not apply to a specific constituent of the proposition itself, but to the attitude of the speaker towards

⁶ This example is taken from a transcription of an oral speech. As the oral dimension is not relevant for my study, diacritic signs used for the transcription of oral speech were omitted. Emphasis is mine.

the propositional content i.e., to his confidence concerning the veracity of the propositional content of this utterance. The concept of shields in particular is relevant to my study because it partially overlaps with some uses of epistemic markers in co-occurrence. Expressions such as *I think, I guess*, epistemic modal markers and tag questions⁷ (see Lakoff 1972) inform about the commitment of the speaker towards the content of the proposition. In combinations such as the one illustrated in example 145, expressions of the type *I think* behave as hedges: they show to what extent the speaker is committed to the veracity of the propositional content of the utterance. According to Coates, the combination of the hedge *I think* with the epistemic modal *must* in example 145 is non-harmonic: while *must* indicates a high degree of confidence of the speaker in what he is saying (Coates 1983, 41), the hedge *I think* introduces a lower degree of confidence. Although they express two different degrees of modality, the combination of *I think* and *must* works because the hedging device *I think* highlights the subjectivity of the epistemic value expressed by *must*: in fact, epistemic markers “focus on the speaker’s attitude to the proposition expressed in the main predication” (Coates 1983, 46). Other hedging devices found by Coates in the corpus combined with the epistemic *must* are *I mean, I suppose, I fancy, I take it, I would guess*.⁸

Coates performs the same type of analysis on the epistemic possibility markers in the corpus *may, might* and *could*. For *may*, Coates lists the adverbs *perhaps* and *possibly* as possible harmonic combinations found in the corpus. Other harmonic combinations with epistemic *may* are the hedges *I suppose, I think, I don’t know, I wouldn’t know, I’m not sure, I mean, It seems to me*. Both the adverbs and the hedging devices express the same degree of epistemic uncertainty as *may*. Consider examples 148 and 149.

(148) No, that **may** be yellow fever, **I’m not sure**. (Coates 1983, 138)

(149) as chairman of our court he **may perhaps** sometimes feel that... (Coates 1983, 138)

In example 148 *may* and the hedge *I’m not sure* mutually reinforce each other (Halliday 1970, 331), as they both express uncertainty and entail the possibility for the utterance to be true or not. The same applies to the combination of *may* and *perhaps* in example 149. Consider now example 150.

(150) The Malay versions of sections of the Mahabharata are derived from Javanese versions of the 14th century and again **may probably** have been translated in 15th century Malacca with its large Javanese quarter. (Coates 1983, 138)

⁷ A tag-question is a type of construction that involves a statement followed by a question e.g. *Joan recognised you, didn’t she?*, and requires the addressee to give a response to the statement (Quirk et al. 1985, 810).

⁸ It must be noted that Coates never refers to such combinations as non-harmonic, although they refer to different degrees of confidence, because they reinforce the subjectivity of the epistemic *must*. The only combination labelled as non-harmonic is given with reference to the co-occurrence of *may* and *probably*.

In this sentence, the combination of *may* with the adverb *probably* is regarded as non-harmonic by Coates because the latter points to a higher degree of epistemic modality: *may* expresses pure possibility, whereas *probably* reveals a higher degree of confidence of the speaker to the truth of the SoA. Coates (1983, 138), while admitting that this type of non-harmonic combination may seem odd at first glance, specifies that in oral speech it is totally acceptable. In this type of context of use, the highest degree of commitment on the part of the speaker is regarded as valid.

Palmer (2001), discussing Coates' (1983) work, elaborates on the co-occurrence of epistemic markers of various types and divides epistemic markers into two distinct categories. He discusses harmonic and non-harmonic combinations⁹ of 'markers of confidence' and 'markers of inference'. Markers of inference, such as *must*, refer to the fact that the speaker is inferring something from the information available to them; markers of confidence, such as *certainly*, indicate that the propositional content pertains to the domain of personal beliefs of the speaker i.e., the speaker believes to some extent what he/she is saying (Palmer 2001, 35). When a marker of confidence and a marker of inference are combined together in a sentence, the type of commitment expressed by a modal marker is modified by the subsequent one. With harmonic combinations, the speaker's commitment is reinforced by the second marker; with non-harmonic combinations, it is weakened by it. It should be noted, however, that according to the distinction suggested by Palmer, in example 150 the speaker is combining a marker of confidence (*maybe*) and a marker of inference of medium degree (*probably*, higher than *possibly* and lower than *certainly*, see Palmer 2001, 34). Palmer does not discuss this example in particular, but the two markers, as already mentioned by Coates, form a non-harmonic combination, as *probably* expresses a higher degree of epistemicity with respect to *may*. However, in this case, *probably* is reinforcing the notion of commitment expressed by *may*, and not the contrary.

Coates is also the first one who expands the notion of modal harmony by applying it to modal domains other than epistemicity, although sometimes not precisely to the co-occurrence of two modal markers. Consider examples 151 and 152.

- (151) Larsen's "luck" lay in his inherited ability to find the roving fish shoals when others **could** not. (Coates 1983, 111)
- (152) and they don't do many things which they **could** do legally because they know that this would be the death. (Coates 1983, 117)

⁹ Although he erroneously ascribes the definition to Halliday (see Palmer 2001, 35).

According to Coates, in both example 151 and example 152 the marker is the modal auxiliary *could*.¹⁰ In the former it expresses an ability (root modality for Coates and dynamic modality in the theoretical framework adopted for this study); in the latter it is the expression of a permission according to the law (root modality for Coates, while I would interpret it as a marker of deontic authority in my theoretical framework). In both cases, the two occurrences of *could* are combined with non-modals (*inherited ability* in example 151 and *legally* in example 152, but see footnote 10) which reinforce the modal notion expressed by the two markers. Although Coates does not delve deeply into the semantic implications of these combinations, her work sheds light on the potential of a more nuanced understanding of modality beyond the boundaries of traditional categories. Besides that, it also allows for a more flexible application of the concept of modal harmony, which goes beyond the combination of only epistemic expressions. Coates herself (1983, 45) declares that she uses the term more loosely, to indicate combinations of a modal marker and another expression that conveys the same degree of modality. This statement is extremely relevant because, as it will appear from Chapter 7, hierarchical combinations in the Latin corpus minimally involve two epistemic markers, and much more frequently an epistemic marker with a non-epistemic one, or two dynamic markers. Since the very definition of modal harmony implies reference to a type of modality that is scalar (as it explicitly refers to the notion of degree), this already highlights how this concept could be limiting for a large-scale analysis of co-occurrences as intended in this study, in a broad sense (i.e., hierarchical and non-hierarchical). Furthermore, it seems that Coates uses the term "harmonic" in a broader sense than Lyons, meaning that the term co-occurring with a modal marker, whether a modal marker or not, "guides" the interpretation of such marker towards a specific modal category. Intended as such, the notion also applies to examples such as 151 and 152.

But this is not the only change introduced by Coates regarding the notion of modal harmony. Returning to example 151, it will be noted that *inherited ability* and *could* are not in a syntactically hierarchical relationship but occur in two separate clauses. Example 153 will further clarify the point.

- (153) Shall we then say with G.F Stout that 'desire and aversion, endeavour to and endeavour from, are modes of attention'? **Certainly** if there is endeavour to x, there **must** be attention to x. (Coates 1983, 42)

¹⁰ The noun phrase (*inherited*) *ability* is regarded by Coates as a co-occurent to *could*, which reinforces the interpretation of the modal auxiliary as a marker of ability, but not as a modal marker *per se*. In our theoretical framework, this would be regarded as a co-occurrence in its own right, as the clause *inherited ability to find the roving fish shoals* corresponds to a modal passage, with a modal marker (*inherited*) *ability* and a scope describing a state of affairs *to find the roving fish shoals*.

In this example, two modal markers co-occur: the adverb *certainly* and the modal auxiliary *must*. Both convey a modal meaning of epistemic certainty. This co-occurrence observed by Coates is relevant to this work for two reasons: i) Coates defines the use of *certainly* as harmonic with respect to *must*, and this is the only example of applying the concept of modal harmony to a combination of two widely recognised modal markers (unlike the case of *inherited ability* above), in a non-hierarchical co-occurrence; ii) although Coates does not provide a thorough analysis for this example,¹¹ it appears to be a passage in which the co-occurrence is used for argumentative purposes, similar to some of the passages that will be illustrated in Chapter 8. Within the scope of this research, this paves the way to a new perspective on the combination of multiple modalities that extends beyond the examples typically outlined in the literature. This new perspective would encompass the combination of any modality type and both hierarchical and non-hierarchical co-occurrences.

The contributions by Lyons, Palmer and Coates set up some primary concepts for the analysis of the co-occurrences, mainly focused on the type of relationship between the markers that co-occur and the type of modality that they express. Co-occurrences of modal markers so far were considered only as combinations of multiple modal auxiliaries (Labov et al. 1968; Halliday 1970) or as the combination of an adverb and a modal verb (Lyons 1977; Coates 1983; Palmer 2001). The concept of modal harmony has also been introduced to denote the semantic relation between the degrees of modality conveyed by two co-occurring epistemic markers. This entails the identification of both harmonic and non-harmonic modal combinations, where markers may express distinct or equivalent degrees of the same modality type. The harmonic or non-harmonic co-occurrence of two markers produces two different outcomes. In harmonic combinations, the type of modality expressed by one marker is reinforced by the co-occurring one; in non-harmonic combinations, the two degrees of modality are combined, leading to a reduction, or as in example 150 presented by Coates (1983, 138), an increase in the degree of modality expressed by one of the co-occurring markers. Furthermore, the notion of harmonic modality traditionally applies (even in subsequent studies) to hierarchically structured co-occurrences, although there exists (perhaps the only one) a case of non-hierarchical co-occurrence defined as harmonic and presented by Coates (Coates 1983, 42).

In the following section, I will outline different studies on the co-occurrence of modal markers. These studies have focused on the analysis of specific modal verbs or sets of modal verbs in different languages, and have explored their possible combinations with other modals, using various theoretical and methodological approaches.

¹¹ Coates is showing the example to demonstrate one of the few uses of *must* in her corpus that she analysed as objective epistemic.

3.2 Previous studies on the co-occurrence of modal markers

Compared to the literature on modality, to my knowledge, studies specifically focusing on the co-occurrence of modal markers are not numerous. However, they present interesting results for my study, both in terms of the findings and the methodological approach. Furthermore, these studies expand the discussion on the co-occurrence to languages other than English, on which I had focused so far in this chapter.

Studies on the co-occurrence of modal markers exist for French (Huot 1974; Sueur 1975, 1978; Pottier 1976; Chu 2008), Dutch (Nuyts 2004) and Japanese (Narrog 2009). A contrastive study on the co-occurrence in German and French is outlined in Hütsch (2020).

Some of these studies are not concerned specifically with the combination of modal markers. Often, the starting point is the study of the syntactic and semantic properties of a particular modal verb or set of modal verbs in a specific language. In these studies, the combinatorial possibilities between the verbs chosen for the analysis are often investigated as they provide information on the semantics of the verbs involved in the co-occurrence. Huot (1974) presents an analysis on the behaviour of the French modal verb *devoir* 'have to' in a range of different semantic and syntactic conditions. In order to do this, she focuses on various features: the subject of the sentence in which *devoir* occurs; the tense of the verb; and suprasegmental features such as accent and intonation. In addition to this, Huot focuses on the co-occurrence of *devoir* with modal and non-modal adverbs, and on the influence of such adverbs on the meaning of *devoir* in a specific context. Similarly, Sueur (1975) proposes an analysis of the French modal verbs *devoir* and *pouvoir* 'I can', in which again the study of their co-occurrence with other verbs and adverbs is functional to defining their syntactic-semantic properties. Pottier (1976) works on a selection of French modal verbs (*devoir*, *pouvoir*, *vouloir* 'I want' and *savoir* 'I know') to investigate specifically the possible combinations within the group. Another study on French, extended to 13 modal verbs, is the monograph by Chu (2008). As part of his wider description of the French modal verbs system, he provides an outline of the semantic and syntactic behaviour of the selected verbs, including their combinatorial possibilities.

Apart from Huot (1974) and Sueur (1975), the studies listed so far only refer to combinations within the same class of parts of speech, namely (modal) verbs. Subsequent studies have broadened the perspective by including other parts of speech as well. Typically, these are adverbs. Sueur (1978) expands on the study published a few years earlier by focusing specifically on the combination of the French verbs *pouvoir* and *devoir* with the epistemic adverbs *peut-être* 'maybe', *certainement* 'certainly' and *apparemment* 'apparently'. The purpose is the description of the semantic and syntactic properties of the two modal verbs, in order to develop a set of rules and constraints that can be used to describe them and their behaviour.

Therefore, in addition to their combination in co-occurrence with modal adverbs, he studies their occurrence in different types of clauses (interrogative, negative or exclamative clauses), morpho-syntactic structures (e.g. *si* 'if' with the past tense), and types of subordinates (e.g. final, causal or consecutive clauses). Hütsch (2020), as mentioned before, proposes a comparative study on French and German modal verbs and their combinations with adverbs. The modal verbs taken into account for the study express possibility and necessity, as defined in the modal domain. The analysis targets *devoir* and *pouvoir* in French and *dürfen* 'to be allowed', *können* 'can, to be able', *mögen* 'want, wish', *müssen* 'must, have to' and *sollen* 'should' in German. The aim of her study is to offer a model for the behavior of modal verbs in both languages, underlining their comparison. In order to do this, Hütsch focuses especially on data obtained from the analysis and evaluation of co-occurrences between these modal verbs and some adverbs, which are formalised in the structure 'Vmod + ADVmod'.

Nuyts (2004) is perhaps the first study, chronologically, that includes other parts of speech beyond verbs and adverbs in the list of targeted markers, adding e.g. adjectives and idioms. This work builds on the functional-cognitivist theoretical framework, and focuses on the expression of deontic, epistemic, and evidential modality in Dutch by using verbs, adverbs, adjectives and idioms. Nuyts is interested in investigating the theoretical organisation of modal categories in a hierarchical structure (the modal hierarchies mentioned in the Introduction), rather than the combinatorial possibilities of markers. The first study that includes mood as a marker of modality is Kratochvílová (2018) on Spanish. She investigates the combination of different types of modality in Spanish, including both lexical and morphological elements, especially verbal moods, in order to show which meanings can combine and how, and what are the results of this combination. One step further is taken by Narrog (2009) in his monograph on the Japanese modal system. In his work, a few chapters are dedicated to the description of the co-occurrence between modal markers. Narrog, as Nuyts (2004), works within the functional theoretical framework. Looking at Nuyts (2004) as the first systematic study on corpus data on the relationship between co-occurring markers and their respective scopes, Narrog follows in his footsteps by proposing a more extensive study on modal hierarchies, in his case using Japanese data, and by including other qualificational categories at the periphery of modality i.e., tense, aspect, mood and negation. His main goal is to investigate the scope and layering properties of a list of Japanese markers expressing dynamic, deontic, boulomaic (volition), epistemic and evidential modality.

From the various studies cited so far, a common conclusion can be drawn: regardless of the language in which it occurs, the presence of co-occurrence always influences the markers involved. Therefore, it is not possible to analyse the value of a marker without considering the value of the co-occurring marker. With respect to this, the analysis of *devoir* performed by Huot (1974), in her analysis of *devoir*, involves the co-occurrence of the modal verb with

different classes of modal adverbs.

- adverbs expressing subjective opinions i.e., *bien entendu* ‘of course, certainly’ *certainement* ‘certainly’, *sûrement* ‘certainly’ (epistemic certainty); *peut-être* ‘maybe’, *probablement* ‘probably’, *normalement* ‘usually, normally’ (epistemic uncertainty); or expressions such as *d’après lui* ‘according to him’ (evidentiality);
- intensifying adverbs (*bien* ‘well’, *aussi* ‘also’, *même* ‘even’);
- adverbs that connect two clauses (*par conséquent*, *donc* ‘therefore’, *au moins* ‘at least’, *en revanche* ‘on the other hand’, *néanmoins* ‘however’)
- adverbs expressing manner (*rapidement* ‘quickly’, *vite* ‘fast’);
- only two adverbs of place were found to be able to have an influence on the meaning of *devoir*, that is, *partout* ‘everywhere’ and *nulle part* ‘anywhere’ (apparently when co-occurring with these two adverbs *devoir* expresses obligation);
- prepositional groups functioning as adverbs. Among them Huot finds that those that express goal (*en vue de* ‘in order to’), opposition (*bien que* ‘although’) and cause (*puisque* ‘since’) drive the interpretation of *devoir* towards the value of obligation.

The co-occurrence of *devoir* with epistemic adverbs has the most relevant impact on the evaluation of its modal value in context. In this respect, Huot distinguishes two modal uses of *devoir*: obligation-necessity and probability-future. The analysis of the co-occurrences shows that all the adverbs expressing epistemic certainty force the interpretation of *devoir* towards the notion of obligation, as illustrated in example 154. On the contrary, all the other epistemic adverbs and phrases expressing evidentiality influence the interpretation of *devoir* towards the notions of probability, as illustrated in examples 155 and 156.

(154) *Le représentant de l’opposition doit bien entendu prendre la parole.*

The representative of the opposition **must certainly** take the floor. (Huot 1974, 77)

(155) *Enfin le Royaume-Uni doit normalement constituer un facteur essentiel d’équilibre au sein d’une Europe où la présence de l’Allemagne [...].*

Finally, United Kingdom **should normally** represent an essential balancing factor within a Europe where the presence of Germany [...] (Huot 1974, 78)

(156) *D’après lui, Jean doit préparer un rapport.*

According to him, Jean **should** prepare a report. (Huot 1974, 78)

However, these conclusions are arguable: the verb *devoir* in examples 155 and 156 seems to preserve a value of obligation, rather than shifting towards the epistemic value of probability. Moreover, the three adverbs are different in nature, and hardly comparable. *Bien*

entendu is an adverbial form that, however, refers to a supposed general agreement with the audience, reinforcing the notion of obligation expressed by *devoir*. The adverb *normalement* indicates repetition/habit but can be used with an epistemic value, and the framing adverbial construction *d'après lui* introduces someone else's point of view, with an evidential function. In my opinion, *devoir* expresses a notion of obligation in the three examples. What changes is that this notion is framed in different ways, depending on the co-occurring adverbial expression.

The semantic influence between markers within co-occurrence can also be exerted by markers other than verb-adverb combinations. Huot performs an analysis of the combinations mentioned above considering also the tense and mood of *devoir*, making a comparison between uses at the present indicative and at the present conditional. The results show that the present tense of *devoir* combined with *sans doute* convey the probability-future value but not the obligation-necessity, whereas the present conditional conveys both. The effect of the combination of the present tense *devoir* with the adverb *rapidement* is completely opposite – the obligation-necessity value is the only accessible one. When the present conditional is combined with this same adverb all the possible readings are possible. Finally, for what concerns *bien entendu*, the present tense and the present conditional only convey the value obligation-necessity in all cases.

The study performed by Sueur (1978) completes the picture by noting that the modal verbs *pouvoir* and *devoir*, when co-occurring with modal adverbs expressing epistemicity¹² are hardly read as epistemic. Consider example 157.

- (157) *Il peut/doit peut-être/sans doute/vraisemblablement/certainement/sûrement/apparemment faire cela.*

He can/has to maybe/undoubtedly/probably/certainly/apparently do that. (Sueur 1978, 239)

In cases such as example 157, *pouvoir* and *devoir* tend to express, respectively, permission, capacity or dynamic possibility and obligation or dynamic necessity¹³. Therefore, a sentence as the one presented in example 158 is perceived as odd.

- (158) ? *Il doit peut-être faire une erreur en ce moment.*

? He must be maybe making a mistake now. (Sueur 1978, 269)

¹² Focusing on co-occurrences in which the epistemic adverb scopes over the modal verb.

¹³ Sueur (1978, 236) does not use the terms dynamic possibility and dynamic necessity, but the generic terms possibility and necessity. I define them as dynamic in my theoretical framework based on the example proposed by the author for e.g. possibility *Pierre peut venir* = *les circonstances permettent à Pierre de venir* 'Pierre can come' = 'the circumstances allow Pierre to come'

Sueur explains that the oddness is due to the fact that *doit* and *peut-être* are partially synonyms, and that their co-occurrence is thus perceived as redundant. Although the sentence may be indeed perceived as odd, in my view, this is not due to the fact that *doit* and *peut-être* can be considered almost synonyms. In fact, they both express epistemic modality, but in different degrees: *devoir* expresses a higher degree of probability, while *peut-être* expresses a simple possibility (what is defined in Lyons 1977 as a non-harmonic combination). Therefore, the fact that the co-occurrence seems strange is probably due to the disagreement between the degrees of commitment expressed by the speaker, rather than the redundancy of the expression itself. Moreover, Sueur seems to confirm this explanation, stating that redundant but perfectly acceptable combinations are possible, as shown by example 159.

(159) *Il doit sans doute pleuvoir à l'heure actuelle sur la Grande Bretagne.*

It **must undoubtedly** rain right now in Great Britain. (Sueur 1978, 270)

In this last example the redundancy does not sound odd because the verb that follows *devoir* i.e., *pleuvoir* 'to rain' makes an epistemic interpretation of *devoir* much more acceptable and natural than the others available for this modal verb (i.e., permission or capacity) (Sueur 1978, 270). Again, the issue probably lies in the fact that here the co-occurrence is, as Lyons would define it, harmonic: *devoir* and *sans doute* both express a high degree of commitment of the speaker on the state of affairs (epistemic necessity) and therefore reinforce each other.

Kratochvílová (2018) identifies in her monograph similar tendencies on the modal interpretation of co-occurring modalities in Spanish, when one is lexically expressed and the other one is conveyed morphologically by markers of tense and mood. Her study builds on the structural/functionalist theoretical framework as formulated in Zavadil (1980), which is entirely built on the Spanish modal system. This approach refuses the logical reading of modality and keep the human psyche at its core. It works on a system of five basic modal meanings that are meant to capture the whole Spanish modal system. The modal meanings considered for the study are Real, Interrogative, Potential, Volitive, Evaluative, and they are built on the main components of the human psyche: Intellect (Real, Potential), Will (in-between with Intellect we have Interrogative, and then Volitive), and Emotions (Evaluative).¹⁴ In Zavadil's theory verbal moods are the main means of expressing modality. So

¹⁴ The correspondences with other theoretical frameworks are as follows. Potential and Volitive are the only categories with a full correspondence in the framework adopted in this study. Potential corresponds to epistemic and dynamic modality; Volitive to deontic modality (both authority and volition). The category Real corresponds to what is commonly defined as 'realis' (Palmer 2001, 1–3), that is, situations portrayed as actualised and are asserted, as opposed to 'irrealis', which pertains to situations that belong to the realm of thought and are not asserted. Interrogative corresponds to interrogative clauses (direct or indirect), and is sometimes associated with the domain of modality (Palmer 2001, 12) given that it implies the non-actualisation of the propositional content. Evaluative corresponds to expressions of wishes and fears e.g. *I fear, I wish that*, which Palmer (Palmer 2001, 22) locates at the periphery of the modal domain, as they somehow express the attitude of the speaker towards a non-actualised event.

for instance the modal meaning Real can be expressed by the Indicative, the Volitive by e.g. the Imperative, the Potential, Volitive and Evaluative by the Subjunctive. Each chapter is dedicated to the interaction between two types of modality, expressed one by a lexical element and the other one always by a verbal mood. As an example, I illustrate the results of the analysis of the interactions between the modal meaning Real and the modal meaning Potential. The two are linked because they both relate to the commitment of the speaker towards the veracity of the utterance: Real corresponds to reality and Potential corresponds to an imaginary situation (Kratochvílová 2018, 34). The analysis of the expression of potentiality depends both on the lexical marker selected to express potentiality (adverbs like *tal vez* 'maybe', *probablemente* 'probably'; constructions like *es posible* 'it is possible', *es probable* 'it is probable'; verbs like *creer* 'to believe', *no estar seguro* 'not to be sure') and on the choice of mood. This latter can either strengthen or weaken the degree of potentiality expressed by the lexical marker. This is represented on an axis of potentiality, building on the idea, already present in Lyons (1977), but presented also in modal logic by Kratzer (1991), that epistemic possibility can be defined in terms of degree. On the epistemic axis the degree 0 is assigned to utterances where the speaker remains neutral with respect to the reality or probability of the utterance. Depending on the modal expression selected, the speaker can approach potentiality or evidentiality moving up or down the scale on the right of the 0 value. The choice of mood is sometimes guided by the selectional preferences of the lexical marker, which is usually constructed with the indicative or the subjunctive. The final potentiality value expressed by the co-occurrence is represented by the formula $P = p + m$, where P stands for the final potentiality, p for what is called 'seme of potentiality' (the primary modal value of the lexical expression) and m for the mood chosen (Kratochvílová 2018, 37). If a different verbal mood is used from the one required or preferred by the chosen lexical marker, the degree of potentiality expressed in the first place by the lexical marker can then be further strengthened or weakened by the mood chosen. Consider examples 160 and 161.

(160) *No creo que se atrevan a entrar.*

I don't think they would dare to enter. (Kratochvílová 2018, 86)

(161) *No creo que debemos molestarle.*

I don't think we should bother him. (Kratochvílová 2018, 86)

The verbs *creo*/*no creo* are listed among the expressions for potentiality (epistemic modality), and they are usually construed with the subjunctive. In example 160 *no creo* is construed with the subjunctive *se atrevan* 'would dare', whereas in example 161 it is construed with the indicative *debemos* 'we should'. Using the formula for determining the potentiality value of the construction $P = p + m$, one can infer how the use of two different verb forms may impact the modal analysis of co-occurrence. In example 160 the potentiality conveyed by *no*

creo is fully sustained by the verbal mood of *atrevan*, because the subjunctive mood is not marked with *no creo*. On the other hand, the use of the indicative in example 161 weakens the level of potentiality of the utterance, moving it one degree closer to reality in the scale of potentiality (Kratochvílová 2018, 87).

In addition to the influence that a marker can have on the semantic interpretation of the co-occurring marker, the co-occurrence can also be analysed with respect to its rhetorical-argumentative use. Hütsch (2020) targets the analysis of combinations of the type ADVmod + Vmod in French and German at the discourse level, to investigate how speakers employ modal meanings in order to accomplish specific argumentative goals. The combinations of modal verb and modal adverb are analysed based on an analysis grid, applied to the significant structures found in the corpus and to each individual modal form. The analysis grid (Hütsch 2020, 12;58) is based on Rossari (2016): a basic semantic contribution (CS) NEC (necessity) or POS (possibility) is assigned to each marker, and then applied to a specific semantic object depending on the employment of that modal form in the discourse. The modal form can be applied to the predicate (*emploi prédicatif*), to the proposition (*emploi propositionnel*) or to the statement (*emploi énonciatif*). Consider the following examples.

(162) *Tu **dois** ranger ta chambre.*

You **must** tidy your room up. (Hütsch 2020, 61)

(163) *Un triangle rectangle **doit** avoir un angle droit.*

A right triangle **must** have a right angle. (Hütsch 2020, 61)

(164) *(À propos d'un individu qu'on surprend l'oreille collée à une porte) Ça **doit** être un psychopathe.*

(As referred to someone who is caught with their ear against a door) This **must** be a psychopath. (Hütsch 2020, 62)

Examples 162 and 163 illustrate, respectively, the predicative and the propositional uses of the modal marker. In example 162 the modal verb qualifies the predicate *ranger* with a CS of necessity (deontic or dynamic uses). In example 163 the modal verb qualifies the proposition i.e., the state of affairs presented in the proposition is qualified as generally necessary or possible (alethic modality). When the CS is applied to the production of the statement, as in example 164, the rhetorical use of the modal forms is accessible. In example 164 the CS of necessity expressed by *devoir* is not applied to the predicate, nor to the representation described in the proposition, but to the statement itself i.e., it expresses the degree of commitment of the speaker towards the statement. This third type of application of the CS

paves the way to employments of the modal forms that drift away from the original semantic contribution of necessity or possibility, opening, for instance, to rhetorical employments of those same forms. Consider example 165.

(165) ... *Le choix de ce vocable **peut** être **certes** discutable mais il est associé aux hypothèses de travail qui sont que les femmes qui habitent en milieu rural ont un rapport particulier avec leur milieu ...*

... The choice of this term **may certainly** be debatable, but it is associated with the working assumptions that women living in rural areas have a particular relationship with their environment ... (Hütsch 2020, 140)

In this example, both co-occurring markers, *pouvoir* and *certes*, have an enunciative application (they apply to the fact that the statement may or may not be uttered) and therefore lend themselves to a concessive interpretation. Their use in combination with the adversative *mais* highlights their rhetorical function. As explained by Rossari (2016), the use of certain markers (*certes*, *pouvoir*, *peut-être*) in adversative structures of this kind can generate a foreground-background alternation that guides the speaker's argumentation towards the intended conclusion. In the case of example 165, the statement to which the combination of markers applies (*le choix de ce vocable est discutable*) is located on the background, to give relevance to the following proposition introduced by *mais* (*il est associé aux hypothèses de travail qui sont*), which presents the convincing argument on the foreground.

On a final note, studies on the co-occurrence of modal markers have also been employed to shed light on the hierarchies that order the modal system. Such studies have focused especially on the functional-cognitive theory, with Nuyts (2004) and Narrog (2009) being prominent researchers in this area. Different proposals had already come from different theoretical approaches, which attempted to arrange modal categories in a hierarchical structure, along with other qualificational categories that are located, so to speak, on the periphery of modality, such as tense, aspect, mood, and negation. Among these, we can mention Role and Reference Grammar (RRG) (van Valin and Foley 1980, van Valin 1993, van Valin and LaPolla 1997) and Functional Grammar (FG) (Hengeveld 1989, Dik 1997). However, Nuyts (2004, 13) complains about a lack of general agreement among such theories, especially regarding the modal categories themselves and the hierarchical relationships that hold between them. For this reason, he proposes a specific study on markers that express deontic, epistemic, and evidential modality in Dutch, trying to provide a systematic hierarchy for these categories, based on evidence from Dutch. The results obtained reveal some clear tendencies. Deontic modality co-occurring with epistemic and evidential modality always implies that the deontic marker is used 'descriptively', while the epistemic/evidential marker is used 'performatively'. Descriptive and performative uses are distinguished in that in the former, the

speaker either reports a statement held by someone else or does not express his commitment with respect to the state of affairs; in the latter, the speaker expresses his own commitment to the state of affairs when the utterance is issued (Nuyts 2016, 47). Examples 166 and 167 illustrate the difference between a performative and a descriptive use of epistemic modality.

(166) *Het is nogal waarschijnlijk dat Piet inmiddels thuis is.*

It is quite likely that Piet is now home. (performative) (Nuyts 2004, 21)

(167) *Jan acht het nogal waarschijnlijk dat Piet inmiddels thuis is.*

Jan considers it rather likely that Piet is now home. (descriptive) (Nuyts 2004, 21)

The distinction between these two forms has an impact on their position in the hierarchy. Performative uses place the marker higher in the hierarchy; descriptive uses move the qualification within the state of affairs, placing the marker lower in the hierarchy. Therefore, in deontic + epistemic/evidential, the epistemic/evidential marker is always higher in the hierarchy (used performatively), whereas the deontic is lower (used descriptively). Consider example 168.

(168) *waarschijnlijk dat uh onze vriend Zabel zijn trui mag behouden.*

probably that uh our friend Zabel **is allowed** to keep his jersey (Nuyts 2004, 32)

In this sentence, the speaker expresses his assessment that there are chances (performative use of *waarschijnlijk* ‘probably’) that others will allow Zabel to keep his jersey (descriptive use of *mogen* ‘to allow’). The deontic verb *mogen* qualifies directly the state of affairs i.e., is used descriptively, and in this sentence it is therefore lower in the hierarchy with respect to the epistemic adverb *waarschijnlijk*, which qualifies the entire statement. Nuyts also states that he did not find equally clear tendencies for cases of epistemic and evidential modality. However, he contributes real data to the aforementioned theories that place deontic modality below epistemic-evidential modality.

A similar but much more extensive study is presented by Narrog (2009) on Japanese. Narrog considers all modal categories and the possible combinations observed among them. In order to test the theoretical hierarchies mentioned above on real data, Narrog identifies, within each modal combination (‘double modality’ in Narrog 2009, 177), embedding and embedded modalities, thus attempting a systematisation of the hierarchical relationships that govern the co-occurrence. Narrog draws several conclusions for a possible modal hierarchy in Japanese:

- dynamic modality does not embed any other type of modality except for, quite rarely, dynamic modality itself. In every example of this kind in the corpus, two co-occurring possibility markers reinforce one another.

- (169) *Siawase=na, zibun=ga omoi egai.te i.ta izyoo=no*
 fortune-ADN self-NOM think-depict-GER be-PST beyond-GEN
risoo=o koe.ta kekkon-siki=o age-rare.ru
 ideal-ACC transcend-PST wedding-ceremony-ACC hold-pot-NPS
koto=ga deki-masi.ta...
 thing-NOM be.possible-POL-PST

‘I was able to have a happy wedding ceremony, better than I had ever imagined and beyond even my dreams.’

In this example (Narrog 2009, 178) the dynamic marker *koto ga dekiru*¹⁵ embeds *-rareru*, a strategy employed by the speaker (it is spoken Japanese) in order to highlight the fact that the marriage has successfully taken place. Narrog compares this strategy to the double negation in spoken English, which is meant to reinforce the negative meaning of the sentence: *I don’t want no cake*. He also states that all the examples found in the corpus are of this type, and that they are specific of spoken Japanese, as the written language would not allow this type of constructions.

- boulomaic modality (deontic volition in the framework adopted in my study) usually embeds dynamic modality (possibility)

- (170) *Tada sono mae=ni=mo, hanasi=o kitinto kik.u koto=ga*
 only DEM before-ADV-FOC talk-ACC properly listen-NPS thing-NOM
deki.te hosi.i=si, hanasi=o kik.u koto=ga
 be.possible-GER want-NPS-ENU talk-ACC listen-NPS thing-NOM
suki=de at.te hosi.i.
 like-ESS be-GER want-NPS

‘Before that, I want them to be able to listen to someone talking, and I want them to enjoy listening to someone talking.’

In example 170 (Narrog 2009, 179) the volitional deontic marker *-te hosi.i* embeds the dynamic *koto=ga deki.ru*. It should be noted that in this sentence there are also two markers expressing deontic modality that co-occur in the same syntactic structure (it is

¹⁵ *Masi* is a morphological marker of politeness (Narrog 2009, 46).

actually the deontic marker *-te hosi.i* used twice). Other examples show deontic markers co-occurring with (embedding) evidential markers. Narrog (2009, 179) clarifies that these examples are actually very rare and were not captured by the corpus used for this study, but were gathered from the internet.

- deontic modality (expressions of permission or obligation) embeds more frequently dynamic modality, and more rarely boulomaic, evidential and some deontic markers. “The combination of dynamic and deontic modality expresses the obligation, moral expectation or necessity of a possibility to hold” (Narrog 2009, 181). See the example 171 (Narrog 2009, 181):

- (171) *Soikara, kairo=o yon.de rikai s.uru koto=ga*
 also circuit-ACC read-GER understand-do-NPS thing-NOM
- deki-na.kereba nar-ana.i.*
 be.possible-NEG-CON become-NEG-NPS

‘Also, you must be able to read and understand (electrical) circuits.’

Apparently deontic markers do not embed epistemic or evidential markers, but the problem here is to detect if it is a matter of scope or this really reflects the position of deontic markers in the hierarchy.

- epistemic and evidential modality embed the other types of modality. However, epistemic modality shows a greater number of phenomena of co-occurrence with any other type of modal markers, and with higher frequency with respect to evidentiality. Example 172 (Narrog 2009, 183) illustrates the co-occurrence between the deontic construction *-(a)nakereba naranai* and the epistemic *ka mo sirenai*:

- (172) *Puraibasii=o, aru teido gisei=ni si-na.kereba*
 Privacy-ACC certain degree victim-DAT do-NEG-CON
- nar-ana.i=ka=mo sir-e-na.i.*
 become-NEG-NPST-QUE-FOC know-POT-NEG-NPST

‘One might have to sacrifice privacy to a certain degree.’

There are also cases of some epistemic and evidential markers embedded by epistemic modality, but they are only a couple. In 173 (Narrog 2009, 183–184) there are two epistemic markers: *ka mo sirenai* is modified by *daroo*.

- (173) *fukiNsiN=da, musiNkei=da=nado=to*
 indiscreet-VRB insensitive-VRB-EXPL-QUO

hihaNare.ru=ka=mo sir-e-na.i=daroo koto=mo
 criticism-do-PASS-NPST-QUE-FOC know-POT-NEG-NPST-EPI thing-FOC

syooti si.te i-mas.u.
 be.aware.of-do-GER be-POL-NPST

‘[I] am aware that [I] could probably be criticized for being indiscreet, insensitive and so on.’

The ultimate aim is to propose a hierarchy of the type of modalities based on their scope, as it appears from the data in the corpus (Narrog 2009, 188). In addition to attempting to outline a hierarchy of modal categories, Narrog also notes that not all markers behave in the same way, even though they belong to the same category. While dynamic, deontic and boulomaic modalities behave quite homogeneously, epistemic and evidential markers can vary considerably in terms of scope, and therefore be placed at different levels of the hierarchy.

Another point that studies have focused on, particularly, is the combinatorial possibilities of markers and modal types. In this context, corpus-based studies that employ quantitative methods have special relevance. Many of the studies cited so far (Huot 1974; Nuyts 2004; Narrog 2009; Kratochvílová 2018; Hütsch 2020) are based on data extracted from corpora. Some (Huot 1974; Chu 2008) use the corpus as a tool to verify combinations produced according to a specific theory. Others (Nuyts 2004; Narrog 2009; Kratochvílová 2018; Hütsch 2020) use frequency and attraction metrics to identify significant structures to be analysed with a qualitative approach. The corpus-based study allows for the identification, for example, of the relatively weak incidence of the co-occurrence of modalities in Dutch (Nuyts 2004, 29–31) and French (Chu 2008, 131). Moreover, some aspects of the methodology adopted by Narrog and Hütsch are important to define what should be considered for a quantitative study of the co-occurrence of modal markers. Narrog (2009, 174) explains that co-occurrences can be quantitatively described with a simple raw count, but it is equally important to define the degree of attraction of one marker compared to another.

In principle, two possible measures of frequency of co-occurrence are of relevance. First, the absolute or ‘raw’ frequency of co-occurrence may indicate how entrenched the collocation of two markers is in the language. Even more important for our study is the question of how relevant two markers or constructions are to each other (Narrog 2009, 174).

Narrog emphasizes the significance of the frequency of the single markers regardless of the co-occurrence. Modal markers that appear relatively frequently in the corpus have higher chances of co-occurring. Consequently, the absence of co-occurrence between two markers with high frequency is unlikely attributable to chance. Conversely, the same number of co-occurrences should be interpreted differently depending on the frequency of those markers in the corpus. The lower the frequency, the greater the mutual relevance between the two markers. The mutual attraction between the co-occurring markers is crucial in Hütsch (2020) to identify co-occurrences of the type ADVmod + Vmod in German and French. The identification of combinations that are then studied in their use in discourse relies on what in corpus linguistics is called co-occurrence analysis. Starting from the forms of *pouvoir* and *devoir*, she studies the combinatorial possibilities of both verbs. The combinations selected for the analysis are based on the values obtained from association metrics, which measure how significant is the attraction between the verb and the adverbial form within the span of 5 words before and after the verb.

Other previous studies (Pottier 1976; Chu 2008), not based on corpus data, have investigated the possible combinations for modal markers. The first one is Pottier (1976), who performed some tests on the combinatory possibilities of *devoir* 'to have to', *pouvoir* 'can/to be able', *vouloir* 'to want' and *savoir* 'to know'. Pottier distinguishes three types of modality for *pouvoir*: internal possibility, external possibility and neutral possibility, illustrated respectively in examples 174, 175 and 176 with the corresponding analyses in the WoPoss framework.

- Internal Possibility

(174) *Je peux y aller seul.*

I can go there on my own. (I am capable of going there on my own = dynamic possibility) (Pottier 1976, 40)

- External Possibility

(175) *Je peux y aller seul.*

I can go there on my own. (I am allowed to go there on my own = deontic authority, permission) (Pottier 1976, 40)

- Neutral Possibility

(176) *Il pouvait être quatre heures.*

It could be 4. (It is possible that it was 4 = epistemic possibility) (Pottier 1976, 40)

He also lists four types of modality for *devoir*: internal obligation, external obligation, probability and prospective, in examples 177, 178 179 and 180.

- Internal obligation

(177) *Je dois partir.*

I have to go. (It is my personal need, it only depends on me = dynamic necessity, participant inherent) (Pottier 1976, 40)

- External obligation

(178) *Je dois partir.*

I have to go. (I am required to go, there is an external constraint = deontic authority, obligation or dynamic necessity, participant-imposed) (Pottier 1976, 40)

- Probability

(179) *Il devait être quatre heures.*

It must have been 4. (It probably was 4 = epistemic probability) (Pottier 1976, 40)

- Prospective

(180) *Je devais ne plus le revoir.*

Lit. I had to never see him again. (It was destiny that I would never see him again = dynamic necessity, situational) (Pottier 1976, 40)

When *devoir* and *pouvoir* co-occur, the modal values that they can express can combine in three possible ways :

(181) *Il doit pouvoir partir à 5 heures.*

He **must be able** to leave at 5. (Pottier 1976, 42)

(182) *Je dois pouvoir y être à midi.*

I **must be able** to be there at 12. (Pottier 1976, 42)

(183) *Je peux devoir y être à midi.*

I **might have to** be there at 12. (Pottier 1976, 42)

Pottier analyses examples 181, 182 and 183 in all possible combinations of the types of modality expressed by the two markers. The outcome is that, depending on the position

of the two verbs, that is whether they precede or follow each other, some interpretations are accessible, but others are not. When *devoir* precedes *pouvoir* (examples 181 and 182), *pouvoir* can only express internal possibility. In this case, *devoir* can express probability or external obligation (example 181), and internal obligation, external obligation and probability (example 182). When *pouvoir* precedes *devoir* (example 183), it can only express neutral possibility (dynamic situational), whereas *devoir* can express internal or external obligation. Pottier exploits made-up examples to explore the combinatorial possibilities of French modal verbs according to the type of modality expressed. It emerges that the position of the marker in what Chu will later define as the verbal chain (Chu 2008, 3) plays a role in the types of modality that are accessible for two markers in co-occurrence. Chu's study (2008) actually builds on Pottier's intuitions, to investigate how a larger group of French modal verbs can be combined in verbal chains, i.e., combinations of at least, but not only, two markers. In order to identify possible verbal chains, Chu submits acceptability tests with all possible combinations of 13 modal verbs¹⁶ co-occurring in number of two or three to 20 francophone speakers.¹⁷ The combination between the modal verbs is guided by a Markov chain-like process: the verbal chain is built step by step, starting with the first 'matrix' verb (*verbe constructeur*), which sets the semantic constraints for the following verb on its left. Then, the sentence is built progressively from right to left, in a potentially infinite process. The selection of each item of the chain depends on the immediately preceding one. Combinations that are judged as unacceptable in the survey are due to semantic interferences (*interférences sémantiques*, Chu 2008, 121) between the two verbs i.e., the semantic criteria set by the preceding verb are not respected. So a possible combination starting with a verb like *fumer* 'to smoke' could be:

(184) *Il + va ← devoir ← commencer à ← sembler ← pouvoir ← cesser de ← fumer.*

He + is going to ← have to ← start ← to seem ← to be able ← to stop ← smoking
(Chu 2008, 129)

The sentence in example 184 is constructed based on the fact that each selection for each verb, going from left to right, is judged acceptable. The chain stops at *va* because no modal verb in the list is judged as being acceptable to occur on the left of the verb *aller*. A verbal chain of such complexity is clearly impossible to find in real use, as confirmed by Chu with

¹⁶ Chu adopts a broad definition of modality, as an evaluation of the event by the speaker, which can also extend to qualificational categories of time and aspect. Therefore, within the group of modal verbs, Chu also considers all verbs that provide information about the aspectual character of the action or event that they describe i.e., duration, initiation, completion etc. (Lyons 1977, 705). Examples are the French verbs *commencer à* 'to begin to' or *finir de* 'to finish doing' etc. (Chu 2008, 61–64).

¹⁷ An interesting outcome of acceptability tests is that in some cases, a combination that is initially judged impossible could be re-evaluated as acceptable if properly contextualised. An example is the sentence *Il continue à cesser de glisser* 'He keeps stopping sliding'. At first judged unacceptable from a semantic point of view, this sentence was later found more acceptable when framed in a situation where it is used as a background comment for a slow motion of someone who manages to stop sliding (Chu 2008, 122).

a study on available French corpora (Chu 2008, 131). However, it relates, albeit through a completely different process, to the discussion on the hierarchical relationships between types of modality and to the fact that restrictions exist on the types of modality that can embed others (Narrog 2009).

3.3 The co-occurrence of modal markers in Latin

There are no systematic studies similar to the ones presented in the previous section for Latin. The literature on the co-occurrence of modal markers in Latin is limited to some mentions of specific co-occurrences within broader descriptions of the Latin modal system or the modal value of individual markers.

The earliest mentions of the phenomenon can be found, to my knowledge, in Bolkestein (1980) and Núñez (1991). One of the topics discussed with relation to the co-occurrence is the combinability of the epistemic adverbs *certe*, *fortasse*, *forsitan* with other epistemic expressions within the same clause. Bolkestein refers back to the traditional notions of harmonic and non-harmonic combinations as defined by Lyons (1977, 807–808, see section 3.1 in this chapter), and tries to use them as an instrument to determine in which contexts necessity Latin verbs such as *debeo*, *necesse est* and *oportet* express dynamic/deontic modality (they are both defined as deontic in Bolkestein) and when they express epistemic modality (inferential in Bolkestein). In order to do this, Bolkestein recovers the distinction between objective and subjective epistemic modality, introduced by Lyons and extensively described in Chapter 2 (section 2.1, page 15), and at the beginning of this chapter. According to her, some restrictions apply to non-harmonic combinations of a modal adverb and a modal verb. When the modal verb expresses objective epistemic modality in a lower degree (*may*), it can co-occur with a modal adverb expressing a higher degree of commitment. Therefore, the sentence *certainly he may be ill* is acceptable. On the contrary, a combination of a modal verb expressing a higher degree of objective epistemic modality (*must*) and a modal adverb expressing a lower degree of subjective epistemic modality is not acceptable (**possibly he must be ill*) (Bolkestein 1980, 74).

Bolkestein's objective is to test this hypothesis in Latin. However, Bolkestein bases the entire discussion about the acceptability of harmonic and non-harmonic combinations on made up examples, which are not informative on the real use of the language. But more importantly she does not refer to any examples from the Latin corpus that she used for this work, neither to prove the acceptability of harmonic combinations nor to prove the unacceptability of (some) non-harmonic combinations. Nonetheless, she claims not to have found any examples of non-harmonic combinations, which is a result *per se*. But at the same time she does not provide any example from the corpus for supposedly acceptable harmonic combinations

either. She mentions plenty of attestations of *fortasse* combining with the three modal verbs when they express a deontic meaning, for which the co-occurrence would prove to be a good disambiguation test, but even in this case no examples are provided.

Núñez (1991, 172–173, 187) builds on Bolkestein confirming that non-harmonic combinations of epistemic adverbs with epistemic verbs are not possible in Latin. However, he proves harmonic combinations to be entirely possible, both in the realm of necessity (*certe* combined with *necesse est*, *debeo*, *oportet*) and in that of possibility (*fortasse*, *forsitan* combined e.g. with *licet*). Consider the following example 185.

- (185) *atque iste vir altus et excellens magno animo, vere fortis,*
 and this man elevated and excellent great mind truly brave
infra se omnia humana ducens, is, inquam, quem efficere
 beneath himself all_things human consider he say who produce
volumus, quem quaerimus, certe et confidere sibi debet ac
 want who seek certainly and be_confident himself must and
suae vitae et actae et consequenti et bene de sese
 his life and conduct and following and well about himself
iudicare, statuens nihil posse mali incidere sapienti.
 judge consider nothing can bad fall_upon wise_man

Also, this man, elevated, excellent, with such a great mind, truly brave, who considers that all human things are beneath him, this man I say, who we want to imitate, who we seek for, he **certainly must** be self-confident and think well of his life, both past and future, thinking that nothing bad can happen to a wise man (Cicero, *De finibus bonorum et malorum* 3, 29) (from Núñez 1991, 173)

In this passage, the epistemic adverb *certe* co-occurs with (scopes over) the epistemic verb *debeo*. Both express epistemic certainty, and therefore represent an harmonic combination.

Other authors, especially Schrickx (2011, 249) have added to the discussion on the possibility of combining epistemic adverbs with each other e.g. *forsitan certe*. In this respect, Schrickx observes that hierarchical combinations between epistemic adverbs do not seem to be possible in Latin, or at least were never observed in the available corpus data. This is consistent with what has been observed in other languages e.g. Dutch and English (Nuyts 2005, 36; Nuyts 2006, 19). However, as shown so far, in the scant literature on harmonic and non-harmonic combinations in Latin, the notion of modal harmony remains anchored to the category of epistemic modality.

Other references to the behaviour of Latin epistemic adverbs that modify another modal expression are rare. A passage with co-occurrence is presented in Pinkster (2021, 334–335). Originally, Pinkster does not mention this passage to focus on the co-occurrence, which is not even explicitly mentioned by the author, but it is relevant to this discussion because it presents another epistemic adverb (*forte*) scoping over a modal verb (*possum*). The passage to which I refer is presented in example 186.

- (186) *Quae res mihi non mediocrem consolationem attulit volo tibi*
 that thing me not slight comfort bring want you
commemorare, si forte eadem res tibi dolorem minuere possit.
 remember if perhaps the_same thing you pain lighten can

I want to remember with you something that has brought me no slight comfort, if perhaps the very same thing **could** lighten your sorrow too. (Cicero, *Epistulae ad familiares* 4, 5, 4) (from Pinkster 2021, 335)

Pinkster observes that often the modal verb *possum* is found within purpose clauses introduced by *si*, as it is the case in the example above. From Orlandini (1997), we know that the epistemic adverb *forte* is often combined with *si*, which emphasises its hypothetical value (see section 2.4.10 in Chapter 2, page 62.). Example 186 shows the epistemic adverb *forte* that scopes over *possum*, which in this case expresses dynamic modality, although the epistemic value of *forte* may be considered almost bleached within the collocation *si forte*.¹⁸

So far, I have shown examples of hierarchical co-occurrences, in which an epistemic adverb projects its modal value onto the co-occurring marker. However, this is not the only case of co-occurrence found in the literature. As anticipated in the Introduction, there is a second type of co-occurrence in which the markers maintain separate scopes. This second type is also mentioned in the literature on modality in Latin, and it is interpreted through two different types of analysis. The first one takes an argumentative perspective. While describing the different uses of *certe*, Núñez (2002, 196) presents a first case of co-occurrence, where the adverb is employed as a focaliser on an adjective with a predicative function.¹⁹ In the same sentence, *certe* is contrasted with *fortasse*, which focalises another adjective (see example 187).

¹⁸ As it will be shown in the analysis of hierarchical co-occurrences in Chapter 7, *si forte* and the corresponding negative expression *nisi forte* can be found in combination with other modal verbs than *possum*.

¹⁹ In our framework, in order to be modal the marker needs to modify a state of affairs. In this case, it can be debatable whether one should only consider the constituents being focalised (*subtile* and *acutum*), or an implied part of the scope together with the adjectives e.g. *fortasse (genus habent) subtile*. In the first case, the adverbs would not be considered modal. However, it is important to introduce this use of epistemic adverbs because, as it is shown in this section, it can be applied to unambiguously modal passages.

- (187) *accedit quod orationis etiam genus habent fortasse subtile et certe*
 add that speech also kind have maybe elegant and certainly
acutum, sed, ut in oratore, exile, ..., obscurum...
 sharp but as in orator weak ... unintelligible

(referred to the Stoics) Add to this, that they also have a kind of speech which is **maybe** keen and **certainly** sharp, but, as for an orator, it is weak, ..., unintelligible... (Cicero, *De oratore* 3, 66) (from Núñez 1991, 196)

In this passage, both markers focalise a different constituent and are used in co-occurrence to compare the two items that are being focalised. The result is that the adverb expressing the higher degree on the scale of epistemicity (*certe*) marks the element that the speaker wants to highlight as the most relevant, between the two, to their argument (*acutum*). Similar examples of co-occurrence between *fortasse* and *certe*, focalising two different adverbial constructions in the sentence, are provided in Bertocchi and Orlandini (2001, 49) and Ricca (2010, 168). This use of *fortasse* and *certe* (and similar combinations) in a contrastive relation for argumentative purposes is also observed by Schrickx (2011, 220), who adds that this combination is quite common in Latin, especially with the second term being negated (*fortasse* X, *certe* non Y).

The contrastive relationship can be constructed not only on different degrees of the epistemic scale but also on two propositions with opposite polarity. Orlandini (2001, 325) illustrates another example of epistemic adverbs used in a contrastive relation, with two occurrences of *fortasse*. The passage is shown in example 188.

- (188) *Habet etiam mala fortuna levitatem. Fortasse erit, fortasse non*
 has even bad fortune changeableness perhaps be perhaps not
erit.
 be

Even bad fortune is subject to change. **Perhaps** there will be, **perhaps** there will not be. (Seneca minor, *Epistulae* 13, 11) (from Orlandini 2001, 325)

In this sentence, the co-occurrence of *fortasse* and *fortasse non* is used by the speaker to organise the discourse and direct the argumentation towards a certain conclusion. In this passage, the speaker is advising his addressee to carefully consider their troubles, as they may not actually happen or may be postponed by other events. It suggests that focusing on positive things and not anticipating suffering can save time and prevent unnecessary worry. Moreover, bad fortune is unpredictable and anticipating it does not lead to anything good. As it was explained in the previous chapter in the description of *fortasse* (section 2.4.9, page 59),

this adverb can be rephrased as ‘possible that *p*, if not necessary’: it can be used with argumentative purposes to lead the addressee towards a certain conclusion i.e., the one to which *fortasse* refers. In the specific passage in example 188, the two *fortasse* lead to two opposite conclusions i.e., *erit* and *non erit*. The preceding sentence, which hinges on the co-occurrence of the two *fortasse*, suggests the suspension of judgment: both options are equally valid. The text which follows eventually reveals to the reader the conclusion to which the speaker’s discourse is aiming i.e., the negative term of the two alternatives *erit* and *non erit*: *interim non est. Meliora propone*. ‘in the meantime it does not. So look forward to better things’.

The other mentions to non-hierarchical co-occurrence of modal markers concerns the so-called distinctive contexts (Bolkestein 1980, 14; Núñez 1991, 89). These are sentences where two or more different markers are used in contrast, so that one necessarily has to be semantically different from the other. This type of co-occurrence is especially relevant to the disambiguation of polyfunctional markers in general, and even more to the disambiguation of such a vague marker as *oportet*. The unstable status of *oportet* was presented in the previous chapter, in the section dedicated to this modal verb (section 2.4.15, page 78; important references are Orlandini 2001, 333; Bertocchi and Orlandini 2002, 18–19). The co-occurrences mentioned the most in literature are those including *oportet* in distinctive contexts together with other modal verbs or constructions, in particular *necesse est* and *licet*. When *oportet* is used to express scalar modal notions such as epistemic and deontic acceptability types of modality, it can take a lower or higher degree on the scale depending on the context. Consider example 189.

- (189) *quem videntem ac vigilantem sic eluseritis, sopitum*
 who be_aware and be_vigilant in_such_manner elude asleep

oportet fallatis, immo necesse est.
 ought deceive rather necessary be

The one you have eluded while he was awake and vigilant, **it is probable**, or rather **necessary** (i.e., inevitable), that you would deceive him when he has fallen asleep. (Livius, *Ab urbe condita* 7, 35, 6) (from Orlandini 2001, 327)

In this passage *oportet* co-occurs with *necesse est*, and both carry an epistemic value. The co-occurrence with a marker expressing a higher degree of commitment (*necesse est*) forces the interpretation of *oportet* to a lower degree of commitment (‘it is probable’). This interpretation is guided by the adversative adverbial *immo* ‘rather’, which implies that the two markers express different degrees as it weakens the value expressed by *oportet* and indicates that the value expressed by *necesse est* should be retained. The other example of contrastive co-occurrence that includes *oportet* concerns the deontic domain. Fruyt and Orlandini (2003,

702) present some examples where *oportet* co-occurs with *necesse est* or with *licet* (another couple of passages can be found in Núñez 1991, 91). Consider example 190 for the co-occurrence with *necesse est*.

- (190) Qui ut primum in illud oppidum uenit, statim, tamquam ita fieri
 who as first in that town come immediately as_if so do
 non solum *oporteret*, sed etiam *necesse esset*, tamquam hoc senatus
 not only should but also necessary be as_if this senate
 mandasset populus=que romanus iussisset.
 order people=and roman command

He came to that town as soon as possible, immediately, not only as if he **had a moral obligation** (lit. should) but as if **it were mandatory** (lit. it were necessary), as the Senate had ordered it and the Roman people had commanded it.²⁰ (Cicero, *In Verrem* 2, 4, 84) (from Fruyt and Orlandini 2003, 702)

In this case, an *oportet* expressing deontic acceptability (moral duty) and a *necesse est* expressing obligation from an authoritative source, namely the Roman Senate, are juxtaposed. In addition to representing another example of the opposition of modal values that aids disambiguation, this passage also introduces a structure that typically instantiates a contrast, a parallelism or a cumulative relation (not only) between types of modality: *non solum, sed etiam* 'not only, but also'. Structures of this kind (similar to *non solum, sed plane*; *non solum, verum etiam*) build a scalar relationship between the two arguments of the construction and move the focus on the second term of comparison. Therefore, in structures of the kind illustrated in example 190, the use of co-occurrence combines both argumentative and contrastive purposes.

As mentioned in the previous chapter, *oportet* can also take a full necessity value and express dynamic necessity. Example 191 presented by Orlandini (2001, 327), again shows *necesse est* and *oportet* in co-occurrence, but this time they are not in a contrastive relation.

- (191) Quorum priusquam partior species, indicandum est esse quaedam in
 which before distinguish type indicate be be certain in
 omni probationum genere communia. Nam neque ulla quaestio est quae
 all proof type common for and_not any question be that

²⁰ I used a looser translation here to render the difference between *oportet* and *necesse est* in this context, in order to underline the difference between the moral obligation expressed by *oportet* and the obligation imposed by a source of authority (*necesse est*). I included a snippet of the subsequent context to motivate my interpretation of *necesse est* as a marker of deontic authority in this passage.

non sit aut in re aut in persona, neque esse argumentorum loci
 not be or on thing or on person and_not be argument topic

possunt nisi in iis quae rebus aut personis accidunt, ea=que
 can unless on it which thing or person happen which=and

aut per se inspici solent aut ad aliud referri, neque ulla
 or by itself regard use_to or to something_else relate and_not any

confirmatio nisi aut ex consequentibus aut ex pugnantis, et
 confirmation unless or from consequence or from conflict and

haec necesse est aut ex praeterito tempore aut ex coniuncto
 this necessary be or from pass time or from contemporary

aut ex insequenti petere, nec ulla res probari nisi ex
 or from follow seek and_not any thing prove unless from

alia potest ea=que sit oportet aut maior aut par aut minor.
 other can that=and be ought or great or equal or inferior

Before I distinguish the types of Arguments (lit. of which), it should be mentioned that there are certain common features common to all kinds of Proofs. There is no Question which is not based either on things or on persons, and there can be no Topics of Argument unless they are based on the events happening to things or people, which usually are either regarded on their own or related to something else; and there can be no Confirmation unless that which is based either on Consequences or on Conflicts, and **it is necessary** to seek them either in the Antecedents or in Contemporaneous Happenings or in the Sequel; nor can any one thing be proved except by something else, and that **must** be either greater or less or equal. (Quintilian, *Institutio oratoria* 5, 8, 5) (from Orlandini 2001, 327)

I included more text with respect to the sentence quoted by Orlandini to provide more context and facilitate the interpretation of the co-occurrence. In this passage, Quintilian is describing the argumentative process, specifically the evidence (the Proofs) that the speaker can bring to support their argument to persuade the audience. In this example both *necesse est* and *oportet* express dynamic necessity. In the case of *oportet*, this also is pragmatically implied by the context: there is no other option available besides the three given in the text *aut maior, aut par, aut minor* 'either greater or less or equal' (see Orlandini 2001, 327). Therefore, the use of different markers in the same context does not necessarily signal their contrastive use. As observed by Núñez (1991, 90), the choice of an author to implement lexical and stylistic variation in their work should always be kept into account in the analysis of co-occurrences in distinctive contexts. That is to say, that two different markers might be used in

the same context to avoid repetition and enhance the quality of the writing, and not to capture specific semantic nuances that differentiate them. It is always the broader context that guides the final interpretation of the ultimate value of the marker, not just the co-occurrence itself. An example worth mentioning is the study on the language of the *tabellae defixionum* outlined by Urbanová and Cuzzolin (2016, 334). In this work, the co-occurrence of *possum* with verbs of command i.e., *permitto* ‘to allow’ is used to disambiguate the modal value of *possum* in a specific context. However, in this case the disambiguation is performed by looking at the context, and in particular at *permitto*, but not via the co-occurrence of modal verbs, as *permitto* is not considered as one.

From the content of this section, it becomes evident that the co-occurrence of modal markers in Latin has been acknowledged in the literature, encompassing a range of marker types and modalities. However, it has not yet been the subject of a thorough and, above all, quantitative study. Efforts have been limited to i) testing theories developed based on other languages, as in the case of harmonic and non-harmonic combinations, sometimes not relying on corpus data and ii) citing sporadic examples of individual co-occurrences within specific modal domains, though unveiling potentially enriching research paths.

3.4 Concluding remarks

The overview presented in this chapter shows that although research on the co-occurrence of modal markers is not particularly developed, there are various studies available that follow different types of approaches and that investigate this phenomenon in various languages. However, systematic studies on the co-occurrence in Latin are still missing. Marginal mentions to specific co-occurrences can be found in e.g. Núñez (1991), Schrickx (2011) and Pinkster (2021) on the co-occurrence of epistemic adverbs; in Orlandini (2001), for the co-occurrence of *oportet* ‘it ought, it is necessary’ with deontic markers, in particular *necesse est* (this study will be discussed in more detail in Chapter 8).

The early theoretical considerations on this type of phenomenon were quite limited to the domain of epistemic modality (Lyons 1977; Coates 1983; Sueur 1978). More recent studies such as Nuyts (2004), Narrog (2009) and Kratochvílová (2018) have broadened the focus to the other modality types such as dynamic and deontic. The co-occurrence of epistemic modal adverbs and verbs is the first (Halliday 1970) and probably most studied type of combination between modal markers (Halliday 1970; Lyons 1977; Coates 1983; Hütsch 2020). However, subsequent studies moved the focus onto other types of modal markers, such as adjectives, nouns (Nuyts 2004) and verbal mood (Kratochvílová 2018; Narrog 2005).

As shown in Chapter 2, there is a great terminological discrepancy within the scientific community about the definition of the modal categories, making it difficult to compare different studies. However, from the list of studies outlined in this research, the following conclusions can be drawn.

With regard to the theoretical reflection on the semantic analysis of the co-occurrence, a shared assumption in all studies is that the co-occurrence somehow determines i) the selection of specific markers over others and ii) (a selection of) modal senses over others. In general, all the studies target co-occurrences in which one marker scopes over the other i.e., it projects its modal value over the co-occurring marker. Studying hierarchical co-occurrences can provide additional information on the hierarchical relations between qualification categories, which different theoretical approaches have attempted to identify. Studies that focus on such relations reveal that some types of modality can be embedded by others, but not vice versa, although the hierarchy of qualificational categories seems to be flexible to some extent e.g. dynamic modality in Japanese can embed dynamic modality (Nuyts 2004; Narrog 2009). Within this hierarchy some combinations are not possible e.g. in French (Chu 2008).

Besides their arrangement in modal hierarchies, the combination of specific markers can be used for rhetorical and argumentative purposes (Hütsch 2020). The co-occurrence of modal markers can be used to enact mechanisms of background and foreground to emphasise specific constituents in the clause or arguments (Rossari 2016; Hütsch 2020).

From this survey, limitations of some of the analyses conducted so far have also emerged, particularly concerning the notion of harmonic and non-harmonic combinations of modal markers. As this term emerged early on, and from studies not based on corpus data (Lyons 1977), it seems to overly narrow the concept of modal co-occurrence to the combination of epistemic markers of equal or different degrees. These combinations are almost always hierarchical, although as we have seen, there are mentions of non-hierarchical combinations too (Coates 1983, 42). As I will show in the chapters dedicated to the analysis of the corpus examples, all the limitations of the notion of modal harmony will emerge in the face of a corpus-based study, on a language that has rarely been considered regarding this phenomenon. It will emerge that the hierarchical combinations of epistemic markers, on which the concept of modal harmony has been conceived, are not the most frequent type of co-occurrence. The concept of modal harmony is not suitable to the description of cases in which non-epistemic markers combine hierarchically and, more importantly, in which modal markers combine in non-hierarchical relations. Therefore, it is necessary to overcome this notion and find other ways to describe such relations.

With regard to methodological insights, this overview highlights the added value of using

corpus data, which has now taken hold in modern linguistic research and has been exploited in many of the works listed in this chapter, starting early with Coates (1983) and continuing with e.g. Nuyts (2004), Narrog (2009), Hütsch (2020). Hütsch (2020, 13) underlines the importance of performing a corpus-based study for determining the frequency of each modal form and their different values in real language use. Some of the studies presented in this overview, which yield interesting results, such as Chu's study on the possibility of combining different markers in a process similar to a Markov chain, are based on acceptability judgments, and therefore on introspective data. This practice was fairly common especially before the rise of corpus linguistics. However, relying completely on acceptability judgments can lead to results that might not be entirely representative of the language in real use.

Beyond the higher reliability of the data extracted from a corpus, corpus-based studies allow for analysing the phenomenon also from a quantitative point of view. Nuyts (2004) and Chu (2008), for instance, report that the co-occurrence of modal markers and specific combinations e.g. deontic and epistemic markers in Dutch are especially rare in the corpus. Moreover, relying on corpora enables the application of statistical methods that can provide information on the use of a form in context, as well as its combinatorial possibilities. The corpus allows for identifying combinations that are particularly significant in the language as it is represented in the corpus itself. The quantitative approach can then be used to guide the qualitative analysis (Hütsch 2020).

What has not been investigated so far in a systematic way, and what I intend to explore with this study is whether the co-occurrence of modal markers in a historical language like Latin shares some of the features observed in other languages: is it a widespread phenomenon in Latin? Do the hierarchical relationships between different types of modality in Latin align with what has been observed e.g. in Nuyts 2004 or Narrog 2009? Are there uses of modal markers in co-occurrence that could be read on the argumentative plan? The survey illustrated in the previous section shows that prospects are promising: a more in-depth and systematic study of the co-occurrence of Latin modal markers can offer several advantages. Some of them have been mentioned for studies on other languages. The functioning of hierarchical relationships between different modal categories has never been observed in Latin, aside from sporadic observations on the use of epistemic adverbs. Furthermore, this research could contribute to exploring i) the uses of co-occurrence for argumentative purposes, which have been briefly mentioned e.g. regarding the contrastive use of epistemic adverbs belonging to different degrees on the epistemic scale, and ii) the subtler semantic differences between inherently polyfunctional verbs and, in some cases, highly vague ones, especially for a language where we cannot rely on the assessment of native speakers.

4 Data: corpus construction and co-occurrence retrieval

4.1 Latin as a text language

Popular definitions that have been used to refer to historical languages such as Latin are ‘corpus language’, ‘dead language’ or ‘classical language’. The notion of dead language has been widely criticised because of its ambiguity with the notion of language death (Crystal 2002, 1; Dell’Oro 2023a, 67). The term corpus language has perhaps received more support in literature e.g. see Langslow (2002, 23–24) and Cuzzolin (2019, 6). However, as observed by Dell’Oro (2023a, 67), the centrality of the notion of corpus in such definition might be misleading: the notion of corpus simply indicates a more or less extensive collection of texts (written texts in this case), which is usually the result of a selection, but is not directly related to the lack of speakers as direct sources; moreover, any language for which a corpus exists, including the most recent stages of a language that is still spoken, would fall within the definition of a corpus language. Finally, the definition of Latin as a classical language does not appear to be entirely appropriate as the Latin language is not unitary: it has evolved through various stages, leading to changes in its lexicon and morpho-syntactic structures. Furthermore, the diverse registers and genres should also be taken into account. Hence, the definition of Latin as a classical language is, if anything, rather restrictive.

A more convincing definition was advanced by Fleischmann (2000, 33–34), who suggested the term ‘text language’, in order to describe all those languages that can only be studied by relying on written attestations because of the lack of living informants. The definition of historical languages such as Latin as a text language unambiguously emphasises the role of written texts as the only source of knowledge on such languages.

4.1.1 The digital resources for Latin

Among text languages, Latin is probably the best endowed one in terms of digital and computational resources. Krawer (2003, 11) defines the ‘Basic LAnguage Resource Kit’ (BLARK)

as the required “minimal set of language resources that is necessary to do any precompetitive research and education at all”. This set includes, among others, linguistic corpora (written and spoken), dictionaries, NLP tools for language processing such as lemmatisers and morphological taggers as well as parsers. Compared to other historical languages, the set of resources for Latin is more developed and is still growing (Passarotti 2010; Piotrowski 2012; Sprugnoli et al. 2022).¹ The first digital corpus was indeed the *Index Thomisticus* (Busa 1974–1980), that is the complete collection of texts written by Thomas Aquinas, for a total of 11 million tokens. The work of Father Busa is traditionally said to have paved the way to computational linguistics and corpus linguistics. Concerning digital resources, Latin can count on a number of digital searchable collections of texts. The main ones are the Perseus Digital Library (Smith, Rydberg-Cox, and Crane 2000), the Library of Latin Texts (LLT, 2005) and the Bibliotheca Teubneriana Latina Online, an online database that collects all editions of Latin texts published in the *Bibliotheca scriptorum Graecorum et Latinorum Teubneriana*. These are collections of raw texts, meaning that the text is not enriched with any linguistic data (such as the lemma of a word form, its part of speech, or the syntactic dependencies in a sentence). Therefore, they can only be used for queries based on word forms. However, to conduct certain types of studies such as the one described here, it is necessary to have access to texts enriched with a certain level of linguistic annotation. The required level of annotation depends on the research topic.

Linguistic annotation can be performed on various hierarchically ordered levels. Lemmatisation assigns each token to its lemma; PoS-tagging and morphological annotation assign each token to a part of speech and enrich it with information about its morphology e.g. for nouns it specifies the categories of case, number, gender; parsing determines the syntactic relations between the sentence constituents. A corpus annotated to the syntactic level is called a treebank. In recent years the research community is increasingly encouraged to adopt an annotation standard, shared by all languages and the resources for those languages, so as to foster exchange within the research community through the interoperability of such resources. Central to this movement is the Universal Dependencies (UD, Nivre et al. 2017) initiative, which is responsible for establishing and maintaining this standard. UD also stores treebanks for over 100 languages. The treebanks for Latin are the Index Thomisticus Treebank (ITTB, Passarotti 2019), which currently collects a subset of the *Index Thomisticus* by Thomas Aquinas; the PROIEL treebank (Eckhoff et al. 2018), collecting texts from Caesar, Cicero and Palladius, as well as most of the *Vulgata*; the PERSEUS treebank (Bamman and Crane

¹ The only historical language that comes close to Latin in terms of availability of digital and computational resources is ancient Greek. For this language there are digital collections e.g. the ancient Greek section of the Perseus Digital Library (Smith, Rydberg-Cox, and Crane 2000); annotated resources e.g. the Ancient Greek Dependency Treebank (Bamman and Crane 2011); a few automatic annotation tools such as the TreeTagger parameter files for ancient Greek (Schmid 1994) and the Classical Language Toolkit (CLTK, Johnson et al. 2021), both also available for Latin (see further in this section).

2007), containing Classical Latin texts; the Late Latin Charter Treebank (LLCT), containing Early Medieval Latin original documents (charters) written in Tuscia (modern Tuscany), Italy, between 774 and 897 CE (Cecchini, Korkiakangas, and Passarotti 2020); the UDante treebank (Cecchini, Passarotti, and Sprugnoli 2020), containing the texts written in Latin by Dante. Other annotated corpora are the Opera Latina (Denooz 2007), manually annotated at the *Laboratoire d'Analyse Statistique des Langues Anciennes* (LASLA) of the University of Liège; the LatinISE corpus (McGillivray and Kilgarriff 2013), available on the SketchEngine platform (Kilgarriff et al. 2014). Finally, the WoPoss project provides a diachronic corpus of Latin texts in which modal passages are manually annotated in accordance with the *Guidelines for annotation* (Dell'Oro 2023b). The annotation is performed on the platform Inception (Klie et al. 2018). The annotators read the text on the platform, and whenever they find a modal marker they determine if the marker is modal in context, its modal value (if applicable), its scope and the modal relation between the marker and the scope. Information about lemmas, PoS and morphological features is added automatically with the Stanza parser (Qi et al. 2020), before manual annotation. The results of the automatic annotation are manually checked by the annotators in correspondence of all the modal passages. In the last release of the corpus (March 2022), a selection of Latin inscriptions of the Republican age annotated with modality was added to the previously annotated texts. Selected texts from the corpus are available in open access and can be searched through the project interface (Dell'Oro 2022).

All the resources mentioned above were manually annotated to a certain level, if not completely.² Manual annotation is fundamental for creating linguistically annotated datasets of high quality (the so-called gold standard), which can be used to train and test automatic annotation tools. Latin can rely on a number of resources for automatic annotation at multiple levels. The latest edition of EvaLatin (Sprugnoli et al. 2022) has seen Latin lemmatisers reach an accuracy of around 93%, whereas PoS taggers have scored 95–97%. Syntactic parsing in Latin is still a challenging task. Among the available parsers for Latin we can mention UD-PIPE (Straka 2018), ALP (A Latin Parser) (Michiels 2022), developed by the LASLA team, the Stanza parser (Qi et al. 2020).

After having given an overview of existing digital resources for Latin, the rest of this chapter will be dedicated to the description of the data collected to perform this study, as well as the workflow, tools and methods that I have used to build the dataset on which I performed this study.

² The conversion of the three treebanks for Latin ITTB, PROIEL and PERSEUS from their original annotation style to the UD standard was performed automatically (Cecchini et al. 2018).

4.2 The corpus

This study was performed on a corpus of Classical Latin texts, referring to a chronological span which goes from the ca. 90 BCE to the 14 CE (Cuzzolin and Haverling 2009, 20). Classical Latin was chosen to be the focus of this study for different reasons. As it was shown in Chapter 3, research work on the co-occurrence of modal markers in Latin is limited to brief mentions within the context of studies on specific markers or other topics e.g. the language of the *tabellae defixionum* (Urbanová and Cuzzolin 2016). To my knowledge, dedicated studies on this topic do not exist at the present moment. This work aims to be the first systematic, though exploratory study on this phenomenon in Latin, combining quantitative and qualitative methods. In the Classical period as defined at the beginning of this section, the awareness of the existence of linguistic registers emerges, and the main features of the different literary genres are established (Mazzini 2007, 109; Cuzzolin and Haverling 2009, 49). Under the influence of Greek culture, which not only permeated the Latin culture but also made incursions in the Latin language with many borrowings and calques, the need to consolidate the Roman identity by (also) establishing a language standard to be used in literary, technical and philosophical texts grew steadily (Clackson and Horrocks 2007, 184). This standard was identified with the Latin spoken by the higher classes of the late Republic, and grammatical and stylistic rules were established (or consolidated) to define the standard and distinguish it from the Latin spoken by lower classes (*peregrinus* o *rusticus sermo*) (Rosén 1999, 14). These rules were established by looking at the contemporary cultural and literary landscape, and by making a selection of literary texts and authors that would correspond to this ideal of standard Latin language (Mazzini 2007, 99). In general, the literary production of Cicero and other authors from this period such as Caesar) was fundamental in the process of standardisation of the Latin language, building the foundations for grammar and style. The prose of Cicero in particular started being regarded as the 'best practice' for the literary language and written composition (Clackson and Horrocks 2007, 183; Clackson 2008, 74). Cicero himself made explicit observations on the necessity of preferring certain linguistic formulations over others e.g. in his *De oratore* (Mazzini 2007). It is also worth mentioning the first grammatical treatise to our knowledge, Varro's *De lingua latina* (43 BC), where the author laid the foundations for the rules of 'good Latin', spanning from phonetics to syntax. The scenario just described contributed to the preservation of standard Classical Latin in the following ages in a sort of crystallised state, which will be used and regarded until the Renaissance and Carolingian period as the good Latin (Rosén 1999, 11–14; Clackson and Horrocks 2007, 183–184).

In light of what has been described so far, Classical Latin seems to represent an ideal starting point for determining the nature of sentence-level interactions among markers in Latin. The stage of the language and type of texts chosen for the corpus are closely scrutinised in

Genre	Author	Text	Size
Letters	Cicero	Epistulae ad familiares	118k tokens
Historiography	Caesar	Commentarii de bello Gallico Commentarii de bello civili	128k tokens
	Sallust	De Catilinae coniuratione Bellum Iugurthinum	
	Unknown	Bellum Africanum	
Treatise	Varro	De re rustica	123k tokens
	Vitruvius	De architectura	
	Unknown	Rhetorica ad Herennium	
Oratory	Cicero	Philippicae	118k tokens
	Seneca the Elder	Controversiae	
Total number of tokens			492k tokens

TABLE 4.1: Texts in the corpus, with author and genre.

terms of grammar and style, and had a long-term impact on subsequent written production. Studying the co-occurrence on the texts included in this corpus paves the way to future diachronic research to determine whether and how this phenomenon changes in the stages of the language preceding and following the time-span chosen for this study. Additional research pathways may deepen aspects of variation related to linguistic register, literary genre and author, by expanding the corpus with other types of texts, e.g. theatre pieces.

The choice of Classical Latin also brings an advantage in terms of constructing the corpus. This stage of the language encompasses a wide range of literary works: therefore, it represents a great source of textual data, allowing for the construction of a corpus as balanced as possible between different genres and authors.

Table 4.1 shows the texts included in the corpus, together with their size in terms of number of tokens and the genre to which they belong. The corpus contains around 492k tokens, and the selection of texts was designed to maintain as much as possible the balance among different genres. For this reason, the set of texts chosen for each genre contains between 118k and 128k tokens.

The corpus includes texts that belong to four different literary genres: epistolography, historiography, treatise and oratory. Each genre is represented by the following works: for letters, Cicero's (and his correspondents) *Epistulae ad familiares*—some of the letters being the most ancient texts in the corpus; for historiography, Caesar's *Commentarii de bello Gallico* and *Commentarii de bello civili*, Sallust's *Bellum Catilinae* and *Bellum Iugurthinum*, and the *Bellum Hispaniense* of unknown author; for treatise, Vitruvius' *De architectura*, Varro's *De re rustica*,

and the *Rhetorica ad Herennium* of unknown author; finally, for oratory, Cicero's *Philippicae* and Seneca the Elder's *Controversiae*—the latter being the most recent text in the corpus³.

As mentioned earlier, the choice of texts included in the corpus was driven by an attempt to respect the criterion of quantitative balance. For this reason, I aimed at having roughly the same number of tokens for each genre and to vary the authors as much as possible within both single literary genres and the corpus as a whole. This led to the decision to include some texts over others in the various subsections of the corpus. The writings of Cicero, for instance, presents a wealth of texts that span over various genres. Given the role that he played in shaping the grammatical and stylistic form of Classical Latin, as described above, Cicero needed to be included in the selection of texts for the corpus. Furthermore, his corpus of letters represents the first work that we can read for this genre in Latin literature. To account for his fundamental contribution both in terms of literary genres and the meticulous use of language, Cicero is present in the corpus with the *Epistulae ad familiares* for the genre of letter, and with the *Philippicae* for oratory. However, including all or a significant portion of Cicero's in the corpus works would have led to a significant imbalance in the corpus concerning authors. This is why the genre of oratory was complemented with the *Controversiae* by Seneca, even though, as explained in note 3 (page 138), they do not perfectly align with the chronological span considered in this study. For the same reason of balance among the authors included in the corpus, I have considered the works of Varro and Vitruvius, including the anonymous *Rhetorica ad Herennium* for the genre of treatise. Finally, within the historiographical genre, I included Caesar as he too, was taken as a model already in classical times and in subsequent stages for introducing the genre of historical chronicle and for the use of a very regular and straightforward language. The choice of Caesar (and of the *Bellum Africum*, which imitates its style) was complemented by including Sallust's *De Catilinae coniuratione* and *Bellum Iugurthinum*, in order to add two works of the same genre but with a more sustained style and a more complex vocabulary e.g. rich in archaisms (see the next section for the description of each work).⁴ This corpus retains a good potential for

³ The exact date for the *Controversiae* is not certain. Seneca the Elder died before 41 CE (Fairweather 1981, 41), which represents the *terminus ante quem* to date this work. This means that some (we do not know how many) of the *controversiae* exceed the span of time adopted here to define Classical Latin. However, in order to respect the principle of balance mentioned above, I decided to include the text in its entirety, considering that i) the majority of the *controversiae* were presumably written before 14 CE (Mazzini 2007, 150), ii) it is reasonable to assume that the language and style of the texts that might exceed the chronological framework chosen are fairly homogeneous with to the rest of the work to which they belong, and iii) the possible heterogeneity of language and style in the later *controversiae* would be balanced out by the volume of earlier ones.

⁴ I was pointed out by a member of the jury that the corpus does not include a significant source for the historiographical genre, namely Titus Livius' *Ab urbe condita*. I would like to thank the jury for this comment. I completely agree with the relevance of including this author in a corpus (or a subcorpus) of historiographical texts. While building the corpus for this study, I aimed to keep the number of tokens for each genre within the range of 118k-128k tokens, in order to be able to compare different genres and not create a quantitative bias toward a specific genre. The choice to include Caesar and then Sallust has led to the exclusion of Livius,

expansion to include other authors and works, in order to enhance its representativeness, which in this case was sacrificed in favour of balance.

Furthermore, the inclusion of various genres allows for determining the presence of possible co-occurrence trends associated with a specific genre, topic, or type of discourse. If one of more trends are proven to be present, this enables determining whether and how the use of modality, and especially the contrasts that sometimes arise from the use of different modalities in co-occurrence, can enhance the argumentative strength of a specific type of discourse, or contribute enriching the style of a literary work. As will be observed later on, perhaps due to the limited size of the subcorpora for each genre, particularly clear co-occurrence trends could not be delineated. However, especially regarding its argumentative use, the co-occurrence of the two subtypes of deontic modality seems to be a sort of established argumentative expedient in the genre of the *Controversiae* by Seneca the Elder.

4.3 Brief overview of the works included in the corpus

In order to guide the reader on the type of texts that they will encounter, especially in the presentation of examples with co-occurrence (chapters 6, 7 and 8), I will provide in this section a brief synopsis for each work included in the corpus. The texts are presented grouped by author and trying to respect the chronological order as much as possible.

4.3.1 Unknown author, *Rhetorica ad Herennium*

The *Rhetorica ad Herennium* is a treatise about the art of rhetoric, and it represents the first complete work about the art of rhetoric in the Roman world that we have. In medieval times the treatise was thought to have been written by Cicero. But Cicero does not refer to such writing ever, nor his successors such as Quintilian, and Gellius among others. Moreover the style and contents of the *Rhetorica* do not suggest the attribution of this work to Cicero. Thus the *Rhetorica* still remains anonymous to this time. The date of composition is probably around 85 BCE. This work, which is divided into four books, provides a detailed examination of all the technical aspects involved in delivering an effective speech. It discusses throughout the four books the five skills that a good orator should acquire i) invention (*inventio*): choosing and developing the arguments to prove a case; ii) disposition (*dispositio*): organising the material in a convincing and effective way; iii) style (*elocutio*): choosing the right words to deliver a speech (a rich inventory of rhetorical figures is provided); iv) memory (*memoria*): exploit mnemotechnical strategies to retain the speech; and v) delivery (*pronuntiatio*): adequate use of voice, gestures, pauses. The language and style

which would have led to an imbalance in the historiographic section of the corpus. However, I plan to include this and other authors in future improved and expanded versions of the corpus.

preserve the technical nature of this work, mainly aiming at clarity and systematicity (Caplan 1954, xlv–lviii; Calboli 2020, 132–151).

4.3.2 Cicero *Epistulae ad familiares*

The *Epistulae ad familiares* is a collection of letters written by the Roman statesman and orator Marcus Tullius Cicero to his friends and associates. The letters date from 62 to 43 century BCE and are collected in sixteen books. Together with the *Epistulae ad Atticus* and the *Epistulae ad Quintum fratrem*, they belong to the corpus of Cicero's correspondence that has come down to us. The letters cover a wide range of topics, including politics, philosophy, literature, personal matters, and advice on public speaking. They were not intended for publication when Cicero wrote them, thus they reflect the true spirit of the author: sometimes they are cheerful, others they reveal his concerns about the political situation, or they cover personal matters. The style is varied. The addressees of the letters are more or less close friends like Trebatius Testa, Caelius, and Papirius Paetus, who were intimate and receive informal letters similar to the ones written to Atticus. But there are also prominent figures of the time such as Cato, Lentulus Spinther, and Appius Claudius to whom Cicero addresses more formal letters, controlled in style. As the letters were written for private exchange, the language is also less controlled: there are often elliptical constructions, and a frequent use of parataxis, with Grecism and colloquialisms (Conte 1994, 202–203; Schackelton Bayley 2001a, 1–3).

4.3.3 Caesar *Commentarii de bello Gallico* and *de bello civili*

The *Commentarii de bello Gallico* is an account of the Gallic campaign led by Julius Caesar from 58 to 52 BCE. The date of composition is debated. It is possible that Caesar wrote each book at the end of each year, or that the whole *Commentarii* were completed between 51 and 52 BCE. However, they were probably published no later than 51 BCE (Edwards 1917, xv–xvi; Conte 1994, 227). This work is divided into seven books, one for each year of the war. Caesar gives an account of the campaigns against the various people that lived in Gaul and their leaders, and concludes with the victory on Vercingetorix, king of the Averni, which ends the Gallic resistance. The genre of the *commentarius* lies somewhere between first-hand sources e.g. personal notes, reports, and an elaborated, stylistically curated account of the events reconstructed from the sources i.e., the genre of *historia*. The style of the *Commentarii* is known for being clear, simple, avoiding stylistic complexity and striking rhetorical effects. Nonetheless, the style seems to get sometimes closer to the genre of the *historia*, when the account of events is dramatised to enhance the narrative pace. The vocabulary also seems to evolve in the second part of the work, where Caesar tends to a greater lexical variation,

avoiding repetitions that were recurrent in the first part (Edwards 1917, x–xiv; Conte 1994, 226–227).

The *Commentarii de bello civili* is another historical account written by Julius Caesar. It narrates in three books the beginning of the Roman civil war that took place between 49 and 45 BCE focusing on the conflict between Caesar and Pompeius. The first two books cover the events of 49 BCE and the third covers 48 BCE. The date of composition of this work is highly debated, especially because the work seems unfinished: for instance, at the end of the third book the author introduces the war in Alexandria but never completed the narrative. However, the work is generally believed to have been composed between 47 and 46 BCE (Conte 1994, 228; Damon 2016, xxxviii–xxxix). The *Commentarii de bello civili* is largely informed by Caesar's political opinions. It is pervaded by a strong criticism of the ruling class, which is described as corrupt and out of control. Compared to them, Caesar presents himself as the one who has always been law-abiding, and as a commander who is respectful of the defeated enemy, and loyal and affectionate towards his troops. The form and style are comparable to the *Commentarii de bello Gallico*, with a clear and simple prose and lexicon (Conte 1994, 228–229; Damon 2016, xxxvi–xxxix).

4.3.4 Unknown author, *Bellum Africanum*

The *Bellum Africanum* is an account of the African War, a series of military conflicts that occurred in the 1st century BC between the Roman Republic and the North African kingdom of Numidia. The work focuses in particular on the events between 47 and 46 BCE, when the king of Numidia is defeated in Thapsus and his reign is annexed as a province (Gaertner 2017, 268). The authorship of this work remains unknown to this day, as for the other two works that belong to the *Corpus Caesarianum* (*Bellum Alexandrinum* and *Bellum Hispaniense*). These texts have long been attributed to Caesar, but it is now certain that they were written by other three anonymous authors. The *Bellum Africanum* is probably to be attributed to a soldier who was on spot during the narrated events (Way 1955, 141). Similarly, we do not know the exact date of composition of these works, although it is supposed to be around 50 BCE (Danckaert 2017, 88). The style of the *Bellum Africanum* follows the model of the *commentarii* described for Caesar's work, although it maintains the stylistic sobriety traditionally demanded by this genre more faithfully compared to Caesar (Conte 1994, 230).

4.3.5 Cicero, *Philippicae*

The *Philippicae* is a series of political speeches delivered by Cicero in 44 and 43 BC against Marcus Antonius, and is the largest collection of speeches delivered by Cicero and collected under a single title. Cicero's intent was to attack him and convince the Senate to declare war

on him, bringing Octavianus, Caesar's heir, under its protection. The title is inspired from the speeches that Demosthenes gave against Philip II of Macedon, and used by Cicero in his private letters to Marcus Brutus (*Epistulae ad Brutum*). The corpus of the *Philippicae* contains fourteen speeches, in which Cicero attacks Marcus Antonius for corruption, tyranny and betrayal of the Roman Republic. The speeches are highly persuasive and Cicero relies on emotive language to take hold on the audience and paint Marcus Antonius in the worst terms, as a tyrant, a drunkard (Conte 1994, 184–185; Ramsey and Manuwald 2010, xvii–xviii).

4.3.6 Sallust *De Catilinae coniuratione* and *Bellum Iugurthinum*

The *De Catilinae coniuratione* is a historical account of the conspiracy led by Catilina in 63 BCE and its subsequent suppression by the consul Cicero, until Catilina's death in 61 BCE. It was written by the Roman historian Gaius Sallustius Crispus, commonly known as Sallust. The date of composition of this work is debated. The *De Catilinae coniuratione* is most probably the first work written by Sallust before the *Bellum Iugurthinum*, and the two were certainly written before the ambitious project of the *Historiae*. Therefore, it should be dated between 42 and 41 BCE (Carew and Ramsey 2013, xxxii). Catilina is portrayed as a corrupt man, who takes advantage of a general decline of morals in the Roman Empire to grow a group of supporters and try to overturn the government.

The *Bellum Iugurthinum* is a historical account of the events concerning the war between Rome and Jugurtha, the king of Numidia, from 111 to 105 BC. This work was written by Sallust after the *De Catilinae coniuratione*, around 40 BCE. At the end of the war, Jugurtha is handed over to Rome by a betrayer, Bocchus king of Mauretania. As in the *De Catilinae coniuratione*, the work insists especially on the corruption and moral decay of the aristocratic class, that Sallust saw as contributing factors to the decline of the Roman Republic. The figure of Jugurtha is emblematic in this respect: contrarily to the treatment of the figure of Catilina, Jugurtha is presented as a character that progressively becomes corrupt, due to the contact with Roman aristocracy during the siege in Africa. In the *Bellum Iugurthinum*, Sallust also emphasizes the role of individual leaders, in particular the tribune Memmius and the Roman general Gaius Marius.

The style of the historiographic works by Sallust is characterised by the use of antithesis, asymmetry and variation. There are frequent ellipses and asyndeton and the text is rich in archaisms, especially concerning the lexicon and a preferred use of parataxis (Conte 1994, 235–242; Carew and Ramsey 2013, xxxi–xl).

4.3.7 Varro *De re rustica*

The *De re rustica* is a treatise on agriculture written by the Roman writer Marcus Terentius Varro. This work was written in 37 BCE, when Varro had already reached an old age. It is divided in three books and it is developed in the form of a dialogue. This treatise has been considered as highly influential since ancient times for the rich amount of information about the world of agriculture. It covers a wide range of practical topics, organised in the three books: general knowledge about agriculture e.g. management of the land, irrigation, planting etc.; livestock; managing aviaries, fishponds and barnyard animals. It also gives an account of the history of agriculture and the socio-economic aspects of agriculture in Rome. The style is sometimes quite difficult. Varro often uses complex syntactic structures with inversions and many subordinates, as well as frequent technical terms (Hooper and Ash 1934, xvi–xvii; Conte 1994, 218–219).

4.3.8 Vitruvius *De architectura*

The *De architectura* is a treatise written by the Roman architect Vitruvius. This work covers in ten books a wide range of topics, such as locations apt for building, materials, construction techniques. It also gives precise indications on specific structures such as sacred, public and private buildings. Finally, it deals with hydraulics, sundials, mechanics and construction of war machines (Vitruvius was an expert on the latter, to the point that Caesar entrusted him with the construction of war machines). The treatise was composed, as Vitruvius himself mentions, between 27 and 23 BCE. Vitruvius dedicates part of this work to illustrate the qualities of a good architect, who should have a rich education, comprising knowledge of acoustics, optics, medicine, technical abilities such as drawing, and especially philosophy. As for the *De re rustica* by Varro for agriculture, the *De architectura* has also been an influential work for architecture, where Vitruvius introduced theories about proportions and symmetry that have impacted this field of expertise to present times. The *De architectura* has a plain and simple syntax. Vitruvius often uses technical expressions, and the lexicon is rich of Greek borrowings. Each chapter is preceded by an introduction, in which the author lays the groundwork for the topics that will be addressed in the chapter and gives an outline of the section. The style of the introduction is richer in rhetorical figures and he avoids technicisms and borrowings in the lexicon (Granger 1931, ix–xvi; Conte 1994, 387–388).

4.3.9 Seneca the Elder, *Controversiae*

The *Controversiae* is a collection of fictitious but more or less verisimilar legal cases written by Seneca the Elder, a Roman rhetorician and father of the philosopher Seneca the Younger. We do not know the date of publication of the *Controversiae*. They were certainly written

before the *Suasoriae*, and the death of Seneca the Elder in 41 CE represents the *terminus ante quem* to date their composition (cf. footnote 3 in Chapter 4, page 138). The genre of the *controversia* is a rhetorical exercise which consists of the declamation of a trial, with opposing sides presenting arguments and counterarguments to their theses. The *Controversiae* are divided in ten books, and each book contains a varying number of legal cases, where fictional characters debate on a specific topic and discuss who should be declared right among the disputants, based on the principles of law and equity, and on their contrast. The debate between the invented characters is meant to be a model for students in schools of rhetoric or law on how to construct an effective argument. The cases covered by the *Controversiae* concern a wide range of legal topics, including inheritance, property rights, marriage, and contracts. They are not always based on the Roman juridical system: legal procedures are sometimes presented that do not exist in the Latin world, and were borrowed from the Greek juridical system (Bonner 1949; Winterbottom 1974a, xvi–xix; Conte 1994, 404–405; Mazzini 2007, 150).

The selection of texts contained in the corpus will first let me grasp a general understanding of the phenomenon of the co-occurrence of modal markers in Classical Latin, within the four genres represented in the corpus. Then, it will allow the comparison between different genres, while keeping the diachronic variable stable. I will determine if it is possible to identify some trends of co-occurrence within the genres, highlighting differences not only due to the subject discussed in each work but also to the type of style adopted by the author. In this regard, it can be anticipated that the co-occurrence of modal marker is observed with lower frequency in historical texts, while in argumentative ones, especially in Seneca's controversies, it is more systematically used as a rhetorical tool to juxtapose two fundamental notions discussed in the debate.

4.4 Building the corpus

The corpus was built in a sequence of steps. The first one was retrieving the texts in a digital format. The texts come from different sources: the Perseus Digital Library (Smith, Rydberg-Cox, and Crane 2000); the Latin Library⁵; the *Bibliotheca Augustana*⁶. The texts gathered from these sources are based on the following editions⁷:

⁵ <https://www.thelatinlibrary.com/index.html>

⁶ <https://www.hs-augsburg.de/~harsch/augustana.html>

⁷ For Varro's *De re rustica* and Vitruvius' *De architectura* I could not retrieve any information about the edition of the text published online. I am also aware that the editions used for the construction of the corpus are rather outdated. This is due to the need to access online texts in digital format that could therefore be processed and treated without resorting to OCR techniques. I also needed to be able to publish them online (citing the source), in my case in an open GitHub repository. Unfortunately, the texts available online often belong to editions that are outdated, as the more recent ones are not available for free use due to copyright issues. Each

- *Epistulae ad familiares*: Purser 1901;
- *Commentarii de bello Gallico*: Holmes 1914;
- *Commentarii de bello civili*: Du Pontet 1901;
- *Bellum Catilinae* and *Bellum Iugurthinum*: Ahlberg 1919;
- *Bellum Africanum*: Du Pontet 1901;
- *Rhetorica ad Herennium*: Marx 1894;
- *Philippicae*: Curtis Clark 1918;
- *Controversiae*: Kiessling 1872.

The digital texts downloaded from the online resources were either in XML (*Perseus*) or HTML (*Latin Library* and *Bibliotheca Augustana*) format. The most convenient input format for the automatic annotation of the texts is raw text, or TXT. Therefore, the files were first preprocessed by removing the XML and HTML tags and converted into TXT files. This operation was performed by using a series of Regular Expressions (RegEx) in the Oxygen XML editor.⁸ Once converted into clean TXT files, the texts were annotated with Stanza (Qi et al. 2020), a parser developed by the Stanford NLP group. Stanza offers different models for Latin. The model chosen for the annotation of the corpus is the one trained on the ITTB, as it has the best accuracy score on the lemmatisation task. The performance score for the Stanza parser with the ITTB model is in fact 99.07 for lemmatisation, and 80.79 for sentence segmentation.⁹ In fact, as I will explain in the next section, the lemmatisation is a key information for the co-occurrence retrieval. At the end of the automatic annotation, the following linguistic information is added to the texts in the corpus: lemma, part of speech, morphological annotation, sentence segmentation and syntactic annotation. Lemmatisation and sentence segmentation are the two types of information exploited to retrieve the modal markers in co-occurrence in the corpus.

4.5 Co-occurrence retrieval

As stated in the Introduction, the aim of this study is to observe the relations between modal markers at the sentence level. The sentence here is defined as the portion of text delimited

passage with co-occurrence was checked against the following editions from the Loeb library: Schackelton Bayley 2001a, 2001b; Carew and Ramsey 2013; Way 1955; Hooper and Ash 1934; Granger 1931 Granger 1934; Caplan 1954; Ramsey and Manuwald 2010; Schackelton Bayley, Ramsey, and Manuwald 2010; Winterbottom 1974b.

⁸ <https://www.oxygenxml.com/>

⁹ Model performances available at <https://stanfordnlp.github.io/stanza/performance.html>

by a strong punctuation sign i.e., period, exclamation or punctuation mark, and, in specific cases, semicolon and the colon. The choice of this type of segmentation is partly due to the behavior of the parser, which follows the conventions of dependency syntactic annotation. Gradually adopted in linguistic resources since 1990s and now widespread in the creation of NLP tools and treebanks, Dependency Grammar (Ágel and Fischer 2015) is the commonly adopted type of syntactic representation at present times. In this framework, the sentence is represented by a syntactic tree, whose nodes correspond each to a word form of the sentence. The nodes are all involved in binary, hierarchical relationships. The only exception is the top node i.e., the syntactic head which governs the whole tree. The syntactic head constitutes the parent node from which the other nodes depend at different levels of depth in the syntactic tree. Different standards exist for syntactic dependency annotation. The most widespread is UD, mentioned earlier in this chapter, which identifies the syntactic head with the main predicate of the sentence. When a syntactic head is recognised beyond the punctuation mark, a new syntactic tree is created with the main verb as the syntactic head.

It is worth clarifying that using punctuation to identify sentence segments and therefore the co-occurrence represents to some extent a limitation of this study for two reasons. The first reason is that punctuation was introduced later on, sometimes in manuscripts that have transmitted the text to us (Gibson 2011, 56), or by the authors of modern critical editions of those texts (Heyworth 2007, liii). Therefore, the use of punctuation that we find in the reference editions reflects a modern approach to the text (Gibson 2011, 55–56), and we cannot be certain of the original intention of the author of the text. The second issue is that punctuation may change depending on the edition used as a reference for the text. In some cases, the editions from the Loeb library (see footnote 7 above) differ from the editions used for the construction of the corpus. Such cases of inconsistency will be indicated in a footnote.

The output of the automatic annotation with the Stanza parser is a CoNLL-U file¹⁰. This type of file format is an extended and revised version of the format CoNLL-X, one of the outcomes of the shared task on multilingual dependency parsing hosted during the CoNLL Conference in 2007 (Nivre et al. 2007). In the CoNLL-U format, all the sentences of a text are in the same file, separated by a blank line. Each token (i.e., word form) of the sentence is represented on one line, and it is assigned linguistic information in ten different fields, separated from each other by single tab characters. In the ten fields information is given, among others, about the token's ID, word form, lemma, part-of-speech tag, morphological features, syntactic dependencies. An example is given in Figure 4.1¹¹, which shows the linguistic annotation of the passage from Vitruvius' *De architectura*, illustrated in example 192.

¹⁰ <https://universaldependencies.org/format.html>

¹¹ A more readable version of the CoNLL-U is presented in Figure A.1 in the Appendix, page 300

- Moreover, philosophy explains the nature of things (which in Greek is called φιλοσοφία). (Vitruvius, *De architectura* 1, 7)

[illegible]

file.

Whenever a marker is met, the program looks for a co-occurring marker in the same sentence. If a co-occurrence is found, the sentences are printed in output in another file, which is then used for the manual annotation (see Chapter 5).

¹² As mentioned in Chapter 2, the list also includes the markers that are attested in later stages of the language i.e., *indubitate*, *indubitanter*, *illicitus*, *possibilis*, *possibilitas* and *possibiliter*, to make sure that they do not appear in the corpus.

4.6 Some notes on the co-occurrence of more than two markers

The sentences obtained in output from the process described above presented a minimum of two markers, and a maximum of four. The co-occurrence as it is conceived in this work describes a relation between two entities, that is, two modal markers. During the manual annotation of the sentences, combinations of more than two markers were analysed by observing the relation between different couples of co-occurring markers. Let us consider example 193.

- (193) *possunt* *autem*, *si* *opus* *fuert*, *eae* *machinae* *ex* *VIII* *rotis*
 can however if necessary be this machine from eight wheel
esse, *si* *ad* *loci* *naturam* *ita* *opus* *fuert* *temperare*.
 be if to site nature so necessary be adjust

However, if **necessary**, these machines **can** go on eight wheels, if **it were necessary** to adapt them in such way to the site's nature. (Vitruvius, *De architectura* 10, 15)

In this passage, Vitruvius describes the nature of some machines that can be used for working and constructing buildings. In this sentence, three modals co-occur: *possum* and two *opus est* and *opus est*. In cases like the one illustrated by this example, the relationship between the markers is analysed by separate couples: the combination *possum* + *opus est* (the first occurrence); then the combination *possum* + *opus est* (the second occurrence); finally the combination *opus est* + *opus est*. Therefore, for the representation of the co-occurrences and in general for the quantitative analysis, each case of co-occurrence of more than two modal markers was analysed by computing all possible combinations of the markers co-occurring in the sentence. For the qualitative analysis of the passages in Chapters 7 and 8, I will explicitly mention cases of co-occurrence of more than two markers. When relevant, I will also elaborate on the cases in which all of the three markers do have a relation in co-occurrence. This applies to cases such as the one illustrated in example 194, which hosts three occurrences of *fortasse*.

- (194) *Fortasse*, *inquit*, *hanc* *nominavit* *ut* *veros* *conscios* *celaret*, *fortasse*
 perhaps say this name so_that true accomplice hide perhaps
ut, *quia* *acerrume* *instabat* *accusator*, *hoc* *metu* *territus* *finem*
 so_that because harshly press accuser this fear frighten end

tormentis inponeret, **fortasse** nimio dolore tormentorum stupefacta
 torture set perhaps extreme pain torture benumb

nescit quid loqueretur.
 not_know what say

“**Perhaps**,” he said, “she named this girl to hide the true accomplices, or **perhaps** to set an end to the torture by frightening the accuser, as he was pressuring her in an extremely harsh way, **perhaps**, benumbed by the extreme pain of the torture, she did not know what she was saying”. (Seneca the Elder, *Controversiae* 9, 6, 20)

In this passage, the speaker uses three occurrences of *fortasse* to organise his discourse and mark the beginning of his three hypotheses. This type of rhetorical-argumentative use of the co-occurrence, to create emphasis, will be a central topic in Chapter 8. For now, I will just mention that cases of this kind, where all the co-occurring markers are considered for the analysis, will be appropriately highlighted throughout this study.

5 Manual annotation

The sentences hosting a co-occurrence of at least two modal markers that were extracted from the corpus were manually analysed and annotated following a fine-grained annotation schema, in order to provide information on the co-occurrence at different levels. Each level of annotation will be illustrated in this chapter with examples taken from the corpus.

The levels of annotation include:

1. The presence or absence of a modal value in the co-occurring markers i.e., if they are modal or not modal (section 5.1);
2. If modal, the type of modality expressed by each marker in co-occurrence (section 5.1);
3. The semantic scope of each marker (if there is an implied scope, this is specified in parenthesis) (section 5.1)
4. The type of syntactic structure in which the modal markers co-occur (section 5.2);
5. The coordinating or subordinating conjunction linking the two markers (if any) (section 5.2);
6. If there is subordination, specify the type of subordinate clause (section 5.2);
7. Presence or absence of scope hierarchisation (boolean value i.e., yes or no) (section 5.2);
8. If there is scope hierarchisation, the direction of the hierarchisation i.e., which marker and type of modality embeds the other one (section 5.2).

The resulting dataset is a csv file which is available at the following address https://github.com/paoma370/PhD_thesis.

5.1 Marker, type of modality and scope

Before illustrating the difference between a modal and a non-modal meaning in context, I will first introduce the annotation scheme that I used for the analysis.

The analysis of the types of modality was performed building on a simplified version of the annotation schema designed in the framework of the WoPoss project (Dell’Oro 2023b, see also Chapter 2 for a detailed description of the WoPoss annotation schema). The four main modal categories (and subcategories or subtypes) used for the manual annotation are:¹

- Dynamic: a situation of possibility or necessity internal or external to the participant of the state of affairs

(195) *quid enim his melius dici potest?*
 what indeed this better say can

For what **can** be said better than these lines? (Petronius, *Satyricon* 55 5)

- Deontic authority: a permission, recommendation or obligation given by a source of authority

(196) *etiam nobis potestatem fecit, ut mucronem ad buccam*
 also us **possibility** give to edge against cheek
probaremus.
 try

He even gave us the **possibility** to test the edge against our cheek. (Petronius, *Satyricon* 70 3)

- Deontic acceptability: evaluation on the degree of moral desirability of the situation described in the state of affairs

(197) *non debemus delicati esse, ubique medius caelus est.*
 not **have_to** spoiled be everywhere in_the_middle sky be

We **should** not be spoiled, everywhere the sky is the same (*lit.* is in the middle). (Petronius, *Satyricon* 45, 3)

- Epistemic modality: evaluation of the speaker on the likelihood of the situation described in the state of affairs

(198) *certe mea causa peracta est.*
certainly my case accomplish be

My case has **surely** been accomplished. (Petronius, *Satyricon* 122, 175)

¹ All the following examples are extracted from the WoPoss corpus, available at the address <https://woposs.unine.ch/form.html>. The reference edition used for the English translation of the passages is the edition by Schmeling (2020).

It is important to clarify that the notions of possibility and necessity are relevant also for the types of deontic authority (in terms of permission and obligation), deontic acceptability (in terms of the degree of moral acceptability of the situation described in the state of affairs) epistemic modality (based on the evaluation of the truth of the state of affairs by the speaker in terms of possibility or necessity). The degrees of deontic and epistemic modality were not specified during the manual annotation phase. However, they will be relevant for the qualitative analysis of sentences with co-occurrence, in order to capture the relationships that are established between co-occurring modalities (see Chapters 7 and 8).

The interpretation of the modal value of a marker in a passage is not always straightforward. Consider example 199, which presents a modal passage annotated in the WoPoss corpus with the modal verb *licet*.

- (199) *Ergo vivamus, dum licet esse bene.*
 therefore live while be_possible be well

Therefore let's live, while **it is possible** to live well. (Petronius, *Satyricon* 34)

In this sentence, the modal reading of *licet* was annotated as ambiguous between the values of deontic authority (permission) and dynamic possibility (situational) (refer to Chapter 2 for the WoPoss annotation scheme). In fact, both interpretations would be possible. The speaker could be referring to the fact that a higher entity, a god, allows humans on earth, and therefore also the speakers and his fellows, to live happily. But the speaker might also not refer to an entity that supposedly allows or gives humans the right to live a happy life. In this case, he would be alluding to an objective possibility that one can actually lead a good life.

The difficulties in the disambiguation between these two types of modality in the passage illustrated in example 199 are mainly due to the fact that in this case the broader context (even beyond the sentence boundaries) does not allow for the identification with absolute certainty of the type of possibility expressed by the verb *possum*. For the sake of this study I have decided to avoid the possibility of annotating ambiguous modal values, because this would have added too many variables and complicated especially the quantitative analysis of the types of modality in co-occurrence. In cases of ambiguity, I have decided to select one type of modality for the analysis, but to indicate throughout this study whenever a modal reading could fit multiple analyses.

As described in Chapter 2, the marker always refers to a portion of text, onto which it projects its modal value. This portion of text is called 'scope'. The semantic scope of the marker *to be able* in the sentence *I am able to drive* projects its dynamic possibility value onto

the representation *I drive*. When a sentence presents two co-occurring markers, each marker has its own scope, as shown by example 200, extracted from the corpus.²

- (200) *Potest enim esse bellum ut tumultus non sit, tumultus autem*
 can indeed be war to insurrection not be insurrection however
esse sine bello non potest.
 be without war not can

For there **can** be a war in such a way that there would not be an insurrection, but an insurrection **cannot** exist without a war. (Cicero, *Philippicae* 8, 1, 3)

In this sentence the co-occurring markers *possum* and *possum*, both expressing dynamic possibility, have two separate scopes. The scope of the first *possum* is *esse ut tumultus non sit* (with *bellum* 'war' as the participant in the state of affairs); the scope of the second (negated) *possum* is *esse sine bello* (with *tumultus* 'insurrection' as the participant in the state of affairs). In order to facilitate the analysis, the two scopes are transcribed separately for each co-occurring marker.

As it was described above, preliminary to the manual annotation of the co-occurrences on multiple levels is the detection of the presence or absence of a modal value for the markers appearing in the sentences. As mentioned in Chapter 2, in order to be modal a marker needs to scope over a representation, that is, a state of affairs. Consider example 201:

- (201) *Ad quaedam enim nulla nos debet necessitas compellere.*
 towards some indeed none us have_to necessity push

For no **necessity** **should** push us towards some things. (Seneca the Elder, *Controversiae* 7, 2, 9)

The context of this sentence is a debate around the appropriateness of judging someone based on the deeds that he has done in the civil war. The underlying question is: is it fair to condemn someone based on the actions made in such special circumstances, when he was probably forced to behave that way? In this sentence, there is a co-occurrence between the markers *debet* (third person singular, indicative of *debeo*) and *necessitas*. *Debeo* scopes over the SoA *ad quaedam nos compellere* roughly translated as "to oblige us to some things". In this context, the modal verb modalises the SoA with the modal value of deontic acceptability: it

² As it will be discussed later in this and in the following chapters, the relation between the co-occurring markers and their scopes can be more complex. The scope can be shared by both co-occurring markers, and therefore be implied for one of them; or one of the markers can include the other in its own scope, in which case I classify it as scope hierarchisation.

is not morally acceptable to act in a certain way just because a situation of necessity is compelling us to do so. This is the reason why *debet* is translated as ‘should’ and not as ‘have to’, although in the passage it is at the present indicative form. The potential marker *necessitas* in this sentence is the subject of *debet*, and it clearly expresses the situation of necessity, but it does not scope over a representation, that is, there is no SoA. Therefore, *necessitas* in this specific context was annotated as not modal.

Consider now example 202, where *necessitas* is considered modal.

- (202) *Qui honos quamquam est magnus illi aetati, tamen ad*
 which honour although be big this age however to
necessitatem rerum gerendarum, non solum ad dignitatem valet.
 necessity thing conduct not only to value be_effectual

Although this is a big honour for this age, however it serves towards the **necessity** of conducting military operations, not only to prestige. (Cicero, *Philippicae* 5, 16, 47–49)

In this sentence the co-occurring (potentially modal) markers are *necessitas* and *valet*. Although the focus here is on *necessitas*, I will briefly describe the value of *valet*. This marker is a polysemic verb, which can potentially have a modal value of possibility. However, in this context it simply means “serve towards (something)”, and therefore was annotated as not modal in this context. Going back to *necessitas*, unlike example 201, here this modal noun does in fact scope over a SoA, more precisely the representation *rerum gerendam* “(of) conducting military operations”. Accordingly, it was annotated as modal (with modal value of dynamic necessity). As the case of non-modal meanings falls out the scope of my study, I have excluded from the analysis all the co-occurrences in which one (or both) co-occurring markers were not modal.

Before moving on to the syntax of co-occurrence, I will illustrate the methodology for analysing the modal values of the markers in co-occurrence. As mentioned in the Introduction and indicated by several studies outlined in Chapter 3, the fact that two modal markers co-occur can have consequences for the type of modality that they express within the passage. This applies to cases where there is scope hierarchisation, which are the most discussed in literature, as well as those that do not involve it, based on the well-known principle in linguistics that the use of a word is also determined by its linguistic context (Firth 1957). To perform the analysis of a sentence with co-occurrence, I considered the two markers and proceeded in two steps. For the first step, I considered the markers in their relationship with their own scope, that is, one modal passage at a time. In some cases, the co-occurrence did not seem to have any influence on the type of modality expressed by the two markers. In other cases, especially ambiguous ones, the co-occurrence was used as a criterion for evaluation in

the second step of the analysis. The possibility of disambiguating certain modal passages by looking at the other co-occurring modal or modalising elements (if present) is a topic already addressed in the literature: I mentioned Urbanová and Cuzzolin (2016, 334) in Chapter 3 as one of the few works on Latin that marginally refer to cases of co-occurrence. Specifically, they indicate the co-occurrence of multiple modal elements as a possible strategy of disambiguation, in particular with reference to the co-occurrence of a contextually ambiguous *possum* with *permitto* ‘to allow’, clearly a verb expressing deontic authority (permission). A similar direction is taken by Orlandini (2001, 333) regarding the interpretation of *oportet* (see Chapter 8). Similar cases were treated during the analysis by looking at the value of the co-occurring marker, the possible values for the marker in question, and determining the most suitable value in context according to my interpretation based on the relationship of one marker with the other.

5.2 Syntax of the co-occurrence

Another feature annotated during the manual analysis of the co-occurrences is the type of syntactic relation between the co-occurring modal markers. From a syntactic point of view, the co-occurrences should first be distinguished into co-occurrences that appear in presence or in absence of coordination. As it will be shown at the end of this chapter, but especially in the following chapters, in light of the analysis of the modal passages, the categorisation into presence and absence of coordination is largely due to the matter of hierarchical co-occurrences. In fact, none of the cases of coordination, as one might easily guess, host hierarchical co-occurrences, whereas some of the cases in the opposite category do.

5.2.1 Presence of coordination

If there is a relation of coordination between the two clauses (and therefore the co-occurring markers), a case such as the one illustrated in example 203 will occur.

- (203) *Mihi vero licet et semper licebit dignitatem tueri,*
 me truly be_allowed and always be_allowed honour preserve
mortem contemnere.
 death disdain

But I **am allowed**, and **will** always **be allowed**, to preserve honour and disdain death. (Cicero, *Philippicae* 1, 6, 14)

In this sentence, the two co-occurring markers *licet* and *licebit* are coordinated by the conjunction *et* ‘and’. This is an example of compound clause, where grammatically independent

clauses are linked together by a coordinator (Pinkster 2021, 2). Other types of cumulative conjunctions found in the corpus, coordinating the propositions in which the two markers occur are *nec, neque* 'and not', *ac, atque*, and the enclitic *_que* 'and'. In other cases, the two clauses are coordinated by an adversative conjunctions e.g. *sed* 'but', which expresses an opposition between the co-occurring markers instead of agreement.

Coordinating and adversative conjunctions are not the only types of particles found in compound clauses. The comma also often occurs in coordinate structures where the clauses are presented in a cumulative manner. More elaborate correlative structures were also found in the corpus, such as *non solum...verum etiam* or *non solum...sed etiam, non modo...sed etiam* 'not only...but also', *utrum...an* 'if...or' (where the latter coordinates two alternatives in the context of indirect interrogatives).

5.2.2 Absence of coordination

The category dedicated to the absence of coordination is quite broad and encompasses co-occurrences in syntactic relations that are very different from each other.

5.2.2.1 Modal adverb modifying a modal verb: the relation ADV + V

In the first case, the co-occurring markers appear in the same clause. The type of relation established between the two will be defined throughout this work with the label ADV + V. The use of this label is based on the fact that all co-occurrences at the level of the simple clause identified in the corpus involve a modal adverb ADV that scopes over a modal verb V. An illustration of this type of figure is given in example 204.

- (204) *Te certe in pecuniam exactam ista referre ex meis rationibus*
 you certainly in money exact this report from my account
relatis non oportuit, nisi quid me fallit.
 render not ought unless something me deceive

You **certainly should** not have reported these from my rendered accounts under 'money exacted', unless I am mistaken. (Cicero, *Epistulae ad familiares* 128, 6)

In this sentence, the co-occurring markers are the modal adverb *certe* (ADV) and the modal verb *oportet* (V). The former expresses epistemic modality with a certainty degree, the latter dynamic necessity. The adverb ADV *certe* scopes over the rest of the clause *Te [...] in pecuniam exactam ista referre ex meis rationibus relatis non oportuit* 'to report these from my rendered

accounts under ‘money levied’, which hosts the modal predicate *v oportuit*.³ This is a type of co-occurrence which has been annotated as a case of scope hierarchisation. The two markers co-occur at two different levels of the syntactic hierarchy of the simple clause. The modal analysis described above shows that this hierarchical relationship also holds on the semantic plan. The marker that is higher on the hierarchy (*certe*) projects its modal value onto *oportuit* and onto its scope *te [...] in pecuniam exactam ista referre ex meis rationibus relatis*. As a result, the notion of dynamic necessity expressed by *oportuit* and the representation modalised by the latter, are invested with a value of epistemic certainty. As I will show below and later in Chapter 7, cases of scope hierarchisation are typical of the relations ADV + V. When the relationship between the two markers results in a case of scope hierarchisation, I also annotate the direction of the hierarchical relationship, namely which marker includes the other in its own scope. In this case, the relationship goes from *certe* (higher position) to *oportet* (lower position and inclusion in the scope of *certe*). The marker and type of modality that are higher up will be defined as the embedding marker or embedding modality, while the lower ones will be labelled embedded marker or embedded modality.

5.2.2.2 Argument clause and modal auxiliaries

In Chapter 2 I have introduced the notion of valency and the distinction between arguments and satellites. I have also described in section 2.4 the types of syntactic patterns associated with each marker in the list of markers targeted for this study. For instance, impersonal verbs like *licet* and *oportet* can have one or two-slot construction patterns, where one of the slots is usually filled by a nominal constituent, and the other needs to be filled by a predicate for the marker to be modal. Clauses that function as arguments to a verb i.e., that fill the mandatory slots for the predication to be grammatical, are called argument clauses (Pinkster 2021). Example 205 shows the construction *facultatem habeo* (in the form *facultatem habitura*).

- (205) ... *et, si res facultatem habitura videatur, ut Alexandream*
 ... and if situation possibility have seem so_that Alexandria

atque Aegyptum tenere possis, esse et tuae et nostri imperi
 and Egypt keep can be and your and our power

dignitatis Ptolomaide aut aliquo propinquo eloco rege conlocato te
 honour Ptolemais or another close place king establish you

cum classe atque exercitu proficisci Alexandream ...
 with fleet and army depart Alexandria ...

³ The hypothetical clause *nisi quid me fallit* is a subordinate clause depending on *oportet*, and it is not part of the scope of *certe*.

... and, if it seems that the situation will create the **possibility** for you to **be able** to keep Alexandria and Egypt, it is by your and our honour that you depart to Alexandria with a fleet and an army, after having established the king at Ptolemais or some other close place. (Cicero, *Epistulae ad familiares* 18, 4)

This construction occurs with a two-slot pattern, where one slot is filled by a nominal constituent, which functions as the subject of the construction, and the other one by an argument clause governed by *facultatem habeo*. In the passage in example 205, the second slot is filled by the argument clause *ut Alexandream atque Aegyptum tenere possis*. In this case, the argument clause is introduced by *ut* with a verb in the subjunctive mood, but in other cases found in the corpus the argument clause can be expressed in different ways, based also on the type of modal marker e.g. by the subjunctive (for instance with *potest* expressing the notion of dynamic possibility, situational); by *quin* followed by a verb in the subjunctive (with the construction *dubium est*); by an accusative with infinitive clause e.g. with *opus est*. The accusative with infinitive clause will be abbreviated in this and the following chapters, especially in figures and tables, with the acronym AcI (*Accusativus cum Infinitivo*).

A specific case in this section is the use of modal predicates such as *possum* and *debeo* as auxiliary modal verbs, constructed with the present infinitive of the main predicate (Pinkster 2021, 219), as in example 206.

- (206) *Rex vero respondisse dicitur Homerum, qui ante annos mille*
king indeed reply say Homer who before year thousand
decessisset, aevo perpetuo multa milia hominum pascere, item
die lifetime constantly many thousand man feed therefore
debere, qui meliore ingenio se profiteretur, non modo unum sed
have_to who better intellect himself declare not only one but
etiam plures alere posse.
also many nourish can

Indeed the king is said to have replied that Homer, who died a thousand years before, had constantly fed many thousands of men for a lifetime, and therefore, as he declared himself of a better intellect, he **should be able** to nourish not only one but many others as well. (Vitruvius, *De architectura* 7, 9)

Differently from the previous example, in this passage the relationship between the co-occurring modal verbs is not one of subordination between a main verb and the dependent object or subject infinitive clause, but rather a single predicate governed by a modal auxiliary. In this example, the predicate *debere posse alere* is formed by the combination of the

two modal verbs *debeo* and *possum*, where *possum* and its argument predicate *alere* depend on *debeo*.

5.2.2.3 Satellite clause

The co-occurrence between a main predicate and a satellite clause can be found in cases such as the one illustrated in example 207.

- (207) *Hoc si qui pati non potuit, mori debuit.*
 this if someone endure not can die have_to

If someone **had been unable** to endure this, he **should have** died. (Cicero, *Epistulae ad familiares* 195, 1)

In this passage the two co-occurring markers are *possum* in the form *potuit* and *debeo*, in the form *debuit*. The latter is the main predicate of the superordinate (and main) clause, whereas the former is in the subordinate clause introduced by *si* 'if'. The argument of the predicate *debuit* is filled by the predicate *mori* 'to die', which functions as an object to *debuit* '(someone) had to die'. Similarly, the object of *non potuit* is the argument clause *pati* 'to endure'. The clause *si qui pati non potuit* functions as a satellite clause, specifically with an hypothetical value: it is not mandatory for the completion of the valency frame of *debuit*, a function that is covered by *mori*, but it adds information as to in which circumstances *qui... mori debuit* 'someone... should have died'.

In the co-occurrences I have found different types of subordinate clauses, besides hypothetical clauses: causal, comparative,⁴ declarative, concessive, consecutive, final, infinitival, (indirect) interrogative, relative, and temporal clauses. As shown by the two preceding examples, certain types of subordinates e.g. finite (declarative with *ut*, *quin*) and non-finite (accusative with infinitive) declarative clauses can function as argument clauses to the main predicate (Pinkster 2021) (see Chapter 7). Subordinate clauses specifying e.g., the time, reason or purpose normally function as satellites.

⁴ Pinkster treats comparative clauses separately from subordination. In the specific, he underlines their complex status, as they do not behave as satellite clauses, because they are required by the comparative element in the sentence, and are part of another clause, so they do not fit the definition of subordinate clause. In other terms, the way in which comparative clauses behave shares some features of coordinate clauses. For instance, the terms of comparison may belong to different categories: verbs, nouns, adverbs or adjectives, and even more complex terms like phrases or clauses. If the two terms being compared share the same function, as it is usually the case, they may belong to different categories e.g. the first term of comparison may be an accusative and infinitive clause, and the second term a main clause (Pinkster 2021, 719–720).

5.2.2.4 Incidental clauses

In a few cases in the corpus, the two co-occurring markers are not related by coordinating or subordinating conjunctions, nor there is a relation of the type ADV + V. In such cases, one of the markers was rather found in an incidental clause with respect to the main clause in the sentence, as shown in example 208.

- (208) *De quo non modo rogare te ut eo studiosius mea quoque causa*
 about which not only ask you to so devotedly my also case
facias non debeo (nihil enim cumulatius fieri potest quam
 do not have_to nothing indeed abundantly happen can than
polliceris) sed ne gratias quidem agere, quod tu et ipsius causa
 promise but not thanks even because that you and him case
et tua sponte feceris.
 and your will do

About that, not only I do not **have to** ask you to do my interests more devotedly (for nothing **can** happen more abundantly than what you promise), but not even to thank you as you had acted for his own cause and out of your free will. (Cicero, *Epistulae ad familiares* 284, 1–2)

In this case the two sentences are not linked by an explicit syntactic relation of coordination or subordination, but they are juxtaposed. There is, however, a semantic relation between the two. Incidental clauses in the texts included in the corpus are mostly used as an *impromptu* comment on the contents of the proposition to which they are juxtaposed. In this case, the modal values expressed by (*non*) *debeo* and *potest*, both dynamic but in the domain respectively of necessity and possibility, are being put in a logical and semantic relation: *potest* and the representation modified by *potest* explain *non debeo*, as it is anticipated by the adverb *enim*.

5.3 Syntactic relation and types of co-occurrence

The analyses presented in Chapters 7 and 8 will show that, depending (not exclusively) on the syntactic relation between the markers, it is possible to detect fundamental differences between types of co-occurrence. This concerns specifically the presence or absence of hierarchical relationships between the co-occurring markers (what has been defined as scope hierarchisation). The type of syntactic relation as well as the distinction between argument and satellite clauses is crucial to determine the difference between the two main types of

co-occurrence identified in this study, namely in presence or in absence of scope hierarchisation. To illustrate what this means on a practical perspective, I will use graphical representations of the most important relationships between the markers encountered during manual annotation.

Co-occurrences in scope hierarchisation can only be found in absence of coordination. When the markers co-occur in absence of coordination, they have to be linked directly on a syntactic-semantic plan in order to observe a co-occurrence with scope hierarchisation. This narrows down the cases of scope hierarchisation to three types of syntactic relationships. In the simple clause, a modal adverb (used as a propositional adverb and not as a focaliser) that modifies a modal verb (the relation ADV +V, example 204); a modal predicate that fills an obligatory slot (i.e., is an argument clause) in the verbal frame of another modal verb or construction (example 205); a modal verb governs a present infinitive in a single nuclear predication (example 206). These types of relationship (and those that will follow in this section) can be represented through what I have defined as a "co-occurrence diagram" i.e., an abstract and simplified representation of the relation of co-occurrence. The co-occurrence diagram for the relations just mentioned, that enable scope hierarchisation, is shown in Figure 5.1.

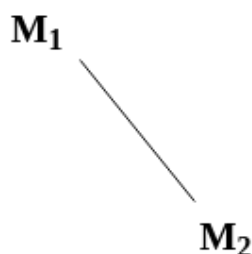


FIGURE 5.1: Co-occurrence in cases of scope hierarchisation (ADV +V, AcI and infinitive).

In this diagram the relations are represented on a semantic perspective i.e., the marker (M_1) that modifies the co-occurring one (M_2) is higher in the diagram. Let us go back to examples 204 and 205. If we were to represent them in the form of a co-occurrence diagram they would look like Figures 5.2 and 5.3.

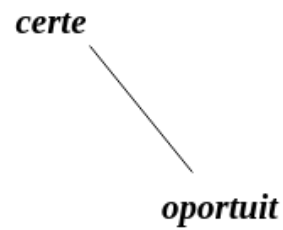


FIGURE 5.2: Co-occurrence diagram for example 204.

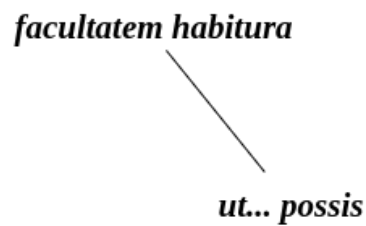


FIGURE 5.3: Co-occurrence diagram for example 205.

The same type of diagram can be used to represent the relation between *debeo* and *possum* in example 206.

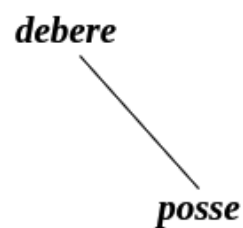


FIGURE 5.4: Co-occurrence diagram for example 206.

The difference between these three co-occurrences and the other types of syntactic relationships emerges clearly when comparing them to examples 203 and 207. A diagrammatic representation of example 203 is shown in Figure 5.5, and another one for example 207 is shown in Figure 5.6.



FIGURE 5.5: Co-occurrence diagram for example 203.

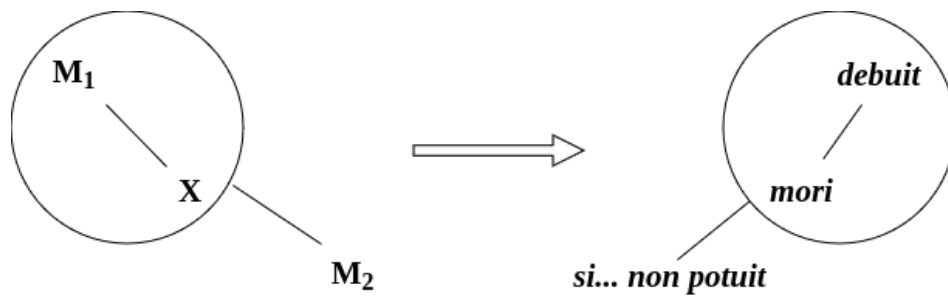


FIGURE 5.6: Co-occurrence diagram for example 207.

The diagram in Figure 5.5, which corresponds to example 203, shows that, as mentioned at the beginning of this section, a relation of scope hierarchisation between an embedding and an embedded modality cannot take place without an asymmetric syntactic relationship between the co-occurring modals. On the other hand, the diagram corresponding to example 207, Figure 5.6 shows that the relationship between the co-occurring markers also needs to be contiguous, such as in the cases of a nuclear predication involving two modals, one of which in the infinitive form, or argument clauses of the type illustrated above in the relevant section. Example 207 is not the case: the subordinate *hoc si qui non potuit* is a satellite clause, precisely an hypothetical, that modifies the nuclear predication *mori debuit*. Therefore, these three types of combinations will have a very different impact on the relationship between the co-occurring types of modality. While in examples 204 and 205 the modality expressed by M_1 embeds the one expressed by M_2 , in examples 203 and 207 the relationship between the two types of modality is different. Example 203 is a classical loop co-occurrence. Loops are likely to occur in this type of structure. As it will be explained in more details in Chapter 8, loop co-occurrences may be used as repetitions with the purpose of emphasising a certain concept. In this case, helped by the alternation of present (*licet*) and future tense (*licebit*), the emphasis is on the speaker's idea that the possibility of preserving honour and disdaining death is long lasting (*semper*) for the speaker.

But more complex relationships between the co-occurring markers exist. Another interesting case with a loop co-occurrence, given in example 209, illustrates a different type of co-occurrence diagram. In this case, the clauses hosting the co-occurring markers are respectively a satellite (*dum licet*) and an argument (*ut semper liceat*) clause to two coordinated (or, in this case, juxtaposed) main clauses. The diagrammatic representation of this co-occurrence is given in Figure 5.7.

- (209) *Fruor dum licet, opto ut semper liceat.*
 enjoy while be_possible wish that always be_possible

I enjoy it as long as **I am able to**, I wish I **may** always **be able to**. (Cicero, *Epistulae ad familiares* 195, 2)

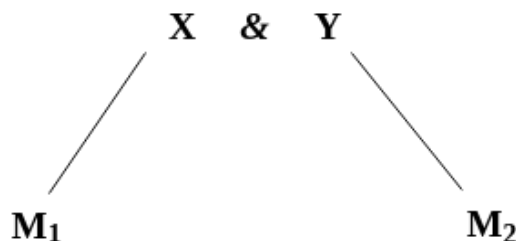


FIGURE 5.7: Co-occurrence in two satellite subordinate clauses.

But loops are not the only interesting case of co-occurrence observed in diagrams with this type of structure. Markers of possibility and necessity can be combined in a contrastive relation, if they have similar or the same syntactic function. Consider examples 210 and 211.

- (210) *Non enim debet nec potest esse architectus grammaticus, uti*
 not indeed have_to and_not can be architect scholar as
fuerit Aristarchus, sed non agrammatus ...
 be Aristarchus but not illiterate ...

For an architect **does not need to** be and **cannot** be a scholar like Aristarchus, but not an illiterate (Vitruvius, *De architectura* 1, 1, 13)

- (211) ... *neque quibus rationibus superare possent sed quemadmodum uti*
 ... and_not what way prevail can but how exploit
victoria deberent cogitabant.
 victory should think

... and they were not thinking about with what strategies they **would be able** to prevail, but about how they **ought** to exploit their victory. (Caesar, *De bello civile* 3, 83, 4)

Both passages will be explained further in Chapter 8, respectively at pages 277 and 269. But for now I want to emphasise how the syntactic configuration can help reading the use of the co-occurrence. In the first passage in example 210 the co-occurring markers share the same argument clause *esse (architectus) grammaticus*. The two clauses *debet esse grammaticus* and *potest esse grammaticus* are linked by a relation of coordination, by means of the negative conjunction *nec* 'and not'. This passage corresponds to the diagram in Figure 5.5. Structures of this kind, where the co-occurring markers are not in a hierarchy and modalise the same

scope, highlight the contrastive relation between the two markers, in this case between the notions of non-necessity and impossibility, or, in other passages from the corpus, their opposite polarity. In example 211 the markers *possent* and *deberent* occur in two argument clauses both depending on the main clause *cogitabant*. The diagram corresponding to this co-occurrence is shown in Figure 5.8. In this case, the two co-occurring markers share the same main clause. In a way, the opposition expressed through the co-occurrence is resolved in the opposition of the two representations modalised by the co-occurring markers i.e., *quibus rationibus superare* and *quemadmodum uti victoria*.

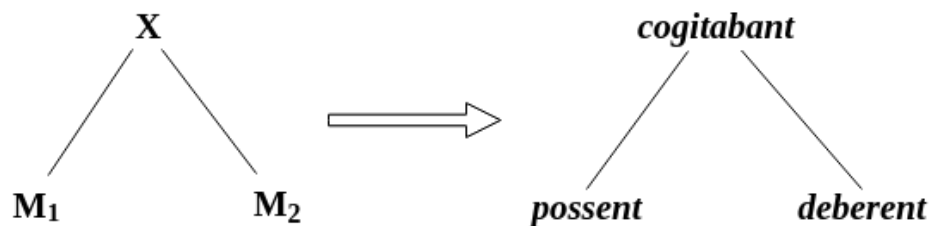


FIGURE 5.8: Co-occurrence diagram for example 211.

In other cases, the notions of necessity and possibility expressed by the two co-occurring markers are linked by a logical relationship, the nature of which is determined based on the type of subordinate clause. Consider example 212.

- (212) *Agere me=cum dementiae, etiamsi potes, <non debes>.*
 act me=against madness even_if have_the_right not should

You **should** not sue me for madness, even if you **have the right to** do it. (Seneca the Elder, *Controversiae* 2, 3, 16)

In this passage, *potes* (implied: *agere*) is the main predicate of a satellite clause that modifies the main clause *non debes* (implied: *agere*). The co-occurrence corresponds to the diagram in Figure 5.6. This passage will be further analysed in Chapter 8, page 276. For now, it is important to note how different markers, or the same markers depending on the type of co-occurrence, can combine in various ways, producing different types of interactions between them. The interactions between them mirror the way in which the co-occurrence is used. The first type of relation concerns hierarchical and non-hierarchical relations. Then, the presence of parallel or contrastive relations, given by loop co-occurrences with opposite polarity or different markers with different or opposite modal meanings to serve rhetorical and argumentative purposes. In this case, in a passage where *potes* indicates the legal possibility and *debes* the moral unacceptability of bringing a lawsuit against one's own father, the two notions are contrasted through the use of the concessive conjunction *etiamsi*.

Before moving on to the quantitative (Chapter 6) and then qualitative (Chapters 7 and 8) analysis of co-occurrences in the corpus, I would like to conclude this chapter with one last summary of the syntactic relationships between markers and their role in the analysis of co-occurrences. As I explained earlier in this section, the type of syntactic relationship primarily distinguishes between the two main types of co-occurrence identified in the corpus, namely, the presence or absence of scope hierarchisation. The presence of scope hierarchisation is strictly related to the absence of coordination. It should be noted that a direct syntactic asymmetry is necessary for the modal value of one marker of the co-occurrence to be directly transferred to the co-occurring marker (embedding relation). Co-occurrences in ADV + V and AcI and infinitives correspond to this type of relations. In other cases, the co-occurrence can take various configurations, starting from the simplest cases of satellite-main clauses (Figure 5.6) to rather complex instances e.g. with two subordinate clauses linked to two different main clauses. Often, these types of syntactic configurations correspond to relationships that revolve around i) the repetition of the marker, in the case of loop co-occurrences, ii) the contrastive relation of basic modal concepts of necessity and possibility, and iii) logical relationships, for example consequential or implicational, between specific modal categories, as specified by the type of syntactic relationship linking the two markers (example 212).

6 Quantitative analysis: measures of co-occurrence

As described in Chapter 4, I queried the corpus to extract sentences that presented the co-occurrence of at least two markers. Table 6.1 shows the number of sentences hosting a co-occurrence, divided into categories according to the presence of zero, one, two or more modal markers in the same sentence. Sixteen sentences had to be excluded from the results obtained automatically, due to errors produced during the lemmatisation and sentence segmentation tasks. Two sentences showed a lemmatisation error: the parser erroneously lemmatised as *possum* the forms *potitus*, perfect participle of *potior* 'to obtain', and *potissimum* 'especially, above all', adverb derived from the adjective *potissimus*. The remaining fourteen sentences were erroneously selected because the parser ignored the exclamation mark as a strong punctuation sign during parsing, therefore merging two independent sentences and presenting them as as a single sentence¹. These errors were spotted and corrected during the qualitative analysis. Table 6.1 shows the statistics on the presence of co-occurrences in the corpus after manual correction. As mentioned above, sixteen sentences showed errors in lemmatisation or parsing, so the total number of sentences with co-occurrence of modal markers in the corpus after curation and qualitative analysis is 868. Some of the sentences extracted with two co-occurring markers were also moved to the category of co-occurrence of three modal markers, because during qualitative analysis I spotted some other co-occurring marker that the code did not lemmatise correctly during processing. It should be noted that, as I have not performed a manual check on the entirety of the texts included in the corpus, it is possible that some sentences relevant to this study because they presented the co-occurrence of two or more modal markers escaped the automatic extraction.

6.1 Measures of co-occurrence

Before illustrating the analysis of co-occurrences, I will show the results for the marker and modality count in co-occurrence and their respective co-occurrence rates, for each marker and type of modality found in co-occurrence in the corpus. The count in co-occurrence for

¹ This was the case for sentences such as *Utinam saluti nostrae consulere possimus! Dignitati certe consulemus.*

Number of markers	Number of sentences	%
0	30095	82.5
1	5508	15.1
2	720	2.0
3+	148	0.4
Total	36471	100

TABLE 6.1: General statistics on sentences in the corpus, based on qualitative analysis.

a marker i describes the number of times in which the marker i appears in co-occurrence with another marker (or itself) j : $n_{i\bullet} = \sum_j n_{ij}$, where $\bullet$ denotes summation over the index in question and j represents all the markers considered for the analysis (included i). The same definition applies to the count in co-occurrence for the types of modality.

This type of analysis answers two preliminary questions: how frequently does a marker or a type of modality appear in co-occurrence? How many times with respect to the total number of occurrences in the corpus? Throughout this chapter, I will use a set of definitions to refer to different measures of co-occurrence, applied to markers, modalities and co-occurrence pairs. For the sake of clarity and to guide the reader through the chapter, I have summarised the definitions with their respective explanations in Table A.2.

6.1.1 The markers

In this section I will show the co-occurrence rate for each marker in the corpus. The co-occurrence rate is obtained by dividing the marker count in co-occurrence by the marker count in the corpus. Co-occurrences of the same marker (e.g. *possum* co-occurring in the same sentence with another instance of *possum*) are counted as two co-occurrences for the same marker i.e., co-occurrences for *possum* = 2. As described in Chapter 5, one of the tasks performed during qualitative analysis was determining the type of modality expressed by each marker in the context of the sentence. Sometimes, the markers were annotated as 'not modal'. This was the case for sentences in which a (potential) modal marker appeared, but did not refer to a representation, i.e., a SoA was missing. A typical example was the use of the adjective *aequus* simply as a modifier to a noun. See Example 213, where *aequas* 'fair, just' modifies the noun *condiciones* 'terms, conditions':

- (213) *Is etiam queritur condiciones suas repudiatas, aequas quidem et*
 he even complain term his reject fair yet and
verecundas, [...].
 modest ...

He even complains that his terms were rejected, yet (they were) **fair** and modest [...] (Cicero, *Philippicae* 13, 18)

As this study focuses on the co-occurrence of types of modality and modal markers, cases in which the marker was found in the sentence but did not contextually show a modal value were detected and excluded from the qualitative analysis. However, in order to get the measure of how frequently the markers found in co-occurrence were actually modal, I compared the co-occurrence rate of the markers both modal and not modal, with the co-occurrence rate of the markers only when they were modal.

6.1.1.1 Modal and not modal markers

The analysis of the markers in co-occurrence—both modal and not modal—is shown in Table 6.2. The number of different markers found in at least one co-occurrence in the corpus is 31. A few markers targeted in this study were found in zero co-occurrences in the whole corpus. These are: *ineptus*, *licitus*, *necessarie*, *nequeo* and *probabilitas*.

The average co-occurrence rate for both modal and not modal markers is 25.7%. More than half of the markers in Table 6.2 are above this threshold. The markers *aeque*, *dubie*, *dubius*, *facultas*, *forsitan*, *incertus*, *iniquus*, *necessarius*, *necessario*, *necessitudo*, *potestas* and *probabiliter* are above the average with values above 30%. Just below this threshold there are *aequus*, *certe*, *certus*, *debeo*, *fortasse*, *necesse est* and *potestas*. All the remaining markers show a co-occurrence rate value that is below the average, with *queo* having the lowest value in the list. However, some differences among the markers can be observed when looking at the count in co-occurrence and count in corpus. The highest co-occurring markers by looking at the count in co-occurrence are *possum*, *debeo*, *oportet* and *certus*. But by comparing the marker count in co-occurrence with the marker count in corpus we obtain a different picture. The adverb *probabiliter* has a co-occurrence rate of 100%, because every time it appears in the corpus i.e., 2 times, it is found in co-occurrence with another marker. Following *probabiliter*, we found the adverb *forsitan* with 55%, the adverb *dubie* with 50% and finally *aeque* with 41% of co-occurrence score. At least three observations can be made about these preliminary results. For starters, none of the markers with the highest count in co-occurrence are included in the list of markers with the highest co-occurrence rate. The verb *possum* is by far the one that is found the most in co-occurrence with another marker (or with itself), but it is also by far the one that is the most present in the corpus overall (with 3561 total occurrences), which noticeably lowers its ranking when looking at the co-occurrence rate. Next, all of the markers with the highest co-occurrence rate are adverbs, and four out of five are (potentially) epistemic markers. Finally, the co-occurrence rate is not necessarily indicative of the

tendency of a marker to have a high co-occurrence count. The case of *probabiliter* is an example: its co-occurrence rate is 100%, but the total number of occurrences (and co-occurrences) in the corpus is just 2, which makes it difficult to draw more or less final conclusions about its tendency to appear in co-occurrence with other markers.

	marker count in co-occurrence	marker count in corpus	co-occurrence rate (%)
<i>aeque</i>	22	53	41.5%
<i>aequus</i>	32	115	27.8%
<i>aptus</i>	13	54	24.1%
<i>certe</i>	51	175	29.1%
<i>certus</i>	100	356	28.1%
<i>debeo</i>	187	676	27.7%
<i>deceat</i>	6	29	20.7%
<i>dubie</i>	1	2	50.0%
<i>dubius</i>	31	80	38.8%
<i>facultas</i>	41	116	35.3%
<i>forsitan</i>	5	9	55.6%
<i>fortasse</i>	33	120	27.5%
<i>forte</i>	19	81	23.5%
<i>incertus</i>	21	72	29.2%
<i>iniquus</i>	18	58	31.0%
<i>ius sum</i>	1	9	11.1%
<i>licet</i>	83	337	24.7%
<i>meum sum</i>	1	9	11.1%
<i>necessario</i>	20	54	37.0%
<i>necessarius</i>	51	152	33.6%
<i>necesse sum</i>	38	144	26.4%
<i>necessitas</i>	17	69	24.6%
<i>necessitudo</i>	32	99	32.3%
<i>oportet</i>	128	490	26.1%
<i>opus sum</i>	38	149	25.5%
<i>possum</i>	837	3561	23.5%
<i>potestas</i>	65	221	29.4%
<i>probabiliter</i>	2	2	100.0%
<i>queo</i>	1	15	6.7%
<i>usus sum</i>	12	99	12.1%
<i>valet</i>	5	23	21.7%
Total	1911	7429	25.7%

TABLE 6.2: Co-occurrence count and co-occurrence rate of the markers appearing in co-occurrence in the corpus (both modal and not modal).

6.1.1.2 Only modal markers

Table 6.3 shows the marker count in co-occurrence and the co-occurrence rate for those markers that resulted as modal after the qualitative analysis of the co-occurrences. Comparing Table 6.3 with Table 6.2, the first difference that can be observed is that the number of

	marker count in co-occurrence	marker count in corpus	co-occurrence rate (%)
<i>aequus</i>	1	115	0.8%
<i>aptus</i>	3	54	5.6%
<i>certe</i>	33	175	18.9%
<i>certus</i>	4	356	1.1%
<i>debeo</i>	124	676	18.3%
<i>decet</i>	2	29	6.9%
<i>dubius</i>	13	80	16.3%
<i>facultas</i>	15	116	12.9%
<i>forsitan</i>	2	9	22.2%
<i>fortasse</i>	24	120	20.0%
<i>forte</i>	11	81	13.6%
<i>incertus</i>	1	72	1.4%
<i>iniquus</i>	1	58	1.7%
<i>licet</i>	75	337	22.3%
<i>necessario</i>	13	54	24.1%
<i>necessarius</i>	5	152	3.3%
<i>necesse sum</i>	30	144	20.8%
<i>necessitas</i>	2	69	2.9%
<i>oportet</i>	114	490	23.3%
<i>opus sum</i>	14	149	9.4%
<i>possum</i>	668	3561	18.8%
<i>potestas</i>	10	221	4.5%
<i>probabiliter</i>	1	2	50.0%
<i>queo</i>	1	15	6.7%
Total	1167	7135	16.4%

TABLE 6.3: Marker count in co-occurrence and co-occurrence rate of the markers appearing in co-occurrence in the corpus (only modal).

markers in Table 6.3 is lower. This is due to the fact that only co-occurrences in which both markers expressed modal meanings were considered for this table: if we take into account only modal co-occurrences, some of the markers included in the study are lost. Specifically, in my corpus the markers *aeque*, *dubie*, *ius est*, *meum est*, *necessitudo*, *usus est* and *valet* never appear with a modal value in co-occurrence. The epistemic adverb *dubie* is found in only one co-occurrence (see Table 6.2), in which it has a modal value. The adverb co-occurs with other two markers. As explained in Chapter 4, section 4.6 (page 148), co-occurrences of more than two markers were analysed based on the presence or absence of a semantic interaction between the markers in co-occurrence. In this case, the co-occurrence of *dubie* with the other two markers was not considered as relevant, and it was left out of the sample of co-occurring modal markers.²

² The sentence was extracted from Cicero's *Epistulae ad familiares* 104, 1: *Etsi non **dubie** mihi nuntiabatur Parthos transisse Euphratem cum omnibus fere suis copiis, tamen, quod arbitrabar a M. Bibulo pro consule certiora de his rebus ad vos scribi **posse**, statuebam mihi non **necesse esse** publice scribere ea quae de alterius provincia nuntiarentur.* 'Although I was **certainly** (by litote, lit. not **doubtfully**) receiving reports that the Parthians had crossed the

The average co-occurrence rate value lowers significantly from Table 6.3 to Table 6.2, changing from 25.7% to only 16.4%. The number of markers with a co-occurrence rate value above this threshold also changes from Table 6.2, because only ten markers have a co-occurrence rate higher than 16.4%. These are *certe*, *debeo*, *forsitan*, *fortasse*, *licet*, *necessario*, *necesse est*, *oportet*, *possum* and *probabiliter*. Among the markers with the lowest co-occurrence rate below 2% are *aequus*, *certus*, *incertus* and *iniquus*. The epistemic adverb *probabiliter* is still the marker with the highest co-occurrence rate, although its status in the corpus is problematic from a quantitative point of view, as described above: it co-occurs, with a modal value, only once, while appearing twice in the corpus. The next markers with the highest score are the adverb *necessario*, the verb *oportet*, the verb *licet* and the adverb *fortasse*. Interestingly, two epistemic adverbs are still among the markers that are most frequently found in co-occurrence (*necessario* also appears as a marker of dynamic necessity). The other three epistemic adverbs *certe*, *fortasse* and *forte* also have quite high scores (18%, 20% and 16%, respectively). This piece of information will emerge as quite relevant for a particular aspect of qualitative analysis, that is, the case of scope hierarchisation, in which epistemic modality, expressed especially by adverbs, covers a good share of the cases found in the corpus (see Chapter 8 and in particular Table 7.2). Another point to be emphasised is that when considering only modal occurrences, two modal verbs, *licet* and *oportet*, reach a high co-occurrence rate.

In the transition from Table 6.2 to Table 6.3, a few markers are excluded due to their non-relevance for the analysis (as they occur with non-modal values). In the same way, Table 6.1 shown earlier in this chapter shows the number of sentences that host the co-occurrence of modal markers after manual correction. In that case, sixteen sentences were excluded from the count. If we were to conduct the reverse evaluation process, that is, determine how many markers and co-occurrences are left out of the count presented in the three tables, two factors need to be considered. The first one concerns sentences excluded due to annotation and automatic extraction errors. The number of sentences deleted from Table 6.1 suggests that a similar number of sentences that were relevant for the analysis may have been overlooked by the automatic extraction. The second factor relates to cases where there is co-occurrence between two types of modality, but one or both modalities are not expressed by the markers included in the list. As mentioned in Chapter 3, section 2.4, the marker list used for this study is not exhaustive. There are various other ways to express modality in Latin, starting from verbal mood, which is not systematically evaluated in this study, and extending to

Euphrates with approximately their entire force, however, as I thought that M. Bibulus, Proconsul, **would be able** to write to you more reliable information on these matters, I decided that **it was not necessary** for me to publicly write about events that were reported from someone else's province.' In this case, the marker *dubie* is scoping over the main verb of the main clause *nuntiabatur*, and it does not modify the other two co-occurring markers *posse* and *necesse esse*, which are in a relation on their own. The sentences to which I applied this type of pre-selection are 89.

other lexical expressions like the phrase *copia est* 'there is the possibility' and morphological markers like the *-bilis* suffix. For instance, for each verb or modal construction in the list that occurs in the corpus, it would be possible to evaluate the co-occurrences between the marker and the verbal mood of their argument predicate, which would provide significant additional data on hierarchical co-occurrences.

6.1.2 The types of modality

After having presented and discussed the results on the modal markers, I will apply the same type of analysis to the types of modality involved in co-occurrence. The methodological approach that I applied here is slightly different from the one applied to the markers. In order to obtain the co-occurrence rate for each marker, I could use the results of the lemmatisation, and simply retrieve all the markers in the corpus, regardless of their co-occurrence with another marker, in order to obtain the total number of occurrences of each marker in the corpus. In order to estimate the co-occurrence rate for types of modality as I did for the markers, I extracted a random sample of sentences representing 10% of the total number of sentences with one modal marker in the corpus and I annotated the types of modality for the sentences in that sample. I estimated the co-occurrence rate of the types of modality in the corpus being the ratio of the modality count in co-occurrence to the sum of the modality count in sample times 10 and the modality count in co-occurrence, as shown below.

$$\text{Co-occurrence rate} = \frac{\text{Modality count in co-occurrence}}{(\text{Modality count in sample} \times 10) + \text{Modality count in co-occurrence}}$$

The types of modality found in co-occurrence cover all the types of modality described in the annotation schema (see Chapter 4). These are illustrated in Table 6.4: deontic modality (acceptability and authority), dynamic modality (necessity and possibility) and epistemic modality. The type of modality that is present the least in the sub-corpus of the co-occurrences is deontic acceptability, followed by epistemic modality. Dynamic modality is the most represented type of modality by far, especially in the domain of possibility. It is reasonable to hypothesise a relation between the over-representation of the modal *possum* in the dataset of the co-occurrences (cf. Table 6.3) and the primacy of dynamic possibility over the other types of modality in co-occurrence. This will be verified in the next section (under 6.5), when I will discuss the association between the modal markers and the types of modality that were found in co-occurrence.

Table 6.4 shows that the co-occurrence rates of the four types of modality in the corpus are not extremely different. Epistemic modality has the highest co-occurrence rate (27%), immediately followed by deontic authority (26%). Deontic acceptability on the contrary is the type of modality with the lowest co-occurrence rate: only 16% of the occurrences of deontic

	modality count in co-occurrence	modality count in sample	estimated co-occurrence rate (%)
deontic acceptability	79	40	16%
deontic authority	140	40	26%
dynamic	837	324	21%
epistemic	111	30	27%
not modal	177	116	13%
Total	1344	550	19%

TABLE 6.4: Modality count in co-occurrence and co-occurrence rate of the types of modality in the corpus.

acceptability are found in co-occurrence. Dynamic modality exhibits an intermediate behavior, with a co-occurrence rate that is rather lower compared to epistemic and deontic authority (21%). It is interesting to notice that none of the types of modality in the corpus reaches a 50% co-occurrence rate. The rarity of the phenomenon of co-occurrence already emerged from Table 6.1, page 170, where co-occurrences of modal markers represent 2.4% of the sentences in the corpus.

6.2 A symmetric representation for co-occurrences

One of the first choices for the interpretation of co-occurrences was whether the direction of the relation between the co-occurring items should be considered or not. The direction of the relation would be determined by the position of one marker with respect to the other in co-occurrence. For instance, in the sentence illustrated by Example 214, the marker *oportet* precedes *possum*.

- (214) *Ita tamen oportet aetate praestare, ut ne propter*
 so however be_necessary age exceed so_that not because_of
senectutem minus sustinere possit labores.
 old_age less endure can toil

However, he **must** not be so advanced in age as to **be** less **capable** of enduring toil due to old age. (Varro, *De re rustica* 2, 10, 3)

Numerous studies have dealt with the degree of freedom of word order in the Latin sentence, characterising Latin as a language with a rather free word order (Clackson, 2008; Pinkster 1990; Bakker 1998; Siewerska 1998). In particular, Spevak (2010, 284) published an impressive study on constituents order in Latin, providing a thorough description of the phenomenon mainly based on Classical Latin texts (Caesar, Cicero and Sallust), and occasionally resorting to other authors. Spevak registers a general freedom in the order of constituents in her corpus, especially for verbs, nouns, and pronouns. It must be noted that the fact that word order is free in Latin does not mean that the syntactic constituents in Latin

are randomly assigned a position in the sentence. Some studies have shown that, in certain cases, some constituents can take a specific position in the clause for pragmatic reasons. Adverbs seem to show a tendency to occur in specific positions in the clause, especially the initial position. Spevak refers in this case to intensive adverbs such as *tantus* 'of such magnitude', *multus* 'numerous' (Spevak 2010, 47) or anaphoric adverbs such as *ibi*, *huc* 'there' (Spevak 2010, 59). Another corpus-based study by Hoffmann (2010) tackled the question of the degree of freedom of word order in Latin. After Marouzeau (1938) first introduced it, studies on Latin have applied the theory of markedness to Latin word order, assigning it the SOV order as the unmarked order (see Bauer 1995; Panhuis 1982; Devine and Stephens 2006; see also Hawkins 1983; Dryer 2005 for a typological perspective). Hoffmann performs his study on a corpus which contains texts of Cicero, Livy, Seneca, Catullus and Virgil. Although the cases of SOV structures are the most frequent in his corpus, Hoffmann measures little difference with other word orders, namely OSV structures. Moreover, by applying the theory of information structure and the distinction between the two pragmatically marked components of topic and focus, he concludes, along the lines of Spevak (2010), that Latin word order is pragmatically (and not syntactically) governed. There cannot be a distinction between marked and unmarked word orders in Latin, as each word order is motivated by pragmatic reasons. Since, as highlighted by the aforementioned studies, the order of constituents in Latin sentences does not follow a fixed syntactic order but rather pragmatic criteria, I have decided to avoid including it in the formalization of co-occurrences. This was also to prevent further issues related to data sparsity, given the already limited volume of data on co-occurrences in the corpus. However, the order of appearance of the markers in the sentence will turn out to be relevant to specific types of co-occurrences, in particular for the type that implies scope hierarchisation. Specific cases will be addressed individually for the qualitative analysis of the sentences in Chapter 7.

With these considerations in mind, I adopt the following method to convert raw co-occurrence matrices to symmetric matrices. The decision to use symmetric matrices arises from the need of quantitatively representing the co-occurrences without taking into account the direction of the co-occurrence. Let $N = (n_{ij})$ be a square matrix of dimensions $(n \times n)$, where n_{ij} ³ denotes the number of times that markers (or modalities) i and j occur in this order in a sentence of the corpus (the *co-occurrence count*) e.g.

³ Not to be confused with the marker (or modality) count in co-occurrence (introduced earlier in sections 6.1.1 and 6.1.2, pages 170 and 175) $n_{i\bullet}$, where $\bullet$ denotes summation over the index in question i.e., $n_{i\bullet} = \sum_j n_{ij}$.

$$N = \begin{matrix} & \begin{matrix} M_1 & M_2 & M_3 \end{matrix} \\ \begin{matrix} M_1 \\ M_2 \\ M_3 \end{matrix} & \begin{pmatrix} 5 & 2 & 6 \\ 0 & 3 & 7 \\ 8 & 0 & 1 \end{pmatrix} \end{matrix}$$

Here is a practical example of how co-occurrences are represented in this matrix. Let us take three random Latin markers: *possum*, *debeo*, and *licet*. Suppose these markers co-occur in the reference corpus, and the co-occurrence count for each pair is represented in the square matrix shown above.

$$N = \begin{matrix} & \begin{matrix} possum & debeo & licet \end{matrix} \\ \begin{matrix} possum \\ debeo \\ licet \end{matrix} & \begin{pmatrix} 5 & 2 & 6 \\ 0 & 3 & 7 \\ 8 & 0 & 1 \end{pmatrix} \end{matrix}$$

In the hypothetical corpus in which the modal verbs *possum*, *debeo* and *licet* co-occur, the co-occurrence counts for e.g. *possum* are the following. The co-occurrence *possum-possum* appears 5 times; *debeo-possum* 0 times; *possum-debeo* 2 times; *licet-possum* 8 times; *possum-licet* 6 times. The same goes for the other two markers, in both directions.

I define the corresponding *symmetrised* co-occurrence matrix as $N^S := (N+N^T)/2$ i.e., half the sum of N and its transpose N^T (the matrix obtained by switching the rows and columns of N):

$$N^S = \frac{1}{2} \left(\begin{pmatrix} 5 & 2 & 6 \\ 0 & 3 & 7 \\ 8 & 0 & 1 \end{pmatrix} + \begin{pmatrix} 5 & 0 & 8 \\ 2 & 3 & 0 \\ 6 & 7 & 1 \end{pmatrix} \right) = \frac{1}{2} \left(\begin{pmatrix} 10 & 2 & 14 \\ 2 & 6 & 7 \\ 14 & 7 & 2 \end{pmatrix} \right) = \begin{pmatrix} 5 & 1 & 7 \\ 1 & 3 & 3.5 \\ 7 & 3.5 & 1 \end{pmatrix}$$

In other words, the *symmetrised co-occurrence score* (SCS) n_{ij}^S between i and j is the average $(n_{ij}+n_{ji})/2$ of the co-occurrence counts n_{ij} and n_{ji} . Going back to the example of *possum*, *debeo* and *licet* the symmetrised co-occurrence matrix obtained by following the calculation shown above would result in the following matrix.

$$N = \begin{matrix} & \begin{matrix} possum & debeo & licet \end{matrix} \\ \begin{matrix} possum \\ debeo \\ licet \end{matrix} & \begin{pmatrix} 5 & 1 & 7 \\ 1 & 3 & 3.5 \\ 7 & 3.5 & 1 \end{pmatrix} \end{matrix}$$

The co-occurrence count of *possum* with *possum* is 5; for *debeo* and *possum* (including *debeo-possum possum-debeo*) it is 2; for *licet* and *possum* (again, in both directions) it is 14. The same goes for the other combinations of *debeo* and *licet*.

However, co-occurrence counts and SCSs do not provide the complete picture of the association between the target markers. The marker count in the corpus plays a role. When presenting the quantitative results of his corpus-based study on Japanese, Narrog (2009, 172–175) discusses the relevance of using both raw frequencies of co-occurrence (corresponding to the co-occurrence count in this study) and normalised frequencies (corresponding to the symmetric independence quotient in this study, to be defined shortly) to describe the co-occurrences. Raw frequencies of co-occurrence give the simple count of the co-occurrences of modal markers. This type of measure does not take into account the size of the corpus, nor the total number of occurrences of each marker in the corpus. However, Narrog points out that although raw frequencies do not give information on the statistical relevance of the association of two markers, they still provide important information about how entrenched a specific type of co-occurrence (between markers or types of modality) is in the language represented in the corpus. As I share Narrog's view, I will present the SCSs for both pairs of modal markers and pairs of types of modality. Besides, for the qualitative analysis (Chapters 8 and 7) in some cases I had to rely inevitably on the raw count of the co-occurrences due to issues of data sparsity, which made impossible to determine reliable measures of association (e.g. for relations involving scope hierarchisation, discussed in Chapter 8).

Coming back to the quantitative analysis on the full corpus, it is important to consider how extensive the presence of each marker is in the corpus in order to determine the strength of the association of two specific markers in co-occurrence. All the other parameters being equal, two markers that have a high count in corpus will have a higher probability of association, compared to another pair of markers with lower counts in corpus. On the contrary, the co-occurrence of two markers that show a lower count in corpus is much more relevant, as the theoretical probability of their association is much lower. In order to measure the degree of attraction between specific markers or types of modality, I calculate the independence quotients for each pair. The *independence quotient* is defined as "the ratio of the observed counts to their expected value under independence" (see e.g. Egloff and Bavaud 2018, 47), and is described by the formula

$$q_{ij} := \frac{n_{ij}n_{\bullet\bullet}}{n_{i\bullet}n_{\bullet j}}$$

where n_{ij} corresponds to the co-occurrence count, and the expected value under the hypothesis of independence is given by the ratio of the total co-occurrence count in the matrix ($n_{\bullet\bullet}$) to the product of the count in co-occurrence of both i and j ($n_{i\bullet}n_{\bullet j}$). There is a relation of mutual attraction between markers i and j if the quotient is higher than 1. A quotient equal to 1 measures a neutral relation, whereas a quotient value that is less than 1 characterises a relation of repulsion between the co-occurring markers. Applied to the symmetrised matrix N^S defined above, this simplifies to $q_{ij}^S = q_{ji}^S := \frac{n_{ij}^S n_{\bullet\bullet}^S}{(n_{i\bullet}^S)^2}$, since $n_{ij}^S = n_{ji}^S$ by construction.

6.2.1 Building the matrix

The matrices for the co-occurrence of markers and types of modality were built with a combination of Python scripts, a workflow in *Textable* (Xanthos 2014)—an open source extension for the data-mining software *Orange* (Demšar et al. 2013)—, and some lines of code in *R* (R Core Team 2022).⁴ As a first step, I pre-processed the data to solve the cases of co-occurrence involving more than two markers or types of modality. When the co-occurrence had more than two items, I computed all possible combinations between the co-occurring items: the co-occurrence of A, B, C would result in AB, AC, BC (as explained above, the direction is not relevant, so the combinations BA, CA and BC are not computed in this first step, because they will be added when transposing the matrix). After having obtained the pairs of co-occurring markers, the list of co-occurrences is given as input to the *Textable* software. First, the co-occurrences are computed in both directions. If the input co-occurrence is *oportet–possum*, a co-occurrence *possum–oportet* will be computed, and so on for all the other co-occurrences. Then the co-occurrence matrix is built based on the results of the co-occurrence count. Finally, the symmetric independence quotient (SIQ) is computed. The matrices in output (symmetrised co-occurrence count–SCS—and symmetric independence quotient–SIQ) are then exported to *R* (R Core Team 2022) and Cytoscape (Shannon et al. 2003) to produce some visualisations.

6.3 Attraction between modal markers in co-occurrence

The symmetrised co-occurrence score (SCS) for the modal markers in the corpus is shown in Table A.3, in the Appendix (see A, page 304). The symmetric independence quotient

⁴ The scripts and the workflow in *Orange Textable* are available in the GitHub repository that hosts this project. Link to the concerned folder: https://github.com/paoma370/PhD_thesis/tree/main/quantitative/co-occurrences.

(SIQ) is shown in Table A.4 in the Appendix (see A, page 305). The problem of data sparsity mentioned above is exemplified by the values of the co-occurrences for the modal markers. If we take the symmetrised co-occurrence score, the number of zero values by columns and rows is immediately evident. The majority of the non-zero values are quite small, ranging from 0.5 to 34.5, with a peak on the very frequent *possum*. The situation described in this matrix is one where there are too many categories (modal markers or types of modality) for very few observations. This can be a problem when trying to determine the measure of attraction between certain markers. In order to show how a problem of data sparsity can affect the analysis, consider the example of the co-occurrence of *aequus* and *iniquus* in Table A.4. The two markers show an extremely high value of attraction that is completely out of the range established by the other values in the matrix. This is due to the fact that for all the times that *aequus* and *iniquus* appear in a co-occurrence, they are co-occurring with each other. However, in Table A.3 one can clearly see that they only appear in one co-occurrence, so that the quotient attributes the highest degree of attraction to this pair. As the co-occurrence count for such markers is only 1, it is not possible to determine if their co-occurrence is determined by a high degree of attraction, or simply by chance.

The matrix that describes the co-occurrences between markers (both modal) observed in the corpus has 24 rows and columns. A network visualisation helps representing it in a more readable way. A network is formally represented by a set of vertices (or nodes) and a set of edges (or links) between them (see e.g. Ferrer i Cancho 2010). In a linguistic network the nodes represent the linguistic units, and the edges some type of relation between them (Passarotti 2015). A network in which the linguistic units are connected by a relation of co-occurrence is called *co-occurrence network*. The network built based on the co-occurrences extracted from the corpus is shown in Figure 6.1. The nodes are the lemmas that appear in at least one co-occurrence. If two modal markers co-occur at least once in the corpus, an edge will be drawn between them. The symmetric independence quotients shown in Table A.4 determine the weight of the edges.

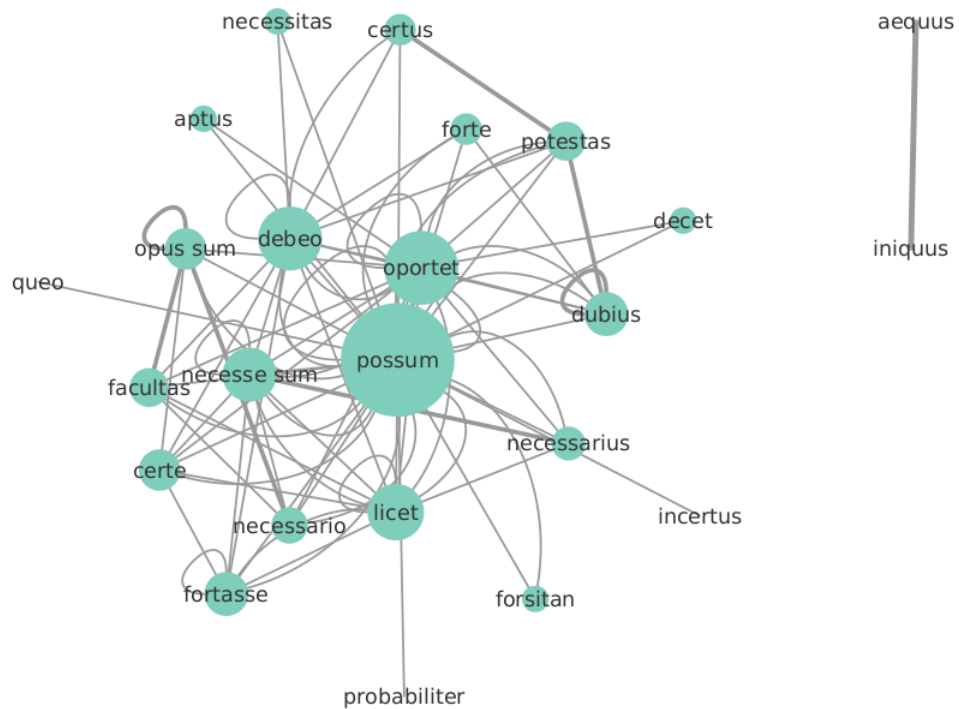


FIGURE 6.1: Co-occurrence network of the modal markers in the corpus.

The configuration and the features of the network immediately convey important information about the co-occurrences. The size of the nodes corresponds to their degree i.e., the number of edges connected to the node. The bigger the node, the higher its degree. The width of the edges corresponds to their weight: a thicker edge corresponds to a greater weight, i.e., to a higher degree of attraction between the two co-occurring markers. In Figure 6.1, it is evident that the markers *possum*, and to a lesser extent *oportet*, *debeo*, *licet* are the ones that co-occur with the highest number of distinct markers in the corpus. Loops onto the same node indicate that some markers can also co-occur with themselves. A loop is an edge that starts and ends on the same node e.g. the node *licet* having a self-loop edge means that there is at least one co-occurrence in which two *licet* co-occur. The other markers for which the diagram shows loop co-occurrences are *debeo*, *dubius*, *fortasse*, *licet*, *necesse*, *oportet*, *opus sum* and *possum*. This specific type of co-occurrence, that I will label from now on ‘loop co-occurrence’ or simply ‘loop’, shows interesting features in terms of the type of modality expressed by the two markers, their polarity, and the syntactic structure in which they co-occur. An in-depth analysis of the feature of loop co-occurrences will be presented in Chapter 8.

Some of the markers in the network have a very low number of co-occurrences in the corpus,

and it is not even possible to spot their node: it is the case of *queo*, *probabiliter*, *incertus*, *aequus* and *iniquus*. In fact, by looking at Table A.4 one can see that for instance *probabiliter* is found in only one co-occurrence, similar to *aequus* and *iniquus*. In terms of connectivity, it is immediately visible how the markers *aequus* and *iniquus* are isolated from the rest of the network, and only co-occur with each other. As one can see from the co-occurrence count, in the corpus they only interact once. The co-occurrence is observed in the sentence shown in Example 215 (I include the previous two sentences to give more context).

- (215) *Haec vivus eripuit, reddit mortuus. At quibus verbis! Modo*
 this alive take_away give_back dead but which word only

aequum sibi videri, modo non iniquum.
 fair him seem only not unfair

He took them away as he was alive, he gave them back as he was dead. And in what terms! Sometimes “it seems **fair**” to him, sometimes “it seems not **unfair**.” (Cicero, *Philippicae* 2, 37)

This co-occurrence is interesting because it represents a hidden loop: a co-occurrence between two markers with opposite polarity, one of which is negated. However, from a quantitative point of view the fact that their co-occurrence is counted only once in the corpus is not enough to make it relevant at the global level. The width of the edges suggests that there is a high degree of attraction between them. Again, the normalisation is biased by the fact that their only occurrence in the sub-corpus of the co-occurrences is found when they co-occur with each other. The value of their edge represents an outlier in the dataset, and forces the visualisation into a much less fine distinction between the weights of the other edges in the network. However, it is still possible to see that the pairs of markers *certus* and *potestas*, *opus sum* and *facultas*, *opus sum* and *necesse sum*, *necesse sum* and *necessario* among others, show higher values with respect to other co-occurrences in the network.

An effective way of visualising the degree of attraction between the co-occurring markers is a sieve plot. Sieve diagrams have been proposed first by Riedwyl and Schüpbach (1983), who later renamed it “parquet diagram” (1994). A sieve diagram provides a visual representation of the relation between the co-occurring markers in terms of observed frequencies, expected frequencies and deviation from independence (i.e., how strong is the association between the co-occurring markers, how strong is their attraction or repulsion). Each cell (i.e., each co-occurrence) of the sieve diagram provides visual information on the following points (Friendly and Meyer 2016, 138–139):

- the observed frequency n_{ij} (i.e., the co-occurrence count) is visualised as the number of squares in each rectangle;

- the expected frequency $\hat{n}_{ij}$ (i.e., the value expected under the hypothesis that the two variables M_1 and M_2 are independent, that is, that their co-occurrence depends only on their individual frequencies) corresponds to the area of each rectangle;
- the difference between observed and expected frequency matches the density of the cell, with denser cells when the observed frequency n_{ij} exceeds the expected frequency $\hat{n}_{ij}$;
- deviation from the hypothesis of independence is color-coded, with blue indicating a positive deviation (i.e., there is an attraction between the co-occurring markers), and red indicating a negative deviation (i.e., there is repulsion between the co-occurring markers).

I used the *R* package *vcd* with the function `sieve()` to produce the sieve plots shown in this and the following chapters.⁵ This type of visualisation allowed me to verify the measure of attraction between a sub-sample of co-occurring markers, selected according to specific criteria. The plot in Figure 6.2 was obtained by selecting the four modal markers that showed a marker count in co-occurrence higher than 40, for all the co-occurrences in which they appear i.e., *debeo*, *licet*, *oportet*, *possum*. Table A.3 shows that these four markers have much higher SCSs than the others. When looking only at their co-occurrences with one another, the results can be surprising. The marker counts in co-occurrence shown in Table 6.3 already indicate that the marker *possum* is over-represented in the corpus. This explains the high expected frequency of co-occurrence with other occurrences of *possum* in the sieve. However, there seems to be an attraction between *possum* and *possum* in terms of co-occurrence, that is, their co-occurrence is more likely than under the hypothesis of independence. On the contrary, the co-occurrence of *possum* with each other markers shows a negative value. The marker *debeo* behaves as *possum*: it is attracted to other occurrences of *debeo*, but not to the other markers. Interestingly, the markers *licet* and *oportet* are attracted both in co-occurrences with themselves and in co-occurrences with each other, of the type *licet-oportet*.

⁵ The software *Orange* offers the possibility of visualising the data in a sieve plot, but it does not allow the user to customise the visualisation (e.g. changing labels, shades of colour etc.).

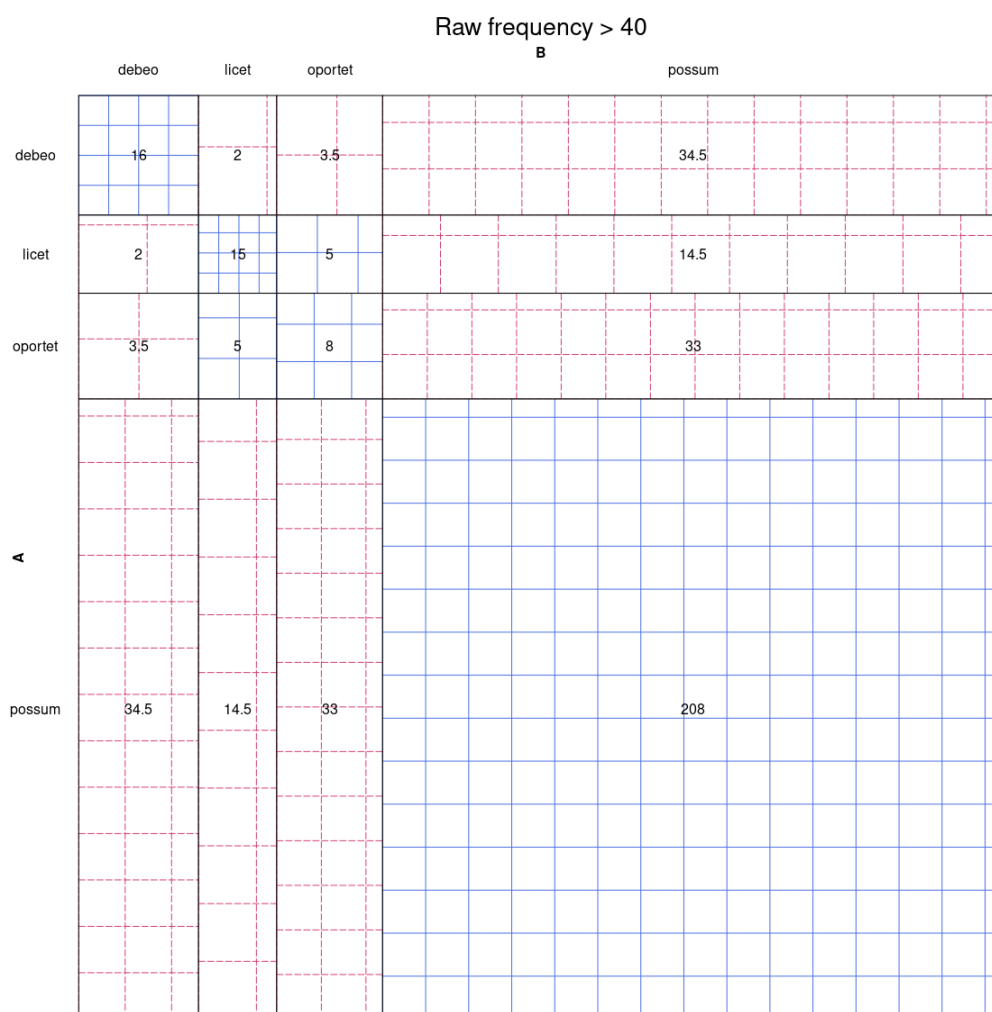


FIGURE 6.2: Co-occurrence of the modal markers *debeo*, *licet*, *oportet*, *possum* (sieve plot).

6.3.1 A larger perspective on the co-occurrences

To enrich the quantitative analysis of the modal markers in co-occurrence, I chose to observe the phenomenon from a broader perspective. In order to do this, I determined the top ten most frequent lexical co-occurrences for each marker shown in Figure 6.1 within a reference corpus of Latin texts. More specifically, I used the corpus Opera Latina, accessed via the online interface Hyperbase Web⁶ (Brunet and Luong 1989; Vanni 2023), which also provides statistical tools of analysis on the texts in the corpus. Opera Latina was briefly mentioned in Chapter 4, section 4.1.1 (page 133), among the most relevant digital resources currently available for Latin. This corpus, developed by the LASLA research group based at the University of Liège, contains Latin texts provided with accurate linguistic information, which

⁶ The platform is freely available at <http://hyperbase.unice.fr/hyperbase/>

includes disambiguated lemmas, complete morphological analysis, and partial syntactic information, mainly concerning the main verb in a sentence and the type of subordinate for the other verbs in the sentence. The annotation is manually verified by a confirmed latinist. The corpus covers texts for a total number of 2.1 million tokens. The Hyperbase Web interface grants access to works from Cato, Catullus, Cicero, Horatius, Juvenalis, Lucretius, Cornelius Nepo, Ovidius, Aulus Persius Flaccus, Petronius, Plautus, Plinius Secundus, Propertius, Quintus Curtius, Sallustius, Seneca, Svetonius, Tacitus, Tibullius, Titus Livius, and Vergilius (Verkerk et al. 2020; see also the information available on the Hyperbase Web interface, under the tab pertaining to the LASLA corpus). The Hyperbase Web platform offers several functionalities: searching occurrences by word form, lemma, or PoS; checking the distribution of a word form, a lemma, or a PoS among the authors represented in the corpus; finally, searching for word forms, lemmas or PoS that co-occur in the corpus with a selected key word. This last functionality, available under the ‘Thème’ option, was utilised to identify the lemmas co-occurring with each marker appearing in Figure 6.1. This type of information allows for a broader contextualisation of the co-occurrence of modal markers. Indeed, it shows the relevance of the co-occurrence of a modal marker M_1 with another marker M_2 within the set of all words that co-occur with M_1 in a reference corpus. The list of co-occurring lemmas obtained through the option ‘Thème’ is ordered based on a specificity index, which measures the degree of attraction between the two lexical items in the corpus. The minimum threshold for the specificity index to be significant is 2, therefore all words associated with the keyword searched by the user that have a specificity index greater than or equal to 2 are listed as co-occurrences (Vanni and Mittmann 2016). The algorithm looks for co-occurrences in i) a span of words decided by the user (both on the left and on the right context of the keyword); ii) in a paragraph; iii) in a sentence. The paragraph is the default option, but I selected the option ‘sentence’ to make the results more comparable with the

results obtained on my corpus.⁷ The platform gives information about the count of the co-occurring lemmas in the corpus, and their count in co-occurrence with the target word. I will describe the results emerging from Opera Latina for each marker below. The complete list of co-occurrences for each marker is available on GitHub together with the data used for the other analyses presented in this study.⁸

Aequus and iniquus. This couple of adjectives will be analysed together as their behaviour in the corpus of co-occurrences is peculiar compared to the other markers in the list. As shown in Figure 6.1, *aequus* and *iniquus* are the only markers that form an isolated link in the co-occurrence network built based on the co-occurrences retrieved and analysed from my corpus. This is an interesting result: the list of markers targeted for this study includes other couples of markers with opposite polarity (besides *aequus* and *iniquus*, there are *aptus* and *ineptus*; *certus* and *incertus*; *queo* and *nequeo*). However, only *aequus* and *iniquus* show an exclusive co-occurrence with each other.

The modal adjective *aequus* occurs 659 times in the corpus Opera Latina. The auxiliary *sum* does not appear among the most frequent co-occurrences of *aequus*. This seems to indicate that the (possibly) modal expression *aequum est* is not used as frequently as the simple adjective. If we were to consider only the first ten co-occurrences with the highest specificity index, only one modal marker appears in the list i.e., the epistemic adverb of certainty *certe*. As it will be shown in the section dedicated to *certe*, this adverb shows one of the highest number of modal markers in the co-occurrence list obtained from Opera Latina. This result aligns with the tendency of epistemic adverbs to co-occur with markers of any other type of modality, as will be demonstrated specifically in Chapter 7. The only other (potentially) modal adverb that appears with a significant specificity is *necessario*, which, as explained in section 2.4.14.1 (Chapter 2, page 74), usually expresses dynamic necessity.

⁷ It is important to clarify that the results of these queries on Opera Latina are not inherently comparable to the results obtained in this study, for various reasons. Firstly, the two corpora are very different: Opera Latina is a larger diachronic corpus, which contains more variation at the level of genre and type of discourse (including texts from theatre, and thus dialogic discourse). It is also essential to keep in mind that the co-occurrences obtained from Opera Latina were not individually manually checked to verify if both the markers in each sentence were modal in context or not. Moreover, the co-occurrences of each marker, ordered by their specificity index values, are not exhaustive of all the possible co-occurrences of the target lemma. This means that there might be sentences in which the target lemma occurs with another modal marker; but if specificity index of their association is not significant, the co-occurring marker does not appear in the list. On the contrary, in the study performed on my corpus of Classical Latin, each co-occurrence has been considered and analysed to exclude non-modal passages: the results shown in Table 6.3 and in Figure 6.1 represent all the co-occurrences of modal markers observed in the corpus. The purpose of this additional analysis therefore is not to observe an overlap between the data in Table 6.3 (and Figure 6.1) and the list of co-occurrences obtained from Opera Latina. The aim is rather to observe how significant the co-occurrences of modal markers are considering the entire vocabulary of a much larger diachronic corpus. At the end of this section, I will discuss similarities and differences spotted between the results obtained from my study and those obtained on Opera Latina.

⁸ https://github.com/paoma370/PhD_thesis/tree/main/opera-latina-coocc

More interestingly, by scrolling through the list of co-occurrences with a significant specificity index beyond the tenth position, we encounter the two nouns derived from the neuter form of *aequus* and *iniquus* i.e., *aequum* and *iniquum*. The latter has a relatively high specificity index (2.99), whereas the co-occurrence with *aequum* is just above the threshold (2.17). It is interesting to see that, in a much larger corpus, with a wider variety of genre, authors, and stages of the language, these two markers seem to be interrelated, and to be used in contrastive contexts such as the one illustrated in example 215 above, and to a lower extent in loop co-occurrences.

The negative counterpart of *aequus* i.e., *iniquus* occurs only 313 times in Opera Latina. Moreover, none of its co-occurrences with a significant specificity index includes a modal marker. The list also does not include the auxiliary *sum*, which might suggest a frequent use of the potentially modal construction *iniquum est*, as it was the case for *aequus*. Many of the co-occurring words in the list seem to suggest the use of the adjective with the sense of ‘unjust, deplorable’. Among these we can mention the verb *irascor* ‘to get mad, angry’ (with the highest specificity index); *iustus* ‘just, right’; *dedecet* ‘it is unbecoming’; *asper* ‘rough, harsh’ among others. From the analysis of these two adjectives, it therefore seems possible to conclude that in a more extensive corpus such as Opera Latina, *aequus* tends to co-occur, both with itself and with its negative counterpart *iniquus*, more frequently compared to *iniquus*. The latter appears more frequently with other non-modal words and thus, perhaps, tends to occur in non-modal contexts.

***Aptus*.** This marker occurs 275 times in the corpus Opera Latina. The lemma with the highest specificity index (5.85) among its co-occurrences is the auxiliary *sum*, which is not surprising, because this adjective often appears in the potentially modal construction *aptus sum* ‘to be able’. Excluding auxiliaries and function words (e.g. the subordinating conjunction *ut*), the specificity index of the first ten co-occurring lemmas positively associated with *aptus* drops considerably (from above 5 to around 3), and the list does not include any modal marker. To be noted among the first ten positions is the verb *prohibeo* ‘to forbid’, which is not a modal marker, but is a performative verb which suggests the modal value of deontic authority, expressing the notion of prohibition. The first marker in the list appears in the 11th position, with a specificity index of 3.36, and it is *aptus*. This result reveals a loop co-occurrence that was not captured within my Latin corpus. In order to perform a closer analysis of this loop, I searched the co-occurrences of *aptus* and *aptus* within the same sentence in the Opera Latina corpus. This co-occurrence appears only once in Opera Latina, in a sentence which belongs to a work that was not included in my corpus. However, the two occurrences of *aptus* in this sentence are not modal and therefore this result turns out not to be particularly relevant for the comparison. Just above the threshold of significance is the noun *necessitas* (2.03).

Aptus confirmed to be a less frequent marker compared to others, and also less inclined to modal co-occurrence. The co-occurrences observed in my corpus between *aptus* and *debeo*, or *aptus* and *oportet* do not emerge from Opera Latina, whereas the loop with *aptus* is missing from the results on my corpus. Concerning the latter, a closer analysis on the Opera Latina corpus reveals that there is only one sentence hosting a loop co-occurrence, and both markers in the sentence are not modal.

Certe. This epistemic adverb occurs in the corpus 662 times in Opera Latina. It co-occurs with a high specificity index with a few markers included in the list for this study: these are, in order, *possum* (4.61), *debeo* (4.24), *licet* (3.8), *fortasse* (2.94) and *necessarius* (2.84). The number of co-occurring markers being higher for *certe* with respect to other markers is quite relevant to the study of the scope properties of epistemic modality. As mentioned in the description of this marker in section 2.4, *certe* can only express epistemic modality. This has been proven to be the type of modality with the widest scope in cross-linguistic studies on modality (see Chapter 3, e.g. the studies by Narrog 2009 on Japanese and Nuyts 2004 on Dutch). It is also worth mentioning that this adverb counts among its highest co-occurents particles such as *non* 'not' and *si* 'if', as well as the epistemic adverb of uncertainty *fortasse* 'maybe, perhaps'. It has been observed in Chapter 3.3 (page 122) that a few examples can be found in the literature about Latin modality on argumentative uses of the co-occurrence of adverbs expressing different degrees of epistemic modality, in particular *certe* and *fortasse*. In such cases, it has also been observed the use of *certe* in correspondence with argumentative patterns involving propositions with opposite polarity (see the co-occurrence with *non*) and with hypothetical clauses (co-occurrence with *si*).

Certus and *incertus*. The adjective *certus* is very frequent in the Opera Latina corpus, compared to the markers described so far. It occurs 1026 times as an adjective and another 6 times as a noun. It is interesting to notice that the co-occurent with the highest specificity index for *certus* is *certus* (4.8), a result that highlights the presence of frequent loops in the Opera Latina corpus, which were not captured in the corpus used for my study. The modal verb *licet* is ranked as third with a specificity index of 4.36. Lower in the list, we should mention the negative counterpart of *certus*, the adjective *incertus*, with a specificity index of 3.3. Therefore, as it was observed for *aequus*, *certus* also tends to co-occur both in loops and with the corresponding adjective with opposite polarity. It is also worth mentioning the co-occurrence of the auxiliary *sum* (2.83), which signals the use of *certus* within the (potentially) modal construction *certus sum*.

The negative counterpart to *certus*, the adjective *incertus*, occurs much less frequently than *certus* in the Opera Latina corpus, only 411 times. As for *certus*, *licet* has a very high specificity index (3.87) with *incertus*, and is the first co-occurent in the list. But besides the case

of *licet*, the list of co-occurents obtained for *incertus* is quite different from the one just described for *certus*. The list does not include *incertus* nor *certus*. Again, as it was observed for *iniquus*, modal loops and co-occurrences with the corresponding marker with opposite polarity are not especially frequent for *incertus*. Moreover, it should be noted that the auxiliary *sum* is completely absent, which indicates that the constructions *incertum est* or *incertus sum* are probably not as commonly used as their counterpart with positive polarity.

***Debeo*.** This modal verb is extremely frequent in Opera Latina, as expected based on its count in my Classical Latin corpus. It occurs 2032 times in Opera Latina. However, the list of co-occurents associated with *debeo* does not include a high number of modal verbs, probably due to the extreme variety of contexts in which it occurs in the corpus. Interestingly, however, the only modal verb appearing in the first ten lemmas positively associated with *debeo* is, again, *debeo*. Another loop co-occurrence which, in this case, was registered also in my corpus of Classical Latin. The specificity index is also extremely high compared to the values that we have seen so far: 11.69. In the list of 100 lemmas co-occurring with *debeo* there is also *necessitas*, which only appears four times in co-occurrence with *debeo*.

***Decet*.** The impersonal verb *decet* occurs in Opera Latina 343 times. In the list of 100 lemmas with a significant specificity index, *decet* is not only the only marker present in the list, but it is also the one with the highest specificity index (5.9). This is another case in which the presence of loop co-occurrences was not detected in the Classical Latin corpus; and one in which other co-occurrences detected in the Classical Latin corpus e.g. *decet* with *oportet* (see Figure 6.1) were probably lost, overwhelmed by the higher amount of data in a larger corpus.

***Dubius*.** The adjective *dubius* occurs in Opera Latina 418 times. The first co-occurent in the list is the negative particle *haud* 'non', with a specificity index of 7.08. This result is relevant to the modal analysis of *dubius* as the collocation *haud dubio* is often used with an epistemic value to convey epistemic certainty. The other two modal markers that appear in the list are also related to the epistemic modal domain: the first one is *incertus*, with a score of 2.76, and the second one is *certum*, with a score of 2.52. Both have much lower specificity indexes than *haud*, but imply a use of the co-occurrence that seems to be similar to what has been observed for *certe* i.e., the exploitation of a contrastive relation between different degrees of epistemic modality to build an argumentative pattern.

***Facultas*.** The results for the nouns *facultas* are peculiar. This marker appears in the corpus Opera Latina only 270 times. The list of its co-occurents is especially poor of other modal markers. The first co-occurent is the verb *do*: *facultas* often appears in constructions such as *facultatem do* and *facultatem habeo*, expressing dynamic or deontic possibility depending on the contexts (see examples in Chapter 7). Indeed, the specificity index of *do* with respect

to *facultas* is particularly high: 6.35. However, the list of co-occurents for this lemma does not include any modal marker. All the other lemmas in the list of co-occurents point towards the notion of knowledge, especially in eloquence (*scientia* 'knowledge', *orator* 'orator, speaker', *eloquentia* 'eloquence'); or towards the notion of opulence (*pecuniarius* '(related to) money', *administro* 'to manage, administrate').

***Forsitan*.** This epistemic adverb is very infrequent in the Opera Latina corpus, with only 158 occurrences. Nonetheless, the list of co-occurring lemmas obtained from the corpus presents some interesting results. Again, we observe another loop co-occurrence: the modal marker that shows the highest specificity index with *forsitan* is *forsitan*, with the value 4.09. The co-occurrence is used to present alternative options in a discourse, both equally valid. The other epistemic adverb appearing in the list, though with a much lower specificity index (2.69) is *certe*. As mentioned above for *certe*, the use of different degrees in co-occurrence is frequently observed in literature both in Latin and for other languages, and it will be observed in this study as well. However, it is important to mention that this type of co-occurrence was observed in the corpus between *fortasse* and *certe*, but not between *forsitan* and *certe* (see Figure 6.1 and Table A.4).

***Fortasse*.** This adverb counts 292 occurrences in the corpus. It is more frequent than *forsitan*, but much less frequent than the corresponding adverb of epistemic certainty *certe*, discussed above (and *forte*, as I will show shortly). For *fortasse*, many of the observations made for other epistemic adverbs seem to apply. Firstly, there is the presence of a loop co-occurrence. Once again, the first co-occurent of *fortasse* is *fortasse* itself, with a high specificity index (6.35). The interpretation of this result is similar to what has been observed for *forsitan*, indicating the use of repetition to introduce alternatives and organise the discourse. In Chapter 8, dedicated to non-hierarchical co-occurrences, examples of this type will be shown and analysed. In addition to this loop, various frequent markers are observed in the list for *forsitan*: *debeo*, *possum* and *valeo*. Again, this type of result can be linked to the combinability of epistemic adverbs with all other types of modality, which leads these adverbs to count among their co-occurents several of the most frequent modal markers in the corpus.

***Forte*.** While in the corpus of Classical Latin *forte* is the least frequent epistemic adverb, in the Opera Latina corpus this adverb counts 660 occurrences, more than the other two adverbs of epistemic possibility *forsitan* and *fortasse*, and around the same frequency as the adverb of epistemic certainty *certe*. However, among its co-occurrences, there is no trace of modal markers. Therefore, it seems to be used much less than its semantic equivalents *forsitan* and *fortasse*, both in oppositional argumentative structures and as a full epistemic modal marker expressing uncertainty. It is interesting to note, however, that in the top positions with a high degree of specificity index, we find the subordinating particles *si* 'if' and the corresponding

negative particle *nisi* 'if not', which are often found used together with *forte*, almost in a collocation, as hedges, to introduce an argument from which the speaker wants to distance himself/herself (see *forte* in Chapter 2, section 2.4, page 30).

***Licet*.** This impersonal modal verb is one of the most frequent markers in the corpus of Classical Latin, and it was confirmed to be one of the most frequent also in the Opera Latina corpus. In the latter, it counts 1639 occurrences. However, the only marker that appears in the list of co-occurents in the Opera Latina corpus in *licet*, which suggests again another case of loop co-occurrence. This result confirms, in this case, the observations made within the corpus of Classical Latin, where a loop was observed already in correspondence with *licet*. On the other hand, many of the co-occurrences observed for *licet* in the corpus of Classical Latin (especially with *possum* and *debeo*, but also e.g. with *probabiliter*, *necessarius* and *fortasse*) do not emerge or are not significant in Opera Latina.

***Necessario*.** The modal adverb *necessario* is the least frequent marker in the Opera Latina corpus, counting only 81 occurrences. In this case as well, a loop is found among the top co-occurents in the list of *necessario*, with a specificity index of 4.71. It is worth mentioning the presence of the markers *iniquus*, with an index of 4.2, and *possum*, with an index of 3.79, among the list of co-occurents in the corpus.

***Necessarius*.** The modal adjective *necessarius* counts 312 occurrences in Opera Latina. The list of co-occurents for this adjective in the corpus does not include any modal marker besides *necessitudo*. However, many of the co-occurents seem to point towards the meaning 'connection, relative, friend', more generally indicating someone who is close to someone else with a close relationship of some kind. The noun *necessitudo* itself can indicate, in its non-modal use, this type of bond. Other words in the list that suggest this interpretation are *meus* 'mine', *familiaris* 'of, related to a household, a family' or 'familiar, close' and 'friend'.

***Necesse est*.** This modal construction counts 597 occurrences in the Opera Latina corpus. *Necesse* is the marker with the highest number of markers among the co-occurents in the list on Opera Latina. The first-ranked lemma in the list is, not surprisingly, *sum*, with a specificity index of 37.56, the highest so far, which is easily explained by the tendency of *necesse* to appear in the impersonal modal construction *necesse est*. The third marker in the list is *necesse*: once again a loop is ranked high in the list of co-occurents in Opera Latina, with a (high) index of 8.13. Other markers lower in the list that co-occur with *necesse* are *debeo* (5.22), *licet* (3.57), and *possum* (3.54).

***Necessitas*.** The noun *necessitas* occurs 326 times in Opera Latina. The list of co-occurents for *necessitas* in this corpus does not include any of the modal markers targeted in this study.

***Oportet*.** This modal marker is quite frequent in the Opera Latina corpus, with 831 occurrences. The first-ranked lemma in the list obtained from Opera Latina is also a modal marker, and it is, again, a loop co-occurrence for *oportet*, with a high specificity index of 27.72. The only other marker present in the list is, with a much lower index, *opus est* (5.71). Compared to the results obtained on my Classical Latin corpus, the numerous co-occurrences of *oportet* that emerge in Figure 6.1 seem to be very diluted in the Opera Latina corpus. Particularly, only the loops and the co-occurrence with *opus est* survive, to the advantage of numerous non-modal nouns and verbs (as a reminder, *oportet* can be constructed with a noun or with a verb in the infinitive or introduced e.g. by *ut*).

***Opus est*.** This impersonal construction occurs 515 times in Opera Latina. One of the lemmas with the highest specificity index is *sum* (6.34), which, as it was observed for several other constructions of this type above, is used to form the modal impersonal construction *opus est*. Besides that, *opus* counts several markers among its co-occurents in the Opera Latina corpus. One of these is *opus*, which again draws the attention on a significant use of loop co-occurrences in Opera Latina: *opus* follows directly *sum* in the list of co-occurents, with a specificity index of 6.28. Other markers that appear in the list of co-occurents for *opus* are *necesse*, with a specificity index of 3.69, *usus (est)* (3.17), and *possum*, with a much lower index compared to the other markers (2.96).

***Possum*.** As the reader might recall, this is the most frequent marker in my corpus of Classical Latin texts, as shown by its count in corpus shown in Table 6.3. It is also the most frequent marker among the ones considered for this overview on the Opera Latina corpus, with 9945 occurrences. The list of co-occurents sorted out from the corpus Opera Latina contains only two modal markers. Once again, the first marker ranked in the list is *possum*, with a specificity score of 6.01, indicating a high tendency to appear in loop co-occurrences for this marker. The other marker in the list is *debeo*, with a specificity index of 3.97. The co-occurrence between *possum* and *debeo* was widely observed also in my corpus of Classical Latin texts. It emerges quite clearly from the comparison with Figure 6.1 that while in the network *possum* is connected to many of the markers targeted in this study, in a study on co-occurrences in general within a bigger corpus, almost none of the combinations shown in the network shows a significant specificity index. This can be explained by the very high count of *possum* within Opera Latina, and by the fact that the co-occurrence of modal markers is in general a very limited phenomenon, which is overshadowed by all the other co-occurrences observed in Opera Latina.

***Potestas*.** The marker of possibility *potestas* occurs in Opera Latina 917 times. Among the list of co-occurents in the corpus there is the verb *do*, probably due to the construction *potestatem do* ‘to give permission’, ‘to give the possibility’ which expresses deontic authority or

dynamic possibility, depending on the context. Other co-occurents belonging to the domain of modality are the markers *ius* and *nequeo*. The latter is especially interesting because it does not appear among the modal markers in co-occurrence in my Classical Latin corpus. Moreover, as it will be shown shortly, it does not appear in the list of co-occurents of its positive counterpart *queo*. Concerning the presence of *ius*, this might indicate the modal use of this marker (in the construction *ius est*) to express deontic authority, in accordance with the deontic use of *potestas* and *potestatem do*. However, it should be mentioned that most of the co-occurents of *potestas* in Opera Latina seem to be related to the meaning 'power, strength', also intended as 'political power' (*consul* 'consul', *rex* 'king', *tribunus* 'chieftain, tribune', *plebs* 'common people, plebeians', *vis* 'strength', but also 'power' and 'military force', *imperium* 'power, command'; but also note the presence of *permitto* 'to allow', with a specificity index of 5.9).

***Probabiliter*.** The adverbial form *probabiliter* does not occur in the Opera Latina corpus accessed from the Hyperbase Web platform, therefore I was not able to extract the most frequent co-occurents for its lemma. The absence of *probabiliter* is not entirely surprising: the adverb occurs only twice in my corpus of Classical Latin, and only once in co-occurrence with another marker.

***Queo*.** This modal verb occurs only 193 times in the Opera Latina corpus. None of the co-occurents listed for *queo* in Opera Latina is included in my list of modal markers. Moreover, the list of co-occurents obtained from Opera Latina does not seem to suggest any specific tendencies of co-occurrence relevant for this study: the lemmas range from proper nouns, to nouns to other verbs. Proper nouns and animate entities e.g. *senex* 'old man' might suggest the use of *queo* as a dynamic marker, indicating possibility internal or external to the participant. However, it is important to mention that the first co-occurent in the list, with an extremely high specificity index (5.57), is the negative particle *non*. In this respect, the reader should recall that, as mentioned in section 2.4.20 (Chapter 2, 91), specific studies on *queo* and *nequeo* have observed that *queo* tends to occur more frequently with negative polarity, preceded by the external negation *non* (Moussy 2002a; Dell'Oro 2023). In such cases, *non queo* is used as a variant for *nequeo*, indicating negative possibility. However, concerning modal co-occurrences, the results on Opera Latina seem to confirm the results obtained on my corpus on the isolation of *queo* with respect to the other modal markers. In Figure 6.1 this modal verb occurs only with *possum*; in Opera Latina, co-occurrences of *queo* with *possum* or other modal markers do not show a significant specificity score.

It is possible to draw some general conclusions based on the comparison between the results obtained on Opera Latina for the general co-occurents of the markers, and those obtained on my corpus of Classical Latin specifically for the co-occurrence of modal markers.

- The isolation of *aequus* and *iniquus* from all the other markers that emerges from Figure 6.1 seems to be confirmed by the results obtained on a much larger corpus. This might open new future paths of research aimed at investigating the reasons behind their behaviour: these markers rarely occur with a modal meaning and tend to occur together, both when modal and when not modal, and often in contrastive relationships.
- Epistemic adverbs are the types of markers that count the highest number of modal markers among their co-occurents in Opera Latina. As the adverbs *certe*, *forsitan*, *fortasse*, *forte* do not express types of modality other than the epistemic one, this might be interpreted as a confirmation to the tendency of epistemic modality to easily combine with all the other types of modality, which has been observed already for other languages and that still needs to be verified in Latin (see the analysis illustrated in Chapter 7).
- Epistemic adverbs also show the tendency to co-occur with each other, especially when they express different degrees of epistemicity. Co-occurrences of the same epistemic marker are rare or non-existent, whereas we do frequently observe loop co-occurrences for all the other markers. This suggests the uses of different degrees of epistemicity with argumentative purposes, to convey an argument and to use them with a shield function. This phenomenon has been already observed e.g. in French, and mentioned in Latin with respect to the use of epistemic markers as focalisers (see some of the examples presented in Chapter 8).
- The cases of loop co-occurrences observed for modal markers in the Opera Latina corpus are extremely frequent. For some markers, such cases were already observed in the corpus of Classical Latin (e.g. *debeo* and *licet*). For other markers, this adds to the results obtained on the Classical Latin corpus (e.g. *aptus*, *decet*).

6.4 Attraction between types of modality in co-occurrence

As the types of modality considered for this study are only 4 i.e., deontic authority, deontic acceptability, dynamic and epistemic modality, it is not useful to determine a minimal frequency for inclusion in the analysis as I did for the markers. The degree of attraction between types of modality was determined based on the whole matrix. As for the markers, I looked both at the SCS and the SIQ.

The SCS for each pair are shown in Table A.5 in the Appendix (A, page 306). The symmetric independence quotients are shown in Table A.6 in the Appendix (see A, page 306). The degree of attraction between the types of modality in co-occurrence, expressed with the symmetric independence quotient, can be visualised in the sieve plot shown in Figure 6.3.

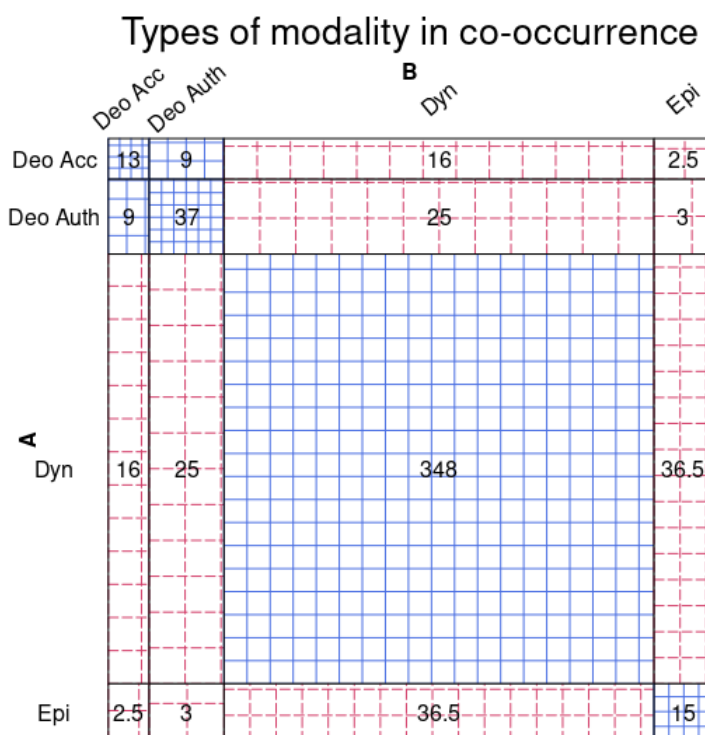


FIGURE 6.3: Modality count in co-occurrence for the types of modality in the corpus (sieve plot).

In this diagram, it is immediately evident that the modalities that register some type of attraction in co-occurrence are located on the main diagonal or next to it. It appears that same types of modality tend to attract and be attracted to each other: deontic modality tends to be attracted towards other markers of deontic modality (in the types acceptability or authority); dynamic modality tends to be attracted to other markers of dynamic modality, either possibility or necessity; epistemic modality shows an attraction to other markers of epistemic modality. As one can see from the SCS in the Appendix, both dynamic possibility and dynamic necessity are widespread across the table so it is not surprising that dynamic modality has such a wide area, indicating to a high expected frequency of co-occurrence with itself. The results for dynamic modality are particularly interesting for the discussion on cases of scope hierarchisation in Chapter 8: as I will explain in that Chapter, a specific type of co-occurrence that often results in scope hierarchisation is the co-occurrence of a marker of necessity scoping over a marker of possibility, the two being related by a relation of cause-effect. Interestingly, epistemic modality does not seem to show any attraction, but rather repulsion towards the other types of modality, despite being the type of modality that appears the most in cases of scope hierarchisation. However, it is important to note that the cases of scope hierarchisation are very few compared to the whole sub-corpus of the

co-occurrences (only 82 i.e., 9% of all the co-occurrences), and probably do not have enough impact on the measure of attraction.

6.5 Combining types modality and modal markers

In this section I will analyse which markers are able to express what types of modality, when found in co-occurrence. The attraction between a specific marker and a type of modality was computed, as for the co-occurrences shown in the previous sections, by using the independence quotient. Table 6.5 shows all the combinations observed in the corpus, and it can be visualised as a heatmap in Figure 6.4.⁹ The scale of colours indicates the degree of attraction between a marker and a type of modality: the darker the shade, the stronger is the attraction. The values of the independence quotient show some differences among the co-occurring markers in the corpus. As mentioned in Chapter 2, some of the markers in the list are polyfunctional, meaning that they can express more than one type of modality, depending on the context in which they occur. The polyfunctionality of modal markers is a well-known topic in literature about modality, and this holds true for Latin modal markers. Among the markers shown in Table 6.5, some retain their nature as more or less polyfunctional markers. But, based on the independence quotient values, only two of them are positively attracted to more than one type of modality. The adverb *necessario* is positively associated with deontic acceptability and dynamic modality; the verb *oportet* with deontic acceptability and deontic authority. These two markers also express epistemic and dynamic modality in the corpus, but their association with these types of modality is not significant (the value of the independence quotient is less than 1). There are also other markers that do not show positive association values with more than one type of modality but still express at least two types of modality in the corpus i.e., they show non-zero values in the table. These include the markers *debeo*, *facultas*, *licet*, *necesse est*, *necessitas*, *possum*, and *potestas*. In particular, *debeo* and *possum* are associated with all four macro-types of modality, showing a specific attraction towards deontic acceptability and dynamic modality, respectively. It is worth recalling that these two markers have the highest count in co-occurrence in the corpus (respectively 837 and 187), which means they appear in the most co-occurrences. This may have an impact on the fact that they express all types of modality, but they do not show positive association with more than one type of modality, unlike a relatively rare co-occurring marker like *necessario* (its count in co-occurrence is only 20).

The majority of markers in co-occurrence, however, are associated with only one type of modality. Among these there are *aequus* and *iniquus*. I have already discussed the particular

⁹ The reason for choosing this type of visualisation instead of the sieve diagram used earlier in this chapter is due to the limitations of the sieve diagram on the number of variables that can be displayed. The number of markers in association to the types of modality is too large to be visualised effectively in a sieve diagram.

status of *aequus* and *iniquus* as outliers in the corpus of co-occurrence. They occur only once, and they are both associated to deontic modality, of the type acceptability. For some other markers, the absence of polyfunctionality is not surprising. All markers exclusively associated with epistemic modality are adverbs (*certe*, *forsitan*, *fortasse*, *forte*, *probabiliter*) or constructions (*dubium est*, *certum/incertum est*) which exclusively express epistemic modality.

	deontic acceptability	deontic authority	dynamic	epistemic
<i>aequus</i>	14,77	0	0	0
<i>aptus</i>	0	0	1,39	0
<i>certe</i>	0	0	0	10,51
<i>certus</i>	0	0	0	10,51
<i>debeo</i>	4,77	0,81	0,79	0,17
<i>decet</i>	0	0	1,39	0
<i>dubius</i>	0	0	0	10,51
<i>facultas</i>	0	0,56	1,30	0
<i>forsitan</i>	0	0	0	10,51
<i>fortasse</i>	0	0	0	10,51
<i>forte</i>	0	0	0	10,51
<i>incertus</i>	0	0	0	10,51
<i>iniquus</i>	14,77	0	0	0
<i>licet</i>	0,20	6,67	0,26	0
<i>necessario</i>	2,27	0	1,07	0,81
<i>necessarius</i>	0	0	1,39	0
<i>necesse sum</i>	0	0,56	1,25	0,35
<i>necessitas</i>	7,39	0	0,70	0
<i>oportet</i>	2,85	1,02	0,95	0
<i>opus sum</i>	0	0	1,39	0
<i>possum</i>	0,24	0,55	1,24	0,28
<i>potestas</i>	0	5,84	0,42	0
<i>probabiliter</i>	0	0	0	10,51
<i>queo</i>	0	0	1,39	0

TABLE 6.5: Combinations of markers and types of modality found in co-occurrence (independence quotient).

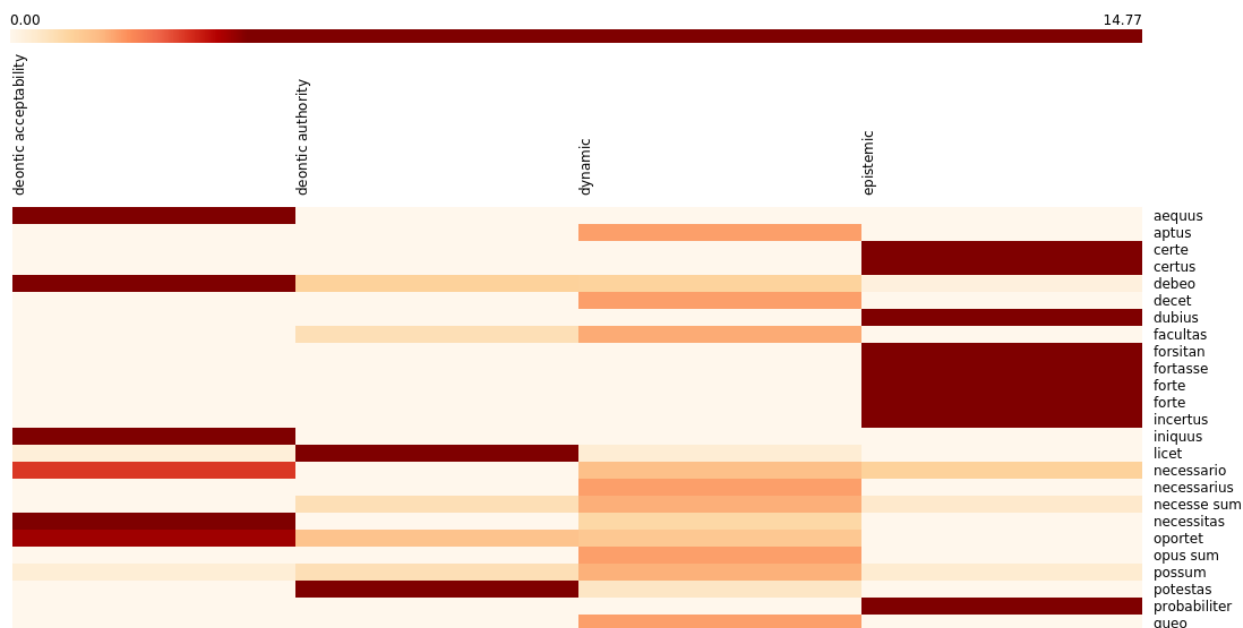


FIGURE 6.4: Visualisation of the combinations of modal markers and types of modality found in the co-occurrences (independence quotient).

6.6 Syntactic structures involved

		count	total count	%
Coordination	Asyndetic coordination	68	145	24.9
	Presence of coordinating particles	77		
		ADV + V	36	
Absence of Coordination	AcI or infinitive	7	438	75.1
	<i>ut/quin</i> + subjunctive	4		
	Subjunctive	2		
	Satellite (adverbial) clauses	378		
	Incidental clauses	11		
Total		583		100

TABLE 6.6: General statistics on the sentences in the corpus.

In Table 6.6, I show some general statistics about the main types of syntactic structures found in cases of co-occurrence. These results are based on the curated output of the co-occurrence extraction: they account for all pairs of markers in the corpus that were annotated as modal. The Table is organised based on the description of the syntactic relations outlined in Chapter 5, section 5.2 (page 156). The cases of co-occurrence are first distinguished based on the

presence or absence of coordination between the co-occurring markers. The cases of coordination include the presence of coordinating or adversative particles e.g. *et*, *at*, *sed*, as well as correlative adversative constructions such as *non solum... sed etiam*. The co-occurrence in coordination can also appear in cases of asyndetic coordination i.e., with the use of commas to separate coordinate clauses.

As shown in Table 6.6, the cases of co-occurrence in absence of coordination are much more numerous than the cases of coordination. The category 'absence of coordination' includes in fact very different types of syntactic structures. The first type is the combination of a modal adverb scoping over a modal verb within the simple clause (ADV + V). then modal predicates governing an accusative with infinitive clause or an infinitive (such as *possum* or *debeo* as modal auxiliaries); modal predicates governing a completive clause introduced by *ut* or *quin* and the subjunctive; modal predicates governing another modal predicate in the subjunctive mood; modal predicates occurring in a satellite (also called adverbial clause), depending on the co-occurring modal predicate; modal predicates occurring in two different incidental clauses (such as the use of parenthetical, as shown in example 208, page 161).

The first four types of relations include all types of syntactic relations that enable a case of scope hierarchisation in the corpus. As mentioned in the previous chapter, cases of ADV + V naturally imply scope hierarchisation, as the adverb, unless it is used as a focaliser with a restrictive and/or argumentative function, always modifies the main verb. In the previous chapter I also outlined the difference between argument and satellite clauses, as well as the use of modal verbs such as *debeo* and *possum* with the present infinitive. These cases are illustrated by the following three types of relation in Table 6.6: AcI (accusative with infinitive) or infinitive, *ut* or *quin* with the subjunctive, or the subjunctive alone. Occurrences in these types of structures are extremely unfrequent with respect to cases of ADV + V, and even less frequent with respect to all the other types of syntactic structures.

The remaining syntactic structures (coordination in presence or absence of a coordinating particle or structure; adverbial clauses e.g. concessive, purpose, temporal clauses; incidental clauses) do not host relations of scope hierarchisation. These cases are much more frequent in the corpus, despite the much wider attention dedicated to hierarchical co-occurrences in the literature. The following chapters will be dedicated to the analysis of both cases of co-occurrences (herarchical in Chapter 7 and non-hierarchical in Chapter 8), with specific attention dedicated also to the syntactic structures in which they occur.

As explained in Chapter 5, section 5.3 (page 161) through the diagrams of co-occurrence, the relation between co-occurring markers can take different forms, from the most simple to the most complex. Relations of subordination are observed in both types of co-occurrence that will be analysed in the following two chapters, that is both in presence and absence

of scope hierarchisation. The relations of coordination are the second most frequent types of relation in the corpus, although much lower than the cases of subordination. This type of syntactic relation, contrarily to subordination, only appears in cases of absence of scope hierarchisation (Chapter 8). Finally, the cases of ADV + V are much less frequent than the others. As it will be shown in Chapter 7, the cases of subordination are the only types of syntactic relation that allow for both cases of presence and absence of scope hierarchisation. The relations of ADV + V and coordination, as mentioned above, strictly overlap with only one type of relation between the markers, i.e., presence (ADV + V) and absence (coordination) of scope hierarchisation.

6.7 Concluding remarks on the quantitative analysis

This quantitative study of the co-occurrences represents an important source of information that provides a general quantitative assessment on the co-occurrences and that will be used to guide the qualitative analysis described in the following chapters.

First and foremost, the incidence of the phenomenon of modal co-occurrence in the corpus of Classical Latin under examination proves to be rather rare. As shown in Table 6.1 (page 170), 2% of the sentences in the corpus present the co-occurrence of two markers, and 0.4% of the sentences presents the co-occurrence of three markers. Therefore, only 2.4% of the sentences in the corpus present the co-occurrence of at least two markers. Within this number, it is also necessary to identify in which cases the markers actually express a modal value. The list of co-occurring markers, after the screening of a first qualitative analysis of the sentences, is further reduced. Some markers are definitively eliminated from the list (refer to Table 6.3): they are *aeque*, *dubie*, *meum est*, *necessitudo*, *usus est*, *nequeo* and *valet*. In other cases the co-occurrences appear particularly reduced: this applies in general to all markers to a different extent, but it concerns in particular *aequus*, *aptus*, *certus*, *facultas*, *incertus*, *iniquus*, *necessitas*. In terms of co-occurrence rate, *possum* is the most represented marker in the corpus in general, which drops its co-occurrence rate to only 19%. However, this places *possum* in the high range of co-occurrence rates, together with other markers such as *debeo*, *dubius*, *licet*, *oportet*. Particularly interesting is the high co-occurrence rate of epistemic adverbs *forte*, *fortasse*, *fortitan*, and *certe*, which more or less always maintain their epistemic value in co-occurrence, except for some cases in which they are used as focus markers rather than modal markers. It is mandatory to comment on *probabiliter*, because its co-occurrence rate at 50% can be misleading: the adverb occurs once in the co-occurrence, and only twice in the whole corpus, which does not provide enough data on the behaviour of *probabiliter* either in co-occurrence or alone.

As for the types of modality, it has been noted that dynamic modality is by far the most represented type of modality in the corpus of co-occurrences and in the sample considered for the analysis. Dynamic modality is followed, to a much lesser extent, by epistemic and deontic acceptability (refer to Table 6.4, page 176). This is possibly also related to the fact that the most frequent markers in the co-occurrences and in the corpus are *possum*, *debeo*, *oportet*, which have a highly polyfunctional value regarding the type of modality that they can express, but are also strongly associated with dynamic modality. This information is provided by measures of association between markers and types of modality (refer to Table 6.5, page 198). Extremely frequent markers such as *possum*, *debeo*, *oportet* and *necesse est* show a high degree of attraction exclusively with dynamic modality (>1), and to a lesser extent in some cases with other types of modality. The only exception is *debeo*, which shows a level of attraction to deontic acceptability even higher than the other types of modality.

In this respect, the value of attraction was also used to identify which markers (among modal co-occurrences) are more attracted to each other. To have a general overview of all markers, I used the network presented in Figure 6.1. Besides the features described earlier in the chapter, some elements emerge from the network, which will be relevant for the discussion in the following chapters. In particular, the markers *opus est*, *oportet*, *dubius*, *debeo*, *possum*, *fortasse* and *licet* present loop co-occurrences. The role of this configuration in the use of co-occurrence will reveal i) that it often concerns co-occurrences not only of the same marker but also of the same type of modality, ii) that the repetition of the marker often has more rhetorical-argumentative purposes than strictly semantic ones.

Attraction measures have also helped revealing the relationships between modalities at the level of co-occurrence. One particularly interesting result is that the three macro-types of deontic, dynamic, and epistemic modality attract each other, regardless of their sub-types. Moreover, the deontic modalities of authority and acceptability attract both each other and themselves. As I will show in the following chapters, especially in Chapter 8, this often results in co-occurrences of the same marker, or of different markers expressing different degrees (for scalar categories) or opposite notions (for polar categories) of the same type of modality. It was mentioned at the beginning of this work that I identified two types of co-occurrences during this study: one in cases of scope hierarchisation, and the other in the absence of scope hierarchisation. Unfortunately, the former have proved to be too few in number to apply association metrics successfully. Therefore, in that case, quantitative evaluation will be limited to co-occurrence counts and co-occurrence rates of modal types. The second type of co-occurrence represents the vast majority of the total number of co-occurrences. Therefore, in Chapter 8, I will revisit these metrics to apply them to the specific case of co-occurrence in the absence of scope hierarchisation and verify whether parallel situations to those observed on the entire corpus emerge.

Now that I have illustrated the methodology used for the quantitative analysis and that I have given a quantitative overview on the entirety of the corpus, I will illustrate the results of the in-depth analysis of the co-occurrences. As mentioned above, the analysis is divided in the following two chapters based on the presence or absence of scope hierarchisation. When relevant, and when the quantity of data allows it, I will also present the results of quantitative analysis on the subset of co-occurrences described in each chapter.

7 Scope hierarchisation: embedding of modal markers

Thus far, I have delineated two scenarios for analysing the co-occurrence of modal markers, hinging on the interplay between the co-occurring markers and their respective scope. In one scenario, one marker is encompassed within the scope of the other. In this case, the two markers do not operate independently within the sentence; rather, one modifies the other by projecting its own modal value onto the co-occurring marker and its scope. In the alternative scenario, the two markers maintain distinct scopes or share a common one, yet they independently modalise it. This second type of co-occurrence and its implications will be expounded upon in the next chapter. In this chapter, I will discuss the first type of co-occurrence, which falls into the category that I have labelled ‘scope hierarchisation’ (the term was briefly introduced in Chapter 5 and repeatedly used in the following chapters). Following Narrog (2009, 177) (see Chapter 4), I will refer to the markers and types of modality that scope over others as ‘embedding marker/modality’; vice versa, I will refer to markers and types of modality that are included in another one’s scope as ‘embedded marker/modality’. Example 216 was presented in Chapter 5 (as example 6) to illustrate a simple case of scope hierarchisation in a sentence with co-occurrence.

(216) = (6) **Maybe** I **can** find someone to apprentice me.

As a reminder for the reader, in this example it is possible to observe the co-occurrence between *maybe*, a modal adverb expressing epistemic possibility, and *can*, a modal auxiliary expressing dynamic possibility (specifically, an external possibility of the participant). *Can* modifies the representation *to find someone to apprentice me*, whereas *maybe* scopes over the propositional content of the whole clause. From a syntactic point of view, *maybe* is located on a higher or more external layer of the clause with respect to the predicate *can find*. From the point of view of the modal analysis, we can observe a modalisation chain: *can* modalises the representation *to find someone to apprentice me*; *maybe* modalises the whole clause *can find someone to apprentice me*.

In more general terms, in this type of co-occurrences the asymmetric relation established primarily on a syntactic level is transferred onto the semantic (specifically modal) level: as *maybe* embeds both *can* and its own scope, it is placed at a higher level of the hierarchy of scopes in this sentence. Moreover, the value of epistemic possibility expressed by *maybe* is projected down the hierarchy and applied to the value of dynamic possibility expressed by *can*. As a result, the final modal reading of the representation in sentence 6 will look like [EPIPOS[DYNPOS[SOA]]], where DYNPOS corresponds to *can* and EPIPOS to *maybe*. The latter introduces a notion of uncertainty to the notion of external possibility conveyed by the former. Therefore, in such cases a hierarchical structure emerges in which the marker embedding the other one into its scope is at a higher level than the marker that is embedded. Similar cases of scope hierarchisation were found in my corpus of Classical Latin, as illustrated in example 217 (I include the left context to facilitate the comprehension).

- (217) “*Quid ergo? tu poteris videre morientem filium?*” *fortasse non potero*
 what then you be_able see die son maybe not be_able
et ideo irascor dum licet.
 and therefore be_angry while be_possible

“What then? Will you be able to tolerate seeing your son die?” **Perhaps** I will not **be able to** and therefore I am angry while I have the chance. (Seneca the Elder, *Controversiae* 2, 3, 3)¹

In this sentence, the epistemic adverb *fortasse* embeds the modal verb *possum* (in the form *potero*), which in this case expresses dynamic possibility (in the example I show the previous context in order to clarify the implicit scope of *potero*, which is *videre morientem filium* ‘to see (your) son die’). The analysis applied to example 6 also holds for this sentence: the value of epistemic possibility expressed by *fortasse* is inherited by the value of dynamic possibility expressed by *potero*. The semantic hierarchy of the modal meanings co-occurring in example 217 can be represented as [EPIPOS[DYNPOS[SOA]]], where DYNPOS corresponds to *potero* and EPIPOS corresponds to *fortasse*.

As mentioned in the introduction, various theories have addressed the hierarchy between modalities, both cross-linguistically (van Valin and LaPolla 1997 in Role and Reference Grammar; Dik 1997 and Hengeveld and Mackenzie 2008 in Functional Discourse Grammar; Cinque 1999, 2001, 2006 in Generative Grammar; Nuyts (2006) in Functional-Cognitive Grammar) and at a language-specific level (Nuyts 2004; Narrog 2009), with some reference to Latin (Orlandini 2001, 313–365; Pinkster 2004, 196).

¹ There is another marker in this sentence i.e., *licet*, but to illustrate the scope hierarchisation I am focusing on the co-occurrence of *fortasse* and *possum*, in bold.

What is missing from these studies is a focus on the impact of this hierarchical structure on the semantic relation between the markers involved, especially for Latin, and an insight on the type of syntactic structures that allow specific types of modality and markers to embed each other. The relevance of this type of information emerges even more if one looks at the co-occurrences that will be analysed in Chapter 8. Consider example 218, presented in Chapter 5 as example 209.

(218) = (209) *Fruor dum licet, opto ut semper liceat.*
 enjoy while be_possible hope that always be_possible

I enjoy it as long as **I am able to**, I pray I **may** always **be able to**. (Cicero, *Epistulae ad familiares* 195, 2)

In this case, none of the co-occurring markers projects its modal value onto the other. As mentioned in Chapter 5, and as it will be explained in more details in the next Chapter, this does not mean that there is no relationship between the two markers at all. However, this relationship is played out on a different level of analysis, as in this case a modal hierarchy does not apply. Therefore this co-occurrence does not inform us on the hierarchical relationship between different (or same) types of modality. For the co-occurrence in example 209 a representation such as [DEOAUT[DEOAUT[SOA]]] would not work, because the two markers keep separate scopes. Consequently, they do not interfere with each other's modal value as in example 6.

Throughout this Chapter I will showcase the results of my analysis on scope hierarchisation, focusing in particular on i) the markers and types of modality involved in this type of relation, ii) the direction of the relation i.e., which markers and types of modality can embed which others, and iii) the types of syntactic structure in which this type of relation can fit, and to what extent. The chapter will be structured as follows: there will be two main sections, one dedicated to illustrating the relationships between different types of modality, and the other to syntactic structures that allow for scope hierarchisation. Regarding the first section, after illustrating the embedding relationships between different types of modality, I will proceed to analyse specifically each type of modality, in order to show the hierarchical relationships emerged from this study and how they relate to previous literature. The second section will show the types of syntactic structures that allow for co-occurrence in scope hierarchisation, namely ADV + V and (some types of) subordination, and the various types of modality and markers that have been observed in correspondence with one or the other syntactic structure. For both the first and second sections, I will focus on the semantic interpretation of the combinations, indicating whether it involves reinforcement or weakening of the embedded marker by the embedding one, or whether a discursive use of co-occurrence can be detected, as described, for example, for French by Rossari (2016).

Before moving on to the in-depth analysis, I will give a quantitative assessment of the cases of scope hierarchisation in the corpus. Table 7.1 shows the number of co-occurrences with and without relations of scope hierarchisation between the markers. To obtain the values shown in Table 7.1 only the sentences in which both markers are modal were counted.

	count	%
Presence of embedding	49	8.4
Absence of embedding	534	91.6
Total	583	100

TABLE 7.1: Cases of embedding in the corpus.

As shown in Table 7.1, the cases of scope hierarchisation cover only the 8,4% of the total number of co-occurrences retrieved in the corpus. In most cases of co-occurrence there is no embedding, which may seem surprising given that the discussion around the combination of modal markers has mostly focused on this type of relationship. In this respect, it should be kept in mind that the notion of co-occurrence adopted for this study is looser than the one to which most previous studies refer. That is to say, that all cases in which the markers appear in the same sentence are taken into account in this study, and not only combinations within the simple clause. I must specify that the analysis of markers such as *certe* or the epistemic *licet* was in some cases complicated by their potential use as discourse markers, and specifically by the fact that they can take up a concessive value, especially in specific argumentative structures (see their respective descriptions under section 2.4). Therefore, in some contexts it was particularly hard to determine if the modal marker preserved its modal epistemic value or rather had a concessive or argumentative function. In those cases, I annotated the marker as epistemic. I will illustrate these occurrences in section 7.1 and I will discuss them into detail in section 7.2.1.

In this chapter, as in the following one, I will present a close qualitative analysis of the sentences with co-occurrence. For this reason, the modal categories used for the discussion will be defined according to a finer scheme than the macro-categories of dynamic, deontic, acceptability, deontic authority and epistemic (shown e.g. in Figure 6.3, page 196). When relevant to the discussion of the examples, I will refer to the notions of possibility and necessity within the dynamic category, as well as to different degrees of epistemicity or acceptability, and values of obligation or permission for deontic authority.

7.1 Embedding: the types of modality involved

The types of modality involved in scope hierarchisation in the corpus and their corresponding co-occurring markers are shown in Table 7.2. This Table represents all the co-occurrences for which I annotated a relation of scope hierarchisation, regardless of the type of syntactic structure. In Table 7.2 the types of modality and their associated markers are classified based on their role as embedding (rows) or embedded (columns) marker/modality. The direction of the embedding relation between specific markers is signaled by the sign '>' e.g. *necessario>oportet* refers to a specific co-occurrence in which *necessario* embeds *oportet*, and where dynamic necessity (*necessario*) embeds dynamic necessity (*oportet*). I will discuss this example when dealing with dynamic modality.

Embedding modality	Embedded modality					
	deontic acceptability	deontic authority	dynamic	epistemic		
deontic acceptability	0	0	0	0	0	0
deontic authority	0	0	0	0	0	0
dynamic	0	0	(?) <i>necessario</i> > <i>oportet</i> <i>potestas</i> > <i>oportet</i> <i>debeo</i> > <i>possum</i> <i>oportet</i> > <i>possum</i> <i>opus est</i> > <i>facultas</i> <i>facultas</i> > <i>possum</i> (x3) <i>possum</i> > <i>possum</i>	2	<i>oportet</i> > <i>dubius</i> <i>possum</i> > <i>dubius</i>	11
epistemic	4	<i>forte</i> > <i>debeo</i> <i>fortasse</i> > <i>debeo</i> <i>certe</i> > <i>debeo</i> (x2)	2	<i>certe</i> > <i>licet</i> <i>fortasse</i> > <i>licet</i>	1	<i>forte</i> > <i>dubius</i>
	4		2	40	3	49

TABLE 7.2: Embedding by types of modality and co-occurring markers (the total number of co-occurrences in scope hierarchisation i.e., 49 is in bold).

In order to have a more immediate representation of the distribution of the modality types in embedding and embedded positions in scope hierarchisation, I calculated the co-occurrence rate in scope hierarchisation in both positions for each type of modality. Results are shown in Table 7.3.

	count in scope hierarchisation	embedding modality count	%	embedded modality count	%
Deontic acceptability	4	0	0%	4	100%
Deontic authority	2	0	0%	2	100%
Dynamic	51	11	22%	40	78%
Epistemic	41	38	93%	3	7%
Total	98	49	50%	49	50%

TABLE 7.3: Distribution of the types of modality as embedding and embedded modality in scope hierarchisation.

Moreover, in order to understand whether certain types of modality are more specific than others to cases of scope hierarchisation, I compared the raw values shown in Table 7.2 with the total count of the types of modality appearing in the co-occurrences, regardless of the presence of scope hierarchisation.² The results are shown in Table 7.4.

	count in co-occurrence	count in scope hierarchisation	scope hierarchisation (%)
Deontic acceptability	79	4	5%
Deontic authority	140	2	1%
Dynamic	837	51	6%
Epistemic	111	41	38%
Total	1344	98	7.3%

TABLE 7.4: Distribution of the types of modality in cases of scope hierarchisation.

I will discuss the data shown in Tables 7.3 and 7.4 for each type of modality in the next sections, complementing it with the data illustrated in Table 7.2. In general terms, it can be observed that the four macro-types of modality have a rather uneven distribution in cases of scope hierarchisation. Epistemic modality is by far the most common type of modality in cases of scope hierarchisation and is found in the majority of cases in the embedding position. The other three types of modality have a significantly lower percentage of co-occurrences in this type of relation, with a particularly low peak for deontic authority (only 1%). All three categories have a much stronger tendency to appear in the embedded position than in the embedding position (deontic authority and acceptability only appear in embedded positions), especially compared to epistemic modality. Given this particular distribution, I will start describing the behaviour of epistemic markers in scope hierarchisation.

² The raw values for each type of modality in co-occurrence were shown in Table 6.4 (Chapter 6, page 176).

7.1.1 Epistemic modality

Looking at Table 7.2 as a whole, it is possible to identify certain patterns relating to scope hierarchisation, both in terms of modality types and the markers associated with them. Epistemic modality is the only type of modality that can embed all types of modality in the corpus, including epistemic markers. Moreover, Table 7.3 shows that epistemic modality has the highest rate in hierarchical co-occurrences as an embedding modality (93%, more than twice the category of dynamic modality). In only 7% of its co-occurrences in scope hierarchisation it occurs in an embedded position. Moreover, Table 7.4 shows that the rate of epistemic modality in scope hierarchisation is quite high: 38% of the co-occurrences in which epistemic modality is involved are cases of scope hierarchisation, while all the other types of modality do not reach 10%. If we compare the values of the count in co-occurrence with those in scope hierarchisation in Table 7.4, the tendency of epistemic modality to appear in hierarchical relationships becomes even more evident. In particular, despite dynamic modality being significantly more numerous than epistemic modality in co-occurrences in general, and slightly more numerous in hierarchical co-occurrences, epistemic modality exhibits a much higher rate in scope hierarchisation. Therefore, epistemic modality seems to show a strong tendency to appear in relations of scope hierarchisation, compared to all the other types of modality. Not coincidentally, as outlined in Chapter 3, most of the studies on the combination of modal markers, especially the pioneering ones, have focused on epistemic modality exclusively in cases of scope hierarchisation (e.g., Lyons 1977; Coates 1983; Palmer 2001). Moreover, these observations are consistent with all the studies mentioned at the beginning of this chapter, on the typological modal hierarchies. Although with different levels of flexibility within the hierarchy (see Chapter 3), all the studies agree on defining epistemic modality as the one with the widest scope properties. Throughout this section I will describe the cases in which epistemic modality embeds all the other types of modality in the corpus.

As shown in Table 7.2, epistemic modality scopes over both types of deontic modality, authority and acceptability, which only appear in the corpus in the role of embedded modalities. In example 219, epistemic modality embeds over deontic authority.

- (219) *Certe* *pugnare* *abdicatis* *licet*.
 certainly fight disinherit be_allowed

Certainly the disinherited **are allowed** to fight. (Seneca the Elder, *Controversiae* 1, 8, 4)

This example is comparable to example 6: *certe* is an epistemic adverb which expresses epistemic certainty. In this context the adverb scopes over the passage *pugnare abdicatis*

licet 'the disinherited are allowed to fight'. In this context, *licet* expresses deontic authority and it scopes over the SoA *pugnare abdicatis*. The adverb *certe* embeds *licet* and its scope, adding an epistemic value of certainty to the deontic authority value expressed by *licet*: [EPI[DEOAUT[SOA]]].³ This type of co-occurrence aligns with the concept of 'double modality' described by Halliday (1970, 330), in which one non-verbal marker (in this case the adverb *certe*) scopes over a verbal marker (in this case the modal verb *licet*). As shown in Table 7.2, the vast majority of scope hierarchisation where epistemic modality is in the embedding position adhere to the model of double modality.

The sentence in example 220 illustrates the case of deontic acceptability embedded by another epistemic marker.

- (220) *Nec vero nunc quidem culpa in eo est in cuius potestate omnia*
 and_not but now indeed fault in this be in which power all
sunt, nisi forte id ipsum esse non debuit; sed alia casu,
 be unless perhaps it itself be not should but some by_chance
alia etiam [in] nostra culpa sic acciderunt ut de
 other even in my fault in_such_way happen so_that about
praeteritis non sit querendum. reliquam spem nullam video.
 pass not be discuss leave hope none see

But actually there is no fault in the person who owns all the power, unless **perhaps** there **should** not to be such a thing; but some things have happened by chance, some others by our fault, in such way that the past should not be further inquired. I do not see any hope left. (Cicero, *Epistulae ad familiares* 200, 3)

In this sentence the epistemic adverb *forte* expresses epistemic uncertainty⁴, and it scopes over the text *id ipsum esse non debuit* 'there should not to be such thing'. The modal verb *debeo* scopes over the SoA *id ipsum esse*, expressing deontic acceptability (it is not acceptable to have a governor who holds all the power in his own hands). Again, the epistemic modality expressed by *forte* embeds the value of deontic acceptability expressed by *debeo*, which inherits the notion of uncertainty: [EPI[DEOACC[SOA]]].

The other case in which epistemic modality embeds another deontic marker is illustrated in example 221, but the analysis of this passage was slightly more complicated.

³ As I will show later in this chapter, in section 7.2.1, the epistemic value of the adverb *certe* is sometimes weakened in favour of an argumentative or discursive use, depending on the context in which it occurs.

⁴ The occurrence of the adverb *forte* with the conjunctions *si* 'if' and *nisi* 'unless, if not' will be further discussed in section 7.2.1. For now I will anticipate that *si forte* in this type of context seems to be closer to a collocation where the epistemic value of *forte* bleaches in favour of an argumentative use of this collocation.

- (221) *qui si cupiat esse rem publicam qualem fortasse et ille vult et*
 who if wish be state such perhaps and he want and
omnes optare debemus, quid faciat tamen non habet.
 all hope have_to what do however not have

Although he wishes the state to be **perhaps** as he wants and as all of us **should** desire, however he does not have anything that he could do. (Cicero, *Epistulae ad familiares* 195, 2)

In this sentence, the co-occurring markers are the epistemic adverb *fortasse* and the modal verb *debeo*. The latter was analysed as a marker of deontic modality, in the sub-type acceptability: 'it is desirable that we all pray for having a certain type of state'. The problem concerns the scope of *fortasse*. The adverb could include in the scope the two coordinate clauses *et ille vult* 'he wanted' and *et omnes optare debemus* 'and we ought to pray for'. The other option is that the scope of *fortasse* is limited to the first clause that it immediately precedes *et ille vult*. Determining the scope of *fortasse* is important because i) only if the first option is true, it embeds *debeo* and this co-occurrence can be analysed as a case of scope hierarchisation ii) if an epistemic adverb scopes over *debeo*, this has to be taken into account for the analysis of *debeo* as well. My reading of this sentence is that the adverb extends its epistemic value over both clauses. The reason for this is that the two clauses are coordinated by a symmetric structure of the type *et... et* 'and... and', and *fortasse* immediately precedes this structure. The co-occurrence of *debeo* and *fortasse* leads to the construction of an hypothetical situation in which it is not sure (but it is probable) that both the subject of the first coordinate clause *ille* and the subject of the second coordinate clause *omnes* want and wish for the state to be in a certain way.

Dynamic modality is by far the type of modality most frequently embedded by epistemic markers. Example 222 illustrates the embedding of a dynamic modality marker by epistemic modality.⁵

- (222) *Ergo si stantes et vivae siccescendo non senescunt, sine dubio*
 therefore if stand and alive drain not decay without doubt
cum eae ad materiam deiciuntur, cum ea ratione curatae fuerint,
 when it to timber take_down when that way treat be
habere poterunt magnas in aedificiis ad vetustatem utilitates.
 have can great in building to long_duration advantage

⁵ Another example was given earlier in this Chapter in 217, where the epistemic adverb *fortasse* scopes over the modal verb *possum*.

(Subject: trees) Therefore if they do not decay by draining when they are standing and alive, **without any doubt** when they are taken down for timber, if they are treated this way, they **will be able** to have great advantages concerning long duration in buildings. (Vitruvius, *De architectura* 2, 9, 4)

In example 222 the adverbial collocation *sine dubio* 'undoubtedly' expresses epistemic certainty and it embeds the marker of dynamic possibility *possum* (in the form *poterunt* 'they will be able'). The speaker is expressing his certainty that the representation described in the scope of *sine dubio* i.e., *habere poterunt magnas in aedificiis ad vetustatem utilitates* 'they will be able to have great advantages in buildings for durability', will be verified. Therefore, we can represent the hierarchy of modalities found in this example as [EPI[DYN[SOA]]], where *sine dubio* is higher in the modal hierarchy, and *possum* inherits its value of epistemic certainty.

Interestingly, epistemic modality seems to be able to also embed other markers of epistemic modality in the corpus, although having only one co-occurrence for certain types of relation does not allow for any generalisation. It is a frequent issue, especially for this type of relation. Therefore in such cases I will limit the discussion to specific observations on individual co-occurrences. In the only example of epistemic modality embedding epistemic modality, the adverb *forte* scopes over the construction *dubium est*, as illustrated in example 223.

- (223) *Neque haec idcirco tibi scribo quod te non eadem*
 and_not this for_that_reason you write because you not same
animadvertere sciam, sed quod mihi persuasissimum est Lepidum
 think know but which me convince is Lepidus
recte facturum numquam, si forte vobis id de hoc dubium
 rightfully behave never if perhaps you it about this doubt
est.
 be

I do not write these things to you for the reason that I do not know if you think the same, but because I am extremely convinced that Lepidus will never behave rightfully, if **perhaps** you **doubt** about it. (Cicero, *Epistulae ad familiares* 380, 2)⁶

In this sentence, the adverb *forte* expresses epistemic possibility, as well as the co-occurring epistemic construction *dubium est*. The former however, embeds *dubium est*, together with the scope that it modalises i.e., *vobis id de hoc*, where *de hoc* 'about it' is anaphoric to the SoA *Lepidum recte facturum numquam* 'Lepidus will never behave well'. As mentioned above in

⁶ The direct scope of *dubium est* in this sentence is *de hoc* 'about it', but since it is anaphoric to the representation *Lepidum recte facturum numquam* 'Lepidus will never behave well', I consider it modal.

reference to example 220, *forte* has a peculiar behaviour in similar contexts, which will be discussed further in this chapter, in the section devoted to the relation of ADV + V. For now, I will just specify that, as it is often the case with epistemic markers in Latin, depending on the context, their basic epistemic meaning can be exploited for other uses e.g. scalar, restrictive, pragmatic (Pinkster 2004; Schrickx 2011, 32–38).

In the vast majority of cases, when epistemic modality is in an embedding position it is always expressed by adverbs (or adverbial collocations) of certainty (*certe, certum, sine dubio*), possibility (*forsitan, fortasse, forte*) or probability (*probabilius*, reported in the Table by its lemma *probabilis*). All the examples presented above in this section contain epistemic markers embedding other types of markers. In this respect, see e.g. example 217 above, where epistemic modality is in an embedding position with respect to dynamic modality, and the former is expressed by the adverb *fortasse*. The only exception to the use of adverbs in an embedding position is the construction *dubium est*, which in three co-occurrences embeds dynamic necessity (twice) and dynamic possibility. An example is given in 224, where the epistemic construction *dubium est* embeds the dynamic necessity marker *oportet*.

- (224) *Ergo si ita videtur, uti in hypaethris locis ab aere*
 therefore if in_such_way seem that in open place by air
- umores ex corporibus exsugantur molestiores, quemadmodum ex terra*
 moisture from body drain harmful just_as from earth
- per nebulas videntur, non puto dubium esse, quin amplissimas et*
 by cloud seem not think doubt be that wide and
- ornatissimas subdiu hypaethrus=que conlocari oporteat in civitatibus*
 decorated by_day in_the_open=and place be_necessary in city
- ambulationes.*
 walk

Therefore if it seems that in open places the most troublesome moisture is drained from the bodies by the air, as it seems to happen from the earth through the clouds, I do not think **it is doubtful** but that the widest and most decorated spaces for walking in the cities **should** be placed under the sun and in the open. (Vitruvius, *De architectura* 5, 11, 6)

Although my study focuses only on modal markers, it is important to acknowledge in this sentence the presence of the verb (*non*) *puto* 'I (do not) think', which is a verb of opinion and therefore modifies the sentence at the illocutionary level, by specifying that what is being said is an opinion of the speaker, and therefore placing the content of the sentence under

an epistemic value. In this sentence, *puto* introduces the infinitive *dubium esse*, projecting its value onto the epistemic value expressed by it.

Epistemic modality occurs in an embedded position only three times in the corpus, one of them being the cases of co-occurrence with another epistemic marker illustrated above. In the other two cases epistemic modality is embedded by a marker of dynamic modality, necessity and possibility respectively. When occurring in an embedded position, epistemic modality is always expressed by the construction *dubium est*. In both cases in which epistemic modality is embedded by a dynamic marker, it is expressed by the construction *dubium est*. Consider example 225.

- (225) *sin ii sumus qui profecto esse debemus, ut nihil arbitremur*
 but_if they be who surely be should so_that nothing think
expedire nisi quod rectum honestum=que sit, non potest esse
 be_expedient unless what right honourable=and be not can be
dubium quid faciendum nobis sit.
 doubt what do us be

But if we are those who we surely should be and we think that nothing is expedient but what is right and honourable, **it cannot be doubtful** what we should do. (Cicero, *Epistulae ad familiares* 151, 2)

In this sentence, the dynamic possibility marker *potest* embeds the epistemic construction *dubium est*. Given the premise introduced by *sin*, the speaker denies any objective possibility of a doubt being raised about what should be done next. The semantic hierarchy here can be represented as [NEG[DYN[EPI[SOA]]]]. Although in this sentence there is a third lexical co-occurring marker (*ii sumus qui profecto esse debemus*), the analysis here focuses on the relation between *possum* and *dubium est*. The discussion on cases where dynamic modality can encompass the epistemic one will be further discussed in the next section 7.1.2.

7.1.2 Dynamic modality

As shown in Table 7.4 (page 211), dynamic modality is scarcely present in cases of scope hierarchisation. As already mentioned in this chapter, this is especially interesting because dynamic modality has a very high count in co-occurrence, both in the whole corpus and in the cases of scope hierarchisation, compared to all the other types of modality. Nevertheless, epistemic modality outnumbers dynamic modality in this type of relation. Focusing on the cases of scope hierarchisation Table 7.3 (page 211) shows that dynamic modality appears, in the great majority of cases, in an embedded position (78% of the sentences).

In order to have an overview of the behaviour of dynamic modality with respect to its embedding properties, I will resort once again to Table 7.2 (page 210). Dynamic modality does not embed markers of deontic acceptability nor markers of deontic authority. Dynamic markers frequently embed other markers of the same type. Finally, there are two cases in which dynamic modality embeds epistemic modality. In general, dynamic modality seems to have reduced scope properties i.e., possibility of embedding other modalities with respect to epistemic modality, which embeds all the four categories.

The types of marker that express dynamic modality in cases of scope hierarchisation coincide with the most frequent markers in the co-occurrences. Comparing Table 7.2 (page 210) and Table 6.3 presented in Chapter 6 (page 210), it appears that the dynamic markers in scope hierarchisation are the most frequent markers in the corpus: *possum*, *debeo* and *oportet*. All of them show a more or less strong association with dynamic modality (the independence quotient value for *possum* in particular shows a positive attraction between this marker and dynamic modality, see Table 6.5, page 198), therefore the result is not entirely surprising. I have shown in the previous section that epistemic markers can express different degrees of epistemic modality, ranging from possibility to absolute certainty. These notions are mostly expressed by adverbs, and in a few cases by the constructions *certum est* and *dubium est*. The expression of possibility within dynamic modality is found with *possum* in almost all cases of embedded dynamic modality, but one sentence, where this notion is expressed by *facultas*. When dynamic possibility is in an embedding position the range of markers is wider: in three cases it is expressed by *facultas*, in two by *possum* and in one by *potestas*. I observed some more variety in the expression of necessity within the dynamic domain, both in embedding and embedded position. In only one sentence dynamic modality is expressed by an adverb i.e., *necessario* which is however a problematic case of co-occurrence, as I will show later in this chapter. Besides the peculiar case of *necessario*, dynamic modality in scope hierarchisation is expressed by the modal verbs *oportet* (the most frequent marker in these cases) and *debeo*, and by the construction *opus est*. Throughout this section I will describe the cases in which dynamic modality can embed other (or the same) types of modality, illustrating each combination with an example taken from the corpus.

Dynamic modality embeds other dynamic markers in the great majority of cases. One of these co-occurrences is illustrated in example 226.

- (226) *Ideo=que de veteribus architectis Pythius, qui Prieni aedem*
 therefore=and of old architect Pythius who Priene temple

Minervae nobiliter est architectatus, ait in suis commentariis architectum
 Minerva famously be built say in his commentary architect

omnibus artibus et doctrinis plus oportere posse facere, quam qui
 all art and science more ought be_able do than who
 singulas res suis industriis et exercitationibus ad summam claritatem
 single thing his diligence and practice to high splendor
 perduxerunt.
 lead

And, therefore, one of the old architects Pythius, who has famously built the temple of Minerva at Priene, says in his Commentaries that an architect **ought to be able to** do more in all arts and sciences than who, with diligence and practice, has led individual arts to the highest splendor. (Vitruvius, *De architectura* 1, 11, 13)

In this sentence, the modal verb *oportere* (infinitive form of *oportet*) scopes over the passage *architectum omnibus artibus et doctrinis plus posse facere* 'the architect (is) able to do more in all arts and sciences'. By embedding the marker *posse* together with its scope, *oportet* projects its necessity value onto the value of possibility expressed by the latter: [DYN[DYN[SOA]]], meaning that it is necessary for the architect to develop specific abilities. The combination of the two notions in this co-occurrence of dynamic markers also highlights the different nature of the necessity and possibility expressed in this sentence: *possum* indicates the possibility that refers more specifically to an ability of the participant *architectum*; *oportet* instead refers to a general necessity that is external and imposed to the participant e.g. whoever aims at becoming an architect. A similar interplay can be observed between two notions of possibility within the dynamic category. Consider example 227.

- (227) Si pro meis pristinis opibus facultatem mihi res hoc tempore
 if for my former action possibility me condition this time
 daret ut ita defendere possem Volaterranos quem ad
 give in_order_to so defend can Volaterrae_people which to
 modum consuevi tueri meos, nullum officium, nullum denique
 way be_used_to protect mine any service any and_then
 certamen, in quo illis prodesse possem, praetermitterem.
 fight in which them be_of_use can neglect

If, thanks to my former actions, the present circumstances **gave** me the **possibility to be able** to defend the Volaterrae people, the way I used to protect my closest ones, I would not neglect any service, and any fight, in which I could be of use to them. (Cicero, *Epistulae ad familiares* 318, 4)⁷

⁷ The sentence contains a third co-occurring marker *possem*, which is however not included in the scope hierarchisation and therefore it is not discussed here.

In the cases in which two dynamic markers expressing possibility embed each other, the two markers are always modal verbs (*possum*) or constructions with *facultas* (*facultatem habere* 'to have the chance, opportunity to' or *facultatem dare* 'to give the chance, opportunity to'). In this sentence, the construction *facultatem dare* expresses dynamic possibility and scopes over the passage *ut ita defendere possem Volaterranos* 'to be able to defend the people of Volterrae', embedding the marker of dynamic possibility *possum* in the following *ut* clause. The speaker is talking about a situation in which the circumstances would enable him to defend the people of Volterrae. This type of co-occurrence is particularly interesting with respect to the notion of modal harmony. Following Coates (1983, 111), the passage in example 227 could be regarded as modally harmonic, as the notion of possibility expressed by *facultatem* is reiterated by *possum*. As much as the presence of *facultas* undoubtedly has a role in assigning the value of dynamic possibility to *possum*, applying a notion explicitly related to scalar categories to the domain of dynamic possibility seems to be an unnecessary stretch. Surely, the presence of the two markers in a hierarchical relation, reading as 'to give the possibility to be able to' might be perceived in English as unnecessarily redundant. However, on a finer degree of analysis, I think that the embedding of *possum* into the scope of *facultas*, both with a dynamic value, which occurs three times in the corpus, marks a difference between two apparently equivalent expressions. The type of possibility expressed by *facultas* in such cases is always an external possibility, given or obtained by the participant because of external circumstances, which can also be translated as 'chance, opportunity' (see the context in example 227 above). As a consequence of this process, the participant derives from this opportunity the actual possibility (participant-imposed in the WoPoss framework) of obtaining or performing an action. A difference in the type of possibility expressed by two markers of the same category can be spotted also in the only co-occurrence of *possum* and *possum* together (one of the loop co-occurrences represented in Figure 6.1, presented in Chapter 6, page 182). This co-occurrence is presented in example 228.

- (228) *Non potest, inquit, respublica laedi possit nisi in aliqua sui parte.*
 not can say state harm can unless in some itself part

It is not possible that the state **can** be harmed unless in some of its parts. (Seneca the Elder, *Controversiae* 10, 14)

In this sentence, the marker of dynamic possibility *possum* scopes over the passage *respublica laedi possit*, embedding the co-occurring marker *possum*, which also expresses dynamic possibility in this context. Again, the combination of the same marker, belonging to the same modal category, does not necessarily mean that this repetition does not have semantic implications, as it was the case in the previous example. Again, the two markers refer to two

different types of possibility. The first *possum* refers to an objective possibility, the *possibilité ontique* described by Bertocchi and Orlandini (2001, 48), building on Horn (1989), which does not express any judgement on the part of the speaker and points to a 50% chances of realisation or non realisation of the SoA. The presence of the external negation *non*, scoping on *potest*, moves the expression from the domain of the pure possibility to the domain of complete impossibility: *non potest* = 'it is impossible'. This type of possibility is described in the WoPoss framework as situational, because it applies to the situation and not to the participant, if any. The type of possibility described by the second *possum* instead, refers to the participant *respublica*, describing the possibility imposed to the participant to be harmed.

As I mentioned in the previous section, there are two cases in which dynamic modality seems to embed an epistemic marker. The sentence is given in example 229.

- (229) *Cum ergo, quae sunt vera, falsa videantur et nonnulla aliter*
 since therefore which be true false seem and some otherwise
quam sunt oculis probentur, non puto oportere esse dubium, quin ad
 than be eye perceive not think ought be doubt that to
locorum naturas aut necessitates detractioes aut adiectiones fieri debeant,
 space nature or necessity subtraction or addition do should
sed ita, uti nihil in his operibus desideretur.
 but in_such_way that nothing in this creation be_missing

Since, therefore, what is true seems false, and some things are perceived otherwise than how they are by the eyes, I do not think it **should be doubtful** that some subtractions or additions should be made to the nature or the constraints of the sites, but in such way that nothing would be missing in these creations. (Vitruvius, *De architectura* 6, 2, 4)

In this sentence, the marker *oportet* expresses dynamic necessity and embeds the epistemic construction of uncertainty *dubium est*, in a chain of infinitives held by the main verb *puto* 'I think'. The representation of the semantic relations triggered by this co-occurrence can be represented as [DYN[EPI]], and it expresses the objective necessity (inevitability) of raising a doubt about something. However, the analysis of this sentence is more complex than that: besides the co-occurrence of *oportet* and *dubium est*, which is the focus of this discussion, there are three more points to consider. I will first list them and then I will discuss their potential influence on the analysis. The first issue is the co-occurrence in the same sentence of two other (potentially) modal markers also included in the list used for this study i.e., *necessitates* and *debeo*. The second point is that, as I have mentioned above, *oportere* and the following infinitive depend on a verb of opinion, *puto*. Finally, the third element is that *puto*

is preceded by the negative particle *non*. Concerning the markers *necessitas* and *debeo*, the former is not modal, whereas the latter is modal, but because of the way this study was conceived i.e., focusing on two-way relationships, does not pertain to this specific discussion. Moving on to the second point, as I have observed already for example 224, the semantic influence of the verb *puto* on the following subordinate clauses in this sentence should not be neglected as it projects a subjective value onto the content of the clause. In particular, we can safely say that although *puto* works at the illocutionary level, and therefore modifies the whole sentence, it is true that its primary scope is the verb *oportet*, which on its own expresses an objective necessity. However, once again the role of expressions such as the *verba putandi* (opinion verbs) falls out the scope of this work, so I will not further discuss it here.

The other case in which dynamic modality embeds epistemic modality is illustrated in example 230 (presented earlier as example 225). In this case, the dynamic marker expresses the notion of possibility, whereas the epistemic marker is still the construction *dubium est*.

- (230) = (225) *sin ii sumus qui profecto esse debemus, ut nihil*
 but_if they be who surely be should so_that nothing
arbitremur expedire nisi quod rectum honestum=que sit,
 think be_expedient unless what right honourable=and be
non potest esse dubium quid faciendum nobis sit.
 not can be doubt what do us be

But if we are those who we surely should be and we think that nothing is expedient but what is right and honourable, **it cannot be doubtful** what we should do. (Cicero, *Epistulae ad familiares* 151, 2)

The combination of these two markers draws once again the attention towards the different types of possibility in co-occurrence here. The analysis of *non potest* is the same as the *potest* in example 228 presented earlier: a pure, objective possibility of a 50% chances for the SoA to be true or not, which under the scope of negation is drawn towards the extreme of the notion of impossibility. On the contrary, *dubium est* refers to a subjective possibility, more specifically a doubt on what should be done. As discussed in Chapter 2, each marker has one or many valency frames depending on their meaning. In this passage (*non*) *potest* in the impersonal form indicates a general (im)possibility 'it cannot' and requires an argument clause functioning as its subject 'X cannot be' (with X referring to the propositional content of the argument clause). This slot is filled by the argument clause *esse dubium* 'be doubtful' (which on its turn requires another argument clause *quid faciendum nobis sit* 'what we should do'). The type of modal hierarchy observed in this sentence can be represented as [DYN[EPI[SOA]]]: the speaker is asserting the objective possibility that the way in which

they should act can be object of doubt. To this hierarchical relation, one should add the role of negation. As mentioned in the section dedicated to *possum* (see section 2.4 in Chapter 2), this highly polyfunctional modal verb can express both purely epistemic modality (subjective, as firstly introduced by Lyons 1977, 807–808 and applied to Latin modality by Bolkestein 1980, then Orlandini 2001 among others) and dynamic modality (objective, or bilateral, contingent; dynamic in our framework). The latter is expressed in Latin by the impersonal form *potest* and the construction *feri potest ut*, both derived from *possum*. A marker that expresses subjective epistemic modality (i.e., the notion indicated in our framework as epistemic modality) cannot be under the semantic scope of negation. That is, an epistemic *oportet* or *potest* can be preceded by the negation *non*, but the negation will scope over their argument, so that *non oportet* = *oportet non*. Objective epistemic modality i.e., dynamic situational modality can be negated (Núñez 1991, 171; Orlandini 2001, 326). Further evidence that in this combination *possum* expresses dynamic modality, namely an objective possibility in which the speaker does not express any evaluation of the state of affairs, is given by the fact that *potest* is under the semantic scope of the external negation *non*. As highlighted by Bertocchi and Orlandini (2001, 53–61), and as already mentioned in the section dedicated to *possum*, the uses of this verb in an impersonal form with a dynamic value are much more frequent in negative contexts, such as the one illustrated in example 230. Therefore, the passage under consideration as a whole (*non potest dubium esse*) can be paraphrased as that ‘it cannot be doubtful’..

7.1.3 Deontic modality

Table 7.2 shows that deontic modality is the type of modality that occurs the least in scope hierarchisation. This holds true for both subtypes of deontic modality, authority and acceptability, which appear in respectively two and four co-occurrences in scope hierarchisation.

The two subtypes are not extremely frequent in the co-occurrences either: Table 7.4 shows that the cases of deontic acceptability are 79 in total, which is the lowest value among the types of modality. Among those 79 co-occurrences only 5% occurs in a relation of scope hierarchisation with another marker. Markers of deontic authority are especially interesting if compared with the values of epistemic modality. Deontic authority has the second lowest count in co-occurrences, right above epistemic modality. Yet, epistemic modality is present in scope hierarchisation 38% of the times, whereas deontic authority is involved in such relations in only 1% of its co-occurrences (the lowest value among all types of co-occurrence).

Deontic modality shows a peculiar behaviour also in regards to the role it takes in the few scope hierarchisation co-occurrences in which it appears. According to the corpus results,

both subtypes of deontic modality only appear as embedded modalities, and never take the embedding modality role (see Table 7.3, page 211).⁸

The co-occurrences in which deontic modality is embedded by epistemic markers have been discussed in the section dedicated to epistemic modality, in example 220 for deontic acceptability and 219 for deontic authority. It should be added that deontic acceptability is expressed by *debeo*, while deontic authority is expressed by *licet*.

7.1.4 Preliminary conclusions on modalities in embedding relations

In this section I will summarise the observations made about the combinations of modalities in relations of scope hierarchisation, and I will draw some preliminary conclusions based on such observations.

The four macro-types of modality behave in rather different ways when it comes to scope hierarchisation. Epistemic modality outnumbers by far the other types of modality in cases of scope hierarchisation in general, and especially in the role of embedding modality, in which it appears 93% of the times. Epistemic modality embeds all the other types of modality in the corpus, with a minimum of two co-occurrences per types of modality. A case of embedding between two epistemic markers was also observed. This is especially relevant if one keeps into account that epistemic modality has the second lowest count in co-occurrence in the corpus (only 111), after deontic acceptability. Dynamic modality on the contrary shows a completely opposite behaviour. Despite being the most frequent type of modality in the co-occurrences and in cases of scope hierarchisation, dynamic modality does not reach 10% of its rate in the latter. Deontic modality occurs in scope hierarchisation in an extremely low number of co-occurrences, and its rate in hierarchical co-occurrences is also lower compared to the other types of modality: 5% for deontic acceptability and 1% for deontic authority.

Based on the embedding properties that emerge from Table 7.2 (page 210), the types of modality in scope hierarchisation can be placed on a scale. Epistemic modality can embed all types of modality in the corpus, including itself. Dynamic modality embeds other markers of dynamic modality, and epistemic modality in only two co-occurrences. But it does not embed markers of deontic modality. Finally, as mentioned above, deontic modality does not appear in any co-occurrence in an embedding role, and it is only embedded by epistemic markers. If we were to conceive a hierarchy based on the scope properties of each type of modality i.e., the possibility of each type of modality to embed a range of modalities, epistemic modality would occupy the top of the hierarchy, followed by dynamic and then deontic modality.

⁸ As frequently stated throughout this study, the quantity of data does not allow for extreme generalisations on the impossibility for deontic markers to occur with an embedding role.

Another interesting point is the combination of markers expressing notions of possibility and necessity in Table 7.2, depending on the types of modality being combined. I have already mentioned in previous sections the types of markers that express different modalities in scope hierarchisation. I'll summarize these observations here. Epistemic modality is expressed by an adverb in the vast majority of the co-occurrences where it is in an embedding position (*forte, fortasse, certe*). The only exception is the epistemic construction *dubium est*, which however is mostly used in the (few) cases in which epistemic modality is in an embedded position. All the other types of modality are usually expressed by modal verbs, which corresponds to the most frequent verbs in the co-occurrences (*possum, debeo, oportet* and *licet*), and in some cases by constructions such as *facultatem do, facultatem habeo*. When observing the combinations of these markers based on the type of modal notion, interesting differences between modal categories emerge. Epistemic modality is expressed by both markers of possibility/probability (*forte, fortasse, dubium est*) and markers of certainty (*certe, certum est*). These, in turn, modify both markers of necessity and markers of possibility. There is a clear distinction between deontic acceptability, which is always expressed by a marker of necessity (*debeo*) but co-occurs with markers of both possibility and epistemic necessity, and deontic authority, which is always expressed by a permission verb (*licet*) and can be modified by both *certe* and *fortasse*. However, the same type of variety is not preserved for epistemic modality in the embedded position, which is always expressed by *dubium est* and therefore always expresses uncertainty (examples 219 and 220). The case of dynamic modality, on the other hand, is quite different. There are numerous cases where a marker of necessity modifies a marker of possibility, and cases where a marker of possibility modifies another marker of possibility (examples 226 and 227 respectively). However, cases where dynamic necessity modifies dynamic necessity and where dynamic possibility modifies dynamic necessity are only represented in two cases, which are nevertheless problematic. The first one is illustrated in example 231.

- (231) *Eorum autem cogitata utiliter hominibus ad vitam explicandam*
of_them but conceptions usefully to_men to life to_explain

e pluribus singula paucorum uti exempla ponam, quae
from many individual of_few as examples will_present which

recognoscentes necessario his tribui honores oportere homines
thankful necessarily to_them render honours ought men

confitebuntur.
will_admit

I will present by way of example a few conceptions among many produced by some thinkers that have been useful in understanding life, so that the human kind, by

considering them, will admit that honours **should necessarily** be rendered to them. (Vitruvius, *De architectura* 9, 2)

In this sentence, the adverb *necessario* expresses dynamic necessity, as well as the verb *oportet*. This is the only case in which dynamic modality is expressed by an adverb in cases of scope hierarchisation. The adverb *necessario* is not one of the most frequent markers in the corpus: it appears 13 times in co-occurrence with another marker (its co-occurrence rate is only 24%, see Table 6.3). This is the only case in which it was annotated in scope hierarchisation, supposedly embedding *oportet*. The value of *necessario* is therefore imposed on the value of *oportet*, which is reinforced by this co-occurrence: [DYNNEC[DYNNEC[SOA]]]⁹. However, this interpretation can be subject to criticism, as the primary scope of *necessario* could be identified in the main verb *confitebuntur*. According to this interpretation, *necessario* would scope over the clause *homines confitebuntur*, and only secondarily on the clause *his tribui honores oportere*, dependent on *confitebuntur*. Due to this strong ambiguity of scope, I have marked this unique case of co-occurrence with a question mark in Table 7.2.

The relation of embedding between dynamic marker of necessity and one of possibility is illustrated in example 232.

- (232) *Quibus autem copiarum generibus oporteat uti, non est architecti*
 which but resource type ought use not be architect
- potestas, ideo quod non in omnibus locis omnia genera*
 possibility for_the_reason that not in all place all type
- copiarum nascuntur, ut in proximo volumine est expositum.*
 material be_born as in antiguous book be explain

The types of material that **should** be used does not fall within the architect's **possibility** (i.e., the architect cannot know what types of materials should be used)¹⁰, for the reason that not all types of materials are found in all places, as was explained in the preceding book. (Vitruvius, *De architectura* 6, 8, 9)

In this case, the marker of dynamic possibility *potestas* embeds the marker of dynamic necessity *oportet*, by scoping over the portion of text *quibus copiarum generibus oporteat uti* 'what types of material it is necessary to use'. Vitruvius is explaining what type of knowledge would define a good architect. In this passage in particular, he is saying that the architect

⁹ The interpretation of *oportet* here can be considered ambiguous: if one is to read a moral value in the content of this sentence, it is justifiable to interpret *oportet* as a marker of deontic acceptability in this context.

¹⁰ The hierarchical relationship between the two markers in this specific passage is easily lost in translation. Therefore, I first propose a literal translation followed by a looser one between parentheses.

would not be able to decree the type of materials that should be used for certain constructions, as these depend on the nature of the site and availability of those materials in the construction site.

However, the issue of data sparsity introduced in Chapter 6 has to be considered also in the case of scope hierarchisation. This is true both with respect to the general overview of the incidence of the cases of scope hierarchisation in the corpus, which only represent 8.2% of the total number of co-occurrences; and in the specific relations of embedding, especially when there is only one co-occurrence for a specific relation, as shown above. Although the data does not allow for generalisations, however it is possible to observe some tendencies in these preliminary results and raise research questions for which further investigation would be needed. The two passages in which dynamic modality embeds epistemic modality are an interesting case. This type of relation is somehow in contradiction with the status of epistemic modality as the highest-ranked type of modality based on its scope properties. At the same time, a closer analysis of the passages reveals that this relation is only possible when the type of necessity or possibility expressed by the dynamic marker is neither internal nor imposed to the participant, but rather it is inherent to the situation i.e., it refers to an objective possibility or necessity as described by Orlandini (examples 225 and 229). The status of deontic authority and deontic acceptability is another case that deserves more attention and data. The fact that neither type of deontic modality is observed to embed any type of modality raises the hypothesis that deontic modality might not be able to embed (or very rarely embeds) all the other types of modality, including itself. But, on the other hand, previous studies on e.g. Dutch have shown that at least deontic acceptability should have embedding properties to some extent (Nuyts 2006, 19).

In the cases presented so far, the concept of modal harmony, as conceived by Lyons, only applies in one case, which is the co-occurrence of two epistemic markers, where we observe a harmonic combination, where *forte* agrees with the degree of epistemic possibility expressed by *dubium est*. However, even in this case, the epistemic possibility expressed by the two markers has a slightly different value. It has already been mentioned that *forte* in combination with *si* and *nisi* tends to behave as a collocation rather than keeping a strong epistemic value (see footnote 4, page 213). In this sense, *si forte* and *nisi forte* are used as hedges (see Chapter 3), as defined by Coates for English (e.g. *I think*) and in other subsequent studies. Their use builds on the epistemic value of the marker *forte*, but aims to tone down the following statement. By using this expression, the speaker does not commit to the propositional content of the utterance and presents it as a simple hypothesis.

It remains doubtful if all the other passages where modalities combine with each other can be considered cases of modal harmony. Epistemic modality that modifies other types of

modality is a case observed in all languages, where one type of modality, which is located at a more external level in the sentence structure, incorporates all other types of modality found at more internal levels. The other combination of markers within the same category observed so far is between dynamic markers. As mentioned in Chapter 3, Coates (1983) expanded the notion of modal harmony to dynamic modality in her work on English markers, taking examples of combinations of dynamic markers with expressions that emphasise, for example, the internal capacity of the participant (e.g., *inherited ability* in harmonic combination with dynamic *could*, see example 151, page 104). Another example was given by Coates for the deontic domain, with a co-occurrence between *legally* and *can*, where the adverb frames the modal auxiliary within deontic modality (see example 152, page 104). However, the adverb *legally* does not belong to the domain of modal markers *per se*, therefore it cannot be taken into account as a proper co-occurrence of modal markers.

Dynamic modality is clearly divided into notions of possibility and necessity. However, as highlighted in the analysis of previous examples, and as is also noted in the WoPoss project, various types of possibility and necessity are further distinguished based on how they relate to the participant or the situation described in the modal passage. It was noted that when two possibility markers are combined, even if the markers are the same, the types of possibility (or necessity) they express are often not identical. In many cases of hierarchical co-occurrence, the idea of modal harmony appears to be overly restrictive, particularly with non-epistemic markers. What criteria determine whether a combination is considered harmonic or not, beyond the notions of reinforcement and hedging? Do these criteria still apply when non-epistemic markers are involved in hierarchical co-occurrences, as frequently observed in the data? It might be more useful to reconsider the concept of modal harmony in light of linguistic corpus data, by adopting a broader perspective for the analysis that takes into account co-occurrences of markers that express types of modality different from the epistemic one. As mentioned above, this concept was, to a certain extent, anticipated by Coates who presented examples of co-occurrences between dynamic or deontic markers with other contextual element that would guide their interpretation towards a certain modal value. Moreover, previous accounts of harmonic combinations do not account for their use in discourse. Additionally, as I will show in the next chapter, the concept of modal harmony does not always work in cases of non-hierarchisation, although the term was applied to one co-occurrence of this type in Coates (1983, 42).

So far I have discussed the combination of markers in scope hierarchisation from a purely semantic point of view. However, syntax plays a key role in the analysis of the relation between the co-occurring markers. The markers in the list adopted for this study have different construction patterns, and the type of syntactic structure in which the markers co-occur contributes defining the relation between them. In the next section I will analyse the types of

syntactic structures that occur in cases of scope hierarchisation, and the modal categories and markers involved in each type of syntactic structure.

7.2 Embedding: syntax

As shown in Table 7.1 at the beginning of this chapter (page 208), I have found and annotated 49 cases of scope hierarchisation in the corpus. The two main types of syntactic structure in which this type of relation occurs are the co-occurrence of a modal adverb and a modal verb, and cases of co-occurrences of two modal verbs or constructions. The former is categorised under the relation ADV + V illustrated in Chapter 5 (section 5.2, page 5.2); the latter under three different types of structures i.e., *ut/quin* with the subjunctive; the accusative with infinitive or simple infinitive; the simple subjunctive. Table 7.5 shows that out of the 49 cases of hierarchisation:

- 36 involve the relation between a modal adverb and a modal verb;
- 13 involve the relation between two modal predicates.

	ADV + V	<i>ut/quin</i> + subjunctive	AcI/infinitive	subjunctive
count	36	4	7	2
total	36	13		

TABLE 7.5: Number of co-occurrences with scope hierarchisation by type of syntactic structure.

As observed in the previous chapter, specifically in section 5.2 (page 156), none of the co-occurrences in coordinate clauses hosts a relation of scope hierarchisation. In fact, hierarchical co-occurrences always build on an asymmetric syntactic relation: when the two members of the asymmetric syntactic relation both host a modal marker, the asymmetry results in a case of scope hierarchisation. The asymmetry can be observed in cases of ADV + V, where the adverb modifies (embeds) the main predication (as in example 217)¹¹; but also in cases of argument clauses (e.g., infinitive and accusative clauses functioning as subject to an impersonal verb or construction) and the use of infinitive with verbs such as *possum* or *debeo* that behave as modal auxiliaries.

Example 233, previously cited in this chapter as example 217, is a case of scope hierarchisation in a relation of the type ADV + V: the adverb *fortasse* scopes over the verb *possum*. As described earlier in Chapter 3, this is the typical case of modal co-occurrence found in

¹¹ In Functional Grammar (Dik 1997, 51; 226) such type of relation is described as a satellite (a lexically encoded modifier) that modifies the nuclear predication.

literature: a modal adverb that modifies a modal verb. Halliday (1970, 331), one of the first to discuss this type of phenomenon, defines it as "double modality."

- (233) = (217) "Quid ergo? tu poteris videre morientem filium?" *fortasse* non
 what then you be_able see die son maybe not
potero et ideo irascor dum licet.
 be_able and therefore get_angry while be_possible

"What then? Will you be able to tolerate seeing your son die?" **Perhaps** I will not **be able to** and therefore I am angry while I have the chance. (Seneca the Elder, *Controversiae* 2, 3, 3)

Table 7.5 also provides an overview of the hierarchical co-occurrences between two modal predicates, divided by type of relation. As shown in the table, cases of scope hierarchisation between modal verbs and/or modal constructions were found in three different syntactic structures: argument clauses *ut* or *quin* with the subjunctive; accusative with infinitive or present infinitive; and asyndetic subjunctive. These all function as argument clauses i.e., they fill obligatory slots in the construction pattern of the main (conjugated) verb (Pinkster 2021, 11).

Example 234 illustrates a case of scope hierarchisation where dynamic necessity embeds dynamic possibility. In this passage, the modal verb *debeo* belongs to an accusative with infinitive clause depending on *respondisse* (another infinitive which depends from the main verb *dicitur*). *Debeo* here behaves as a modal auxiliary, governing the infinitive predicate *posse alere*.

- (234) = (206) Rex vero respondisse dicitur Homerum, qui ante annos
 king indeed reply say Homer who before year
 mille decessisset, aevo perpetuo multa milia hominum
 thousand die lifetime constantly many thousand man
 pascere, item *debere*, qui meliore ingenio se profiteretur,
 feed therefore have_to who better intellect himself declare
 non modo unum sed etiam plures alere *posse*.
 not only one but also many nourish can

Indeed the king is said to have replied that Homer, who died a thousand years before, had constantly fed many thousands of men for a lifetime, and therefore, as he declared himself of a better intellect, he **should be able** to nourish not only one but many others as well. (Vitruvius, *De architectura* 7, 9)

In example 235, the epistemic construction *dubium est* embeds the epistemic marker *oportet*. The argument clause introduced by *quin*, with *oportet* in the subjunctive mood, functions as a subject to the impersonal construction *dubium est*.

- (235) = (224) *Ergo si ita videtur, uti in hypaethris locis ab
therefore if in_such_way seem that in open place by
aere umores ex corporibus exsugantur molestiores, quemadmodum
air moisture from body drain harmful just_as
ex terra per nebulas videntur, non puto **dubium** esse, quin
from earth by cloud seem not think doubt be that
amplissimas et ornatissimas subdiu hypaethrus=que conlocari
wide and decorated by_day in_the_open=and place
oporteat in civitatibus ambulatione.
be_necessary in city walk*

Therefore if it seems that in open places the most troublesome moisture is drained from the bodies by the air, as it seems to happen from the earth through the clouds, I do not think **it is doubtful** but that the widest and most decorated spaces for walking in the cities **should** be placed under the sun and in the open. (Vitruvius, *De architectura* 5, 9, 6)

Finally, example 236 (presented earlier as 232) illustrates the only case of embedding with an asyndetic subjunctive: the argument clause *quibus autem copiarum generibus oporteat uti*, is embedded by the construction *potestas est*.

- (236) = (232) *Quibus autem copiarum generibus oporteat uti, non est architecti
which but resource type ought use not be architect
potestas, ideo quod non in omnibus locis omnia genera
possibility for_the_reason that not in all place all type
copiarum nascuntur, ut in proximo volumine est expositum.
material be_born as in antiguous book be explain*

The types of material that **should** be used does not fall within the architect's **possibility** (i.e., the architect cannot know what types of materials should be used), for the reason that not all types of materials are found in all places, as was explained in the preceding book. (Vitruvius, *De architectura* 6, 8, 9)

In the three sentences presented above, the two modal predicates have a direct syntactic relation. In example 234, the construction pattern associated with *debeo* has two mandatory

slots. The subject of *debeo* is implied and corresponds to the subject of *qui*: Zoilus i.e., the person interacting with the king. The modal verb *posse* in the clause *non modo unum sed etiam plures alere posse* is governed by *debeo*. Let us move on to sentence 235. In this sentence, the impersonal construction *dubium est* is governed by the main verb *puto* (the role of the verb in the modal interpretation of the passage will be discussed in section 7.2.2), which requires an infinitive clause. As mentioned in the description of *dubius* in section 2.4, the impersonal construction derived from this adjective *dubium est* is associated with a one-slot syntactic pattern. In the example above, this slot is filled by the clause *quin... conlocari oporteat in civitatibus ambulationes*, which functions as a subject to the impersonal construction. Similarly, in example 236 *potestas est* governs the clause *quibus... copiarum generibus oporteat uti*. The cases of scope hierarchisation retrieved in the corpus show that the asymmetrical relationship between co-occurring markers is (intuitively) a necessary condition for this type of relationship, but it is not a sufficient one. It is necessary, in fact, that the relation between the two markers is contiguous i.e., one marker is in the immediate scope of the co-occurring one. This can be observed in various cases: the relation ADV + V, with a modal adverb directly modifying a modal verb; a modal verb such as *possum* or *debeo* followed by an infinitive; a modal verb that governs an argument clause e.g. the accusative with infinitive clause associated with the impersonal construction *dubium est*).

As shown in Chapter 5 (page 232), all the types of relation discussed so far, that enable the presence of hierarchical co-occurrences, can be represented by the diagram in Figure 5.1.

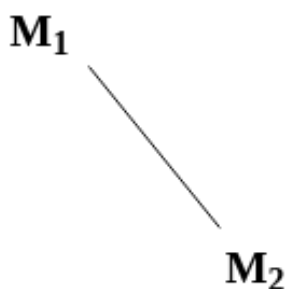


FIGURE 5.1: Diagram of co-occurrence in cases scope hierarchisation.

This diagram represents in an abstract manner the relation between two markers in a hierarchical co-occurrence both in cases of ADV + V and in cases of co-occurring modal predicates. If applied to example 233, M_1 represents the epistemic adverb *fortasse* and M_2 the dynamic verb (*non*) *potero*, modified by the uncertainty value expressed by *fortasse*. In the same way, the diagram applies to cases such as the ones illustrated in examples 234, 235 and 236, where M_1 would be filled by, respectively, *debere*, *dubium esse* and *potestas est*, and M_2 by *posse*, *oporteat* and *oporteat*. In both types of structure the markers are contiguous and the embedded marker is immediately included in the scope of the embedding marker. As I will

show in the next chapter, this is a crucial point because the presence of satellite (or adverbial) clauses (Pinkster 2021, 11) such as purpose, concessive and temporal clauses, nullifies the prerequisites for scope hierarchisation. In such cases, the hierarchical relationship between the markers still holds but enables to another type of co-occurrence i.e., non-hierarchical.

Before moving on to an in-depth analysis of specific co-occurrences, I will present a general overview of the distribution of the different types of modality in the two types of syntactic relation. Table 7.6 shows the count in scope hierarchisation and the scope hierarchisation rate for the co-occurrence of two modal predicates and for the relation ADV + V.

	count in scope hierarchisation	modal predicate + modal predicate count	modal predicate + modal predicate %	ADV + V count	ADV + V %
Deontic acceptability	4	0	0%	4	100%
Deontic authority	2	0	0%	2	100%
Dynamic	51	21	41%	30	59%
Epistemic	41	5	12%	36	88%
Total	98	26	27%	72	73%

TABLE 7.6: Distribution of the types of modality in scope hierarchisation by type of relation.

Some types of modality largely differ in their distribution between the two types of hierarchical co-occurrence. Deontic modality, both acceptability and authority, only appears in relations of ADV + V. Epistemic modality is also more frequent in ADV + V (88% of its occurrences in scope hierarchisation). Dynamic modality, on the other hand, is more equally distributed: it appears in ADV + V 50% of the times.

Tables 7.7 and 7.8 provide a more detailed overview on the role of modality types in the two syntactic relations, dividing them by embedding (Table 7.7) and embedded (Table 7.8) modality.

	count in embedding position	modal predicate + modal predicate count	modal predicate + modal predicate %	ADV + V count	ADV + V %
Deontic acceptability	0	0	—	0	—
Deontic authority	0	0	—	0	—
Dynamic	11	10	91%	1	9%
Epistemic	38	3	8%	35	92%
Total	49	13		36	

TABLE 7.7: Distribution of the types of modality that occupy an embedding position in the relations between a modal adverb and a modal verb ADV + V and between two modal predicates.

Concerning the embedding modalities in cases of ADV + V (Table 7.7), the distinction between different types of modality is quite sharp. Only markers of epistemic and dynamic

	count in embedded position	modal predicate + modal predicate		ADV + V	
		count	%	count	%
Deontic acceptability	4	0	0%	4	100%
Deontic authority	2	0	0%	2	100%
Dynamic	40	11	28%	29	72%
Epistemic	3	2	67%	1	33%
Total	49	13	27%	36	73%

TABLE 7.8: Distribution of the types of modality that occupy an embedded position in ADV + V and between two modal predicates.

modality can take the embedding position in relations of ADV + V. Epistemic modality outnumbers dynamic modality, which only appears once in such position. The range of modalities that can be embedded in ADV + V is much more diversified: deontic modality, as observed above, occurs only in an embedded position, and always in ADV + V; dynamic modality tends to be embedded more in cases of ADV + V (73% of cases); epistemic modality, which is rarely embedded, appears in two cases out of three in co-occurrences of two modal predicates.

Throughout the rest of this chapter I will present and describe the cases of scope hierarchisation in the relation ADV + V (section 7.2.1) and between two modal predicates (section 7.2.2), illustrating examples and specific markers for each structure.

7.2.1 Embedding within the relation ADV + V

As shown in Table 6.6 (see Chapter 6, page 199), the cases of co-occurrence of modal markers in ADV + V are 36. This type of relation is the most typical case of scope hierarchisation: as shown in Table 7.5 (page 229), all cases of a modal adverb combining with a modal verb imply scope hierarchisation, as the adverb directly modifies the verb. The combinations of modalities in cases of ADV + V are illustrated in Table 7.9.

Embedding modality	Embedded modality				Total embedded modality
	Deontic authority	Deontic acceptability	Dynamic	Epistemic	
Epistemic	2	3	28	2	35
Dynamic			1		1
Total embedding modality	2	3	29	2	36

TABLE 7.9: Types of modality involved in scope hierarchisation for ADV + V.

In ADV + V the embedding modality is epistemic in 97% of cases. All the co-occurrences presented in section 7.1.1 in this chapter (e.g. example 217 mentioned above) where epistemic modality is expressed by an adverb (the double modality described by Halliday) illustrate

this type of relation.¹² The only exception to this pattern found in the corpus is one co-occurrence where a dynamic necessity marker embeds another marker expressing dynamic necessity. This case is illustrated in example 237 (presented earlier in this chapter as example 231), where the adverb *necessario* scopes over the verb *oportere* (although as I have commented in section 7.1.2 this is a very doubtful example).

(237) = (231)

<i>Eorum</i>	<i>autem</i>	<i>cogitata</i>	<i>utiliter</i>	<i>hominibus</i>	<i>ad</i>	<i>vitam</i>	<i>explicandam</i>	
them	but	conception	usefully	men	to	life	to	
<i>e</i>	<i>pluribus</i>	<i>singula</i>	<i>paucorum</i>	<i>uti</i>	<i>exempla</i>	<i>ponam,</i>	<i>quae</i>	
explain	from	many	individual	few	as	example	present	
<i>recognoscentes</i>	<i>necessario</i>	<i>his</i>	<i>tribui</i>	<i>honores</i>	<i>oportere</i>	<i>homines</i>		
which	thankful	necessarily	them	render	honour	ought		
<i>confitebuntur.</i>								
man	admit							

I will present by way of example a few conceptions among many produced by some thinkers that have been useful in understanding life, so that the human kind, by considering them, will admit that honours **should necessarily** be rendered to them. (Vitruvius, *De architectura* 9, 2)

Table 7.10 shows the markers involved in each co-occurrence of the type ‘epistemic embeds x’. I excluded the case of dynamic necessity because it is represented by only one co-occurrence, which has already been discussed above.

Epistemic markers	Embedded modality					Epistemic <i>dubius</i>	Total embedding modalities
	Deontic authority <i>licet</i>	Deontic acceptability <i>debeo</i>	Dynamic <i>debeo</i>	<i>oportet</i>	<i>possum</i>		
<i>certe</i>	1	2	3	1	7		14
<i>certum</i>					1		1
<i>dubius</i>					1		1
<i>forsitan</i>					1		1
<i>fortasse</i>	1	1	1		5		8
<i>forte</i>		1			7	1	9
<i>probabilis</i>					1		1
Total epistemic markers	2	4		28		2	35

TABLE 7.10: Epistemic markers involved in scope hierarchisation for ADV + V.

Table 7.10 clearly shows that in all cases of scope hierarchisation in ADV + V the embedding modality (epistemic and dynamic necessity) is expressed by an adverb, regardless of the type of modality. This is not surprising, because the relation ADV + V, as it was defined in this study, only captures asymmetric relations at the level of the simple clause. This type of

¹² Refer to section 7.1.1 for a description of the examples.

modification in the simple clause is often performed by adverbs.¹³ In the studies mentioned in Chapter 3, the embedded modality in this type of combinations is always expressed by a lexical verb. In none of the co-occurrences found in the corpus an adverb embeds another adverb, regardless of the type of modality involved. Co-occurrences of modal adverbs were detected in the corpus, but these always appear in relations of coordination or subordination, and never in cases of scope hierarchisation.

Going more into details on the markers involved (refer to Table 7.9 at page 234), as it was shown in example 231 the adverb *necessario*, expressing dynamic necessity, is the only non-epistemic marker in the list that is found in a relation of scope hierarchisation, embedding another dynamic necessity marker. For the expression of epistemic modality, the most frequent adverb is *certe* (14 co-occurrences), followed by *forte* (9 co-occurrences) and *fortasse* (8 co-occurrences). All the other adverbs appear only once in this sub-set. Among them, *certe*, *certum* and the collocation *sine dubio* (*dubius* in the Table) express epistemic certainty (16 co-occurrences). The adverbs *forsitan*, *forte* and *fortasse* express uncertainty, which is therefore slightly more frequent in this type of relation than the other degrees of epistemicity. The degree of probability is expressed in only one co-occurrence by the marker *probabilis*. Concerning the markers used to express the embedded modality, these correspond to the markers most frequently found in the co-occurrences: *debeo*, *licet*, *oportet* and *possum* (see Table 6.3 in Chapter 6, page 173). In one case, the embedded marker is the epistemic construction *dubium est*, and it corresponds to the example 223 presented in section 7.1.1.

For the analysis of the specific co-occurrences the reader will refer to the categories of embedding presented in the previous section, and to the description of the examples. In this section, I will focus on the semantic and/or argumentative use of the co-occurring markers in ADV + V.

In some circumstances, the core epistemic value of the adverb that embeds the co-occurring marker can be weakened, and take on a discursive, scalar or restrictive role, depending on the context. This type of phenomenon is observed in the corpus especially for the epistemic adverbs *forte*, *fortasse* and *certe*. The use of epistemic adverbs with functions other than that of modal markers in Latin is not new *per se* and it has been discussed by Orlandini (1997), Pinkster (2004; 2005), Schrickx (2011). When this is observed in co-occurrence with another modal marker, it leads to a modification on the relation of scope hierarchisation that would normally apply in such cases.

¹³ I want to clarify that the co-occurrence of a modal adverb and another modal marker in the simple clause does not necessarily lead to a case of scope hierarchisation. Some types of adverbs can be used as focus adverbs on specific constituents of the clause, limiting their scope to that nominal constituent. This is the case for the restrictive use of the adverb *certe* (Schrickx 2011, 249).

The first adverb that I will analyse is *fortasse*. Bertocchi and Orlandini (2001) consider it as one of the Latin markers apt at expressing subjective possibility (epistemic modality as it is defined in this study), and rather oriented towards the domain of probability. In the co-occurrences, *fortasse* tends to preserve its epistemic value more than *forte*, as in example 217, repeatedly cited in this chapter (*fortasse non potero*). In specific circumstances, this adverb can be used with an argumentative function which tends towards the domain of concessivity. Consider example 238.

- (238) *Dicere fortasse quae sentias non licet, tacere plane*
 say maybe which feel not be_allowed keep_silence clearly
licet.
 be_allowed

Perhaps you **are not allowed** to say what you think, but you are clearly allowed to keep silence. (Cicero, *Epistulae ad familiares* 4, 9)

In this sentence, from a syntactic point of view, we observe the co-occurrence of three modal markers: (*fortasse*, *licet* and the second *licet*). The scope hierarchisation is realised by the co-occurrence of *fortasse* with the first *licet*: the former, a marker of epistemic uncertainty, embeds the passage *dicere quae sentias non licet*, in which *licet* expresses deontic possibility. This sentence is structurally equivalent to the one presented in the example 6: an epistemic marker is placed at a higher level of the scope hierarchy, and scopes over the co-occurring non-epistemic marker, which is placed at a lower level in the hierarchy. However, this use of *fortasse* is slightly different from the other uses presented so far in this chapter, as in this context, its basic modal value of epistemic uncertainty is exploited in order to play a specific role in terms of the argumentative structures. The sentence illustrated in 238 is formed by two coordinate main clauses: *dicere fortasse quae sentias non licet* and *tacere plane licet*. The coordination between the two clauses is asyndetic, therefore we cannot rely on a coordinating conjunction *et* 'and' or *sed* 'but' to understand the type of logical relation that binds them. However, the argumentative structure of the sentence reveals an opposition between the two clauses: the main verb *licet* is repeated in both clauses, whereas its scope changes and raises two opposite representations, i.e., *dicere quod sentias* 'to say what one thinks' and *tacere* 'to keep silence'. The opposition between the two representations (the SoAs of the two *licet*) is instantiated by the two adverbs *fortasse* 'maybe' in the first clause and *plane* 'clearly, plainly' in the second clause. The structural features of this sentence that I have described instantiate an argumentative movement that seems to be a variation on the model described in Rossari (2016, 2020) with respect to the use of French epistemic adverbs in co-occurrence to the French connector *mais* 'but' (see Chapter 3). In 238 we do not have a connector such

as *mais*, but the opposition between *fortasse* and *plane* appears to work similarly: the representation given by the first clause is placed on the background (*fortasse* signals the lack of commitment of the speaker to the SoA *dicere quae sentias non licet*), whereas the second clause is on the foreground (with *plane*, the speaker fully commits to the SoA *tacere licet*). This use of epistemic markers in the argumentative structure is also discussed specifically for Latin by Maraldi (2001) in her survey on the means of expressing concession in Latin. Building on the distinction between causal concession and argumentative concession elaborated by Moeschler (1989), she presents the use of argumentative concessives (also defined rhetorical concessives) as a "discourse strategy with argumentative purposes" (Maraldi 2001, 116). In the passage illustrated in 238, Cicero is defending his own point of view, and he argues his position by using a rhetorical concessive which relies on the adverb *fortasse*. Epistemic adverbs are one of the linguistic devices identified by Maraldi to convey concessive meanings. Berretta (1997) states that in this type of concessives the factuality of the SoA in the concessive clause is not denied by the speaker, who however commits to the main clause. This is the case with epistemic markers of certainty (defined by Maraldi as "assertive markers" such as the Italian *certamente* 'certainly'), but it also applies to epistemic markers of uncertainty such as *fortasse*. When the conceded argument is marked by a marker of epistemic uncertainty, the speaker is not doubting the factuality of the SoA *per se*, but s/he states the irrelevance of the argument for his/her reasoning. In other words, in a structure of the type 'maybe *p*, but *q*', the factuality or non-factuality of *p* does not challenge the commitment of the speaker to *q*.

The adverb *forsitan* appears only once in scope hierarchisation in the corpus, so I do not have a range of different contexts to observe its behaviour as I did with *forte* and *fortasse*.¹⁴ However, the co-occurrence of this adverb with a marker of dynamic possibility allows me to show another possible use of epistemic markers. The sentence to which I refer is illustrated in example 239.

- (239) *Ego enim malis sententiis vinci non possum, bonis forsitan possim*
 I indeed bad purpose vanquish not can good perhaps can
et libenter.
 and willingly

I cannot be vanquished by bad purposes, but **perhaps** I **could** (i.e., be vanquished) willingly by good ones. (Cicero, *Philippicae* 14, 7, 18)¹⁵

¹⁴ Kühner and Stegmann (1962[1912], 812) draw a distinction between *forsitan* and *fortasse*, as the former expresses real uncertainty, whereas *fortasse* should be placed higher in the scale of certainty, towards the notion of probability. Orlandini (2001, 325) and Schrickx (2011, 221) also supports the tendency of *fortasse* to express probability rather than pure uncertainty.

¹⁵ In this passage there are three co-occurring markers: *possum*, *fortasse* and *possim* (subjunctive form of *possum*). The relation of scope hierarchisation involves *fortasse* and *possim*. The presence of the first *possum* is

This specific case in which *forsitan* has scope on *possim* illustrates a specific use that this epistemic adverb shares with *fortasse*. Orlandini observes that these two adverbs often appear in co-occurrence with a verb in the subjunctive mood, expressing a notion of potentiality, and they function in such harmonic combinations as a reinforcement to the notion of potentiality.¹⁶

A similar function of reinforcement is mentioned by Schrickx also with respect to *certe*. Schrickx assigns to this adverb of epistemic certainty four main values: epistemic, scalar, reinforcing and pragmatic.¹⁷ In most of the co-occurrences in which *certe* embeds another marker, it preserves its epistemic value. However, I could find some examples of scalar uses in co-occurrence with another marker. One of such cases is the sentence illustrated in example 240.

- (240) *Quod si de Antonio non laboratis, mihi certe,*
 which if about Antonius not be_concerned me certainly
patres conscripti, consulere debetis.
 Senate_members have_regard should

But if you are not concerned about Antonius, Senate members, you **certainly should** have some regard for mine. (Cicero, *Philippicae* 12, 8, 19)

The use of *certe* in this context is not entirely epistemic: the adverb is used as a marker of scalarity, with a meaning that could be translated as ‘at least’, implying that there is a scale of possibilities in which there is something higher in the scale, which might also be the case. In the passage illustrated in example 240, the higher degree of the scale is expressed by the hypothetical clause that precedes *certe*, whereas the scalar notion expressed by *certe* is applied to the second scenario *consulere debetis*. In this sense, the co-occurring marker *debetis*, embedded by *certe*, inherits a notion of scalarity rather than the value of pure epistemic certainty.

7.2.2 Embedding between two modal predicates

The relation of scope hierarchisation between modal verbs or constructions presents a completely opposite picture compared to the relation ADV + V. The co-occurrences between two

relevant to the study of co-occurrences because it is the first member of a contrastive structure with two members that have opposite polarity. This type of interactions will be discussed in Chapter 8.

¹⁶ Orlandini (1997, 259) and Schrickx (2011, 221) also register for the adverbs *fortasse* and *forsitan* a specific use as an attenuation device. The speaker would use these two adverbs to nuance his statement about e.g. an ability, as a strategy for politeness. Unfortunately, such uses did not emerge from the corpus in co-occurrence with other modal markers.

¹⁷ Schrickx borrows these four categories from the study performed by Byloo, Kastein and Nuyts (2007) on markers similar to *certe* in English and Dutch, as she found that they apply to the Latin adverb.

modal predicates that coincide with a case of scope hierarchisation represent only the 3.3% of the corpus.¹⁸ The cases of scope hierarchisation that involve two modal predicates can be distinguished into different types of syntactic relation between the markers. The results of the analysis on the corpus data have shown that only clauses that function as arguments in the construction pattern of a modal verb or construction can entail a relation of scope hierarchisation between two co-occurring modal predicates. The argument clauses found in the corpus can be expressed by *ut* or *quin* with the subjunctive, by the subjunctive alone, or with an accusative with infinitive clause. Additional cases of scope hierarchisation include the use of *debeo* or *possum* with a present infinitive. These types of syntactic structures were shown so far in examples 206 (scope hierarchisation between *debeo* functioning as an auxiliary and *possum* in the present infinitive), 224 (scope hierarchisation in an accusative with infinitive clause with a subject function) and 232 (scope hierarchisation in a clause with simple subjunctive, functioning as indirect interrogative clause), presented in section 7.2 above. All the different types of syntactic construction just mentioned can be described by the diagram of co-occurrence shown in Figure 5.1 above.

Table 7.5, presented earlier in section 7.2 (page 229), lists the number of co-occurrences in scope hierarchisation per type of clause. Cases of accusative with infinitive and simple infinitive show the highest number of hierarchical co-occurrences, followed by *ut/quin* with the subjunctive and simple subjunctive.

Table 7.11 provides an overview of the types of modality and the corresponding markers involved in scope hierarchisation between two modal predicates, regardless of the type of syntactic structure.

¹⁸ Table 6.6 at page 199 shows all the other syntactic relations in the corpus; refer to Table 7.5, page 229 for the cases of scope hierarchisation between two modal predicates.

Embedding modality	Embedded modality					Total embedding
	<i>debeo</i>	<i>oportet</i>	<i>dynamic</i> <i>facultas</i>	<i>possum</i>	<i>epistemic</i> <i>dubium est</i>	
dynamic	<i>debeo</i>			1		10
	<i>oportet</i>			1	1	
	<i>opus est</i>		1			
	<i>facultas</i>			2		
	<i>possum</i>		1	1	1	
	<i>potestas</i>	1				
epistemic	<i>dubium est</i>	1	1	1		3
Total embedded			11		2	13

TABLE 7.11: Types of modality and markers in scope hierarchisation between two modal predicates.

Before commenting on specific types of co-occurrence and syntactic structures, I will outline the main features that emerge from this Table. Dynamic necessity and dynamic possibility are the types of modality that appear the most in relations of hierarchical co-occurrences between two modal predicates. Both of them show a higher tendency to scope over markers of dynamic possibility compared to epistemic modality. Moreover, the hierarchical co-occurrence of modal predicates is the only type of relation in which dynamic possibility can take up the role of embedding modality. On the contrary, a considerable drop in terms of co-occurrences is observed for epistemic modality, compared to cases of ADV + V. In co-occurrences of a modal adverb with a modal verb, epistemic modality is almost the only type of modality in embedding position, with only one (doubtful) occurrence of dynamic modality. In hierarchical co-occurrences of two modal predicates epistemic modality only appears in three sentences, and in two of them it occupies the embedded position. Another noticeable difference is that in co-occurrences between two modal predicates epistemic modality is only expressed by the construction *dubium est*. Dynamic modality on the other hand draws on a wider selection of markers, some of which only appear in this type of relation e.g. *facultatem do* or *facultatem habeo* (see e.g. example 227 for *facultatem do*), *opus est* (see example 244 which will be shown shortly) and *potestas* (see e.g. example 232).

The different types of construction in which the hierarchical co-occurrences appear depend on the construction patterns to which different modal predicates are associated.

In the cases of infinitive clauses, the embedded marker that occurs in the infinitive form is governed by the embedding modal marker. Only two types of hierarchical relations are found in this structure: i) epistemic modality embedded by dynamic modality; ii) dynamic modality embedded by dynamic modality.

The epistemic construction *dubium esse* is embedded in one case by the marker of dynamic possibility *possum*, and the other one by the marker of dynamic necessity *oportet*. The two co-occurrences are illustrated, respectively, by examples 241 and 242 (previously examples 225 and 229). Both examples have been presented earlier in this chapter, but I present them again below for the sake of clarity.

(241) = (225) *sin* *ii* *sumus* *qui* *profecto* *esse* *debemus*, *ut* *nihil*
 but_if they be who surely be should so_that nothing

arbitremur *expedire* *nisi* *quod* *rectum* *honestum=que* *sit*,
 think be_expedient unless what right honourable=and be

non *potest* *esse* *dubium* *quid* *faciendum* *nobis* *sit*.
 not can be doubt what do us be

But if we are those who we surely should be and we think that nothing is expedient but what is right and honourable, **it cannot be doubtful** what we should do. (Cicero, *Epistulae ad familiares* 151, 2)

- (242) = (229) *Cum ergo, quae sunt vera, falsa videantur et nonnulla*
 since therefore which be true false seem and some
- aliter quam sunt oculis probentur, non puto oportere esse*
 otherwise than be eye perceive not think ought be
- dubium, quin ad locorum naturas aut necessitates detractioes aut*
 doubt that to space nature or necessity subtraction or
- adiectioes fieri debeant, sed ita, uti nihil in his*
 addition do should but in_such_way that nothing in this
- operibus desideretur.*
 creation be_missing

Since, therefore, what is true seems false, and some things are perceived otherwise than how they are by the eyes, I do not think it **should be doubtful** that some subtractions or additions should be made to the nature or the constraints of the sites, but in such way that nothing would be missing in these creations. (Vitruvius, *De architectura* 6, 2, 4)

The two dynamic markers introduce the infinitival complement *dubium esse*, followed by its argument clause introduced by *quid* in example 241 and *quin* in example 242. As mentioned several times in this chapter, (see in particular sections 7.1.1 and 7.1.2), epistemic modality is almost never embedded by other types of modality. The impersonal verb *oportet* and the verb *possum* in the impersonal form are the only two cases in which a marker of dynamic modality appears in an embedding role with a marker of epistemic modality in the corpus.¹⁹

In the other type of combination (dynamic modality embedding dynamic modality), a marker of dynamic necessity always embeds a marker of dynamic possibility. Consider examples 243 (previously presented as example 206) and 244.

- (243) = (206) *Rex vero respondisse dicitur Homerum, qui ante annos*
 king indeed reply say Homer who before year
- mille decessisset, aevo perpetuo multa milia hominum*
 thousand die lifetime constantly many thousand man

¹⁹ For the semantic implications of such embedding relation, refer to section 7.1.2.

pascere, item debere, qui meliore ingenio se profiteretur,
 feed therefore have_to who better intellect himself declare

non modo unum sed etiam plures alere posse.
 not only one but also many nourish can

Indeed the king is said to have replied that Homer, who died a thousand years before, had constantly fed many thousands of men for a lifetime, and therefore, as he declared himself of a better intellect, he **should be able** to nourish not only one but many others as well. (Vitruvius, *De architectura* 7, 9)

(244) *Confirmant quidem certe totius exercitus animos alienos esse a*
 confirm in_fact certainly all army spirit hostile be from

Curione, maxime=que opus esse in conspectu exercitum venire
 Curio extremely=and necessary be with respect army come

et colloquendi dare facultatem.
 and talk give possibility

In fact they confirm that the spirits of the whole army were certainly hostile to Curio, and that it **was** absolutely **necessary** (i.e., for Varus' army) to come see the army and **give the possibility** to talk.²⁰ (Caesar, *De bello civile* 2, 27, 1)

In these sentences, the two dynamic necessity markers *debeo* and *opus est* embed the markers of dynamic possibility *possum* and *facultas* (in the construction *facultatem do*). The types of necessity expressed by the two markers are different: *debeo* in the context of example 206 refers to a necessity imposed to the participant, whereas *opus est* in example 244 refers to a situational necessity. The two types of possibility are also different: the first *possum* refers to an ability of the participant, whereas the latter refers to an external possibility, a chance that is given to the participant to do something. Despite these differences, in both passages the co-occurrence expresses a possibility subordinated to a necessity. This type of relationship is used, in contexts similar to the examples presented above, to express the need for something to become or to be made possible.

The other type of syntactic relation in hierarchical co-occurrence between two modal predicates is the use of *ut* or *quin* constructed with the subjunctive. One of the co-occurrences found in such relation is epistemic modality embedding dynamic modality. The co-occurrence is illustrated in example 245 (presented earlier in sections 7.1.1 and 7.2 as example 224).

²⁰ In this sentence appears another marker, the adverb *certe*, which is an epistemic marker. However, the adverb does not scope over any of the markers involved in this relation, so I will not discuss it here.

- (245) = (224) *Ergo si ita videtur, uti in hypaethris locis ab*
 therefore if in_such_way seem that in open place by
aere umores ex corporibus exsugantur molestiores, quemadmodum
 air moisture from body drain harmful just_as
*ex terra per nebulas videntur, non puto **dubium** esse, quin*
 from earth by cloud seem not think doubt be that
amplissimas et ornatissimas subdiu hypaethrus=que collocari
 wide and decorated by_day in_the_open=and place
oporteat in civitatibus ambulationes.
 be_necessary in city walk

Therefore if it seems that in open places the most troublesome moisture is drained from the bodies by the air, as it seems to happen from the earth through the clouds, I do not think **it is doubtful** but that the widest and most decorated spaces for walking in the cities **should** be placed under the sun and in the open. (Vitruvius, *De architectura* 5, 9, 6)

In this sentence, epistemic modality is expressed by the construction *dubium est*, which is followed by an argument clause introduced by *quin* with *oportet* in the subjunctive mood as the main verb.

Another type of co-occurrence in a similar relation is illustrated in example 246.

- (246) = (205) ... *et, si res facultatem habitura videatur, ut*
 ... and if situation possibility have seem so_that
Alexandream atque Aegyptum tenere possis, esse et tuae et
 Alexandria and Egypt keep can be and your and
nostri imperi dignitatis Ptolomaide aut aliquo propinquo eloco rege
 our power honour Ptolemais or another close place king
conlocato te cum classe atque exercitu proficisci Alexandream ...
 establish you with fleet and army depart Alexandria ...

... and, if it seems that the situation will create the **possibility** for you to **be able** to keep Alexandria and Egypt, it is by your and our honour that you depart to Alexandria with a fleet and an army, after having established the king at Ptolemais or some other close place. (Cicero, *Epistulae ad familiares* 18, 4)

This sentence is similar to example 227, discussed in section 7.1.2. In such cases, we observe the combination of two markers of dynamic modality, *facultas* and *possum*, where *facultas* embeds the marker *possum* in an argument clause introduced by *ut*. I have already commented in reference to example 227 (page 219) on how applying the notion of modal harmony to a non-scalar category as dynamic possibility is problematic. In this example the two types of modality that are combined belong to the same domain of dynamic possibility, and have the same polarity. The combination might seem redundant, because the concept of possibility expressed by *facultas* introduces another concept of possibility, conveyed by *possum*, so that this passage in translation would result as ‘the possibility of having the possibility’.²¹ However, as I have often observed for other combinations presented in this chapter, the two notions of possibility expressed by *facultatem* and *possum* in both examples that present this co-occurrence are not the same. The constructions *facultatem habeo*, *facultatem do* always refer, in the examples in the corpus, to an occasion, a chance, an external possibility that originates from the circumstances, from the specific situation, and that is offered to the participant. On the other hand, the notion expressed by *possum* in this case refers to the possibility that the participant has received, given by the circumstances, to do something. In this sense, the redundancy of such co-occurrence lies in the fact that both expressions refer to a concept of external possibility. However, they are framed differently: the type of possibility conveyed by *facultas* originates from a specific circumstance; the notion of possibility expressed by *possum* instead, is framed from the perspective of the participant, who receives the possibility to accomplish something.

As shown in Table 7.5, the cases of simple subjunctive in a hierarchical co-occurrence between two modal predicates are only two in the corpus. The first one was illustrated in example 232 mentioned earlier in this chapter (page 232). In this case, as already mentioned, *quibus... oporteat* functions as an indirect interrogative clause directly governed by *facultas*. The other case of the use of subjunctive was illustrated in example 228, shown again here as example 247.

(247) = (228) *Non potest, inquit, respublica laedi possit nisi in aliqua sui*
 not can say state harm can unless in some itself
 parte.
 part

It is not possible that the state **could** be harmed unless in some of its parts.

(Seneca the Elder, *Controversiae* 10, 14)

²¹ As a proof of the redundancy of this co-occurrence, I clarify that the translation that I kept as a reference point translated it as ‘Should circumstances appear to furnish a fair prospect of your controlling Alexandria and Egypt’, avoiding the repetition of the concept of possibility.

In this sentence the marker *potest* expresses dynamic possibility and embeds the clause *respublica laedi possit*, in which *possit* again expresses dynamic possibility. This is another example of contrastive use of the co-occurrence between markers of different polarity, as the first *possum* is negative (it is preceded by the marker of negation *non*), and the co-occurring *possum* is positive. This passage is also another case in which the use of the co-occurrence leads to an accumulation of types of modality and markers that may seem redundant. In fact, the first *possum* expresses a negated objective possibility (situational in the WoPoss framework); the second *possum* expresses the possibility that the republic may be damaged. In the co-occurrence, the first marker is used to deny the possibility (situational) that the representation described in the clause *respublica laedi possit* i.e., another possibility, may be verified.

7.3 Concluding remarks

In this section, I will discuss the results that I presented in this chapter by focusing on the interplay between the syntactic structure and the semantic hierarchy of scopes. As mentioned at the beginning of the chapter, hierarchical co-occurrences are characterised by the presence of one marker within the scope of the co-occurring marker.

The great majority of cases of scope hierarchisation are observed in correspondence of the relation ADV + V i.e., with a modal adverb scoping over a modal verb (36 co-occurrences out of 49). This is due to the different scope properties of the co-occurring markers, as one of the main features of modal adverbs is that they can apply to the propositional content of the clause as a whole.²² In n 35 cases out of 36, the adverb embedding the verb expresses epistemic modality. In only one (doubtful) case the embedding adverb expresses dynamic necessity (i.e., *necessario* in example 231, but see the discussion concerning the scope of the adverb). In relations of the type ADV + V, epistemic modality can embed all types of modality found in the corpus: there are cases of epistemic adverbs scoping over dynamic modality (both possibility and necessity, as shown in examples 217 and 224), deontic authority (example 219), deontic acceptability (example 220), and other epistemic markers (example 223). In the case of dynamic necessity as embedding modality, *necessario* co-occurs with another expression of dynamic necessity. However, as this is the only case of scope hierarchisation in ADV + V with dynamic necessity in an embedding position, I cannot draw significant conclusions about the use of this type of modality in an embedding position. Embedding epistemic markers in relations of ADV + V are (almost) all the adverbs listed in section 2.4 (Chapter 2, page 30): *certe*, *forsitan*, *fortasse*, *forte*, *probabiliter*, and the adverbial expression *sine dubio*.

²² Excluding cases in which the modal adverb is used as a focaliser with a restrictive value, as shown e.g. for *certe* in section 2.4 (Chapter 2, page 2.4).

The types of modality in an embedded position in the relation ADV + V are expressed by some of the main modal verbs in the list: *debeo* (deontic acceptability and dynamic types of modality); *licet* (deontic authority); *oportet* and *possum* (dynamic modality); the construction *dubium est* (epistemic modality). Dynamic modality is the only embedded type of modality that is expressed by more than one marker (but it is also the most frequent type of modality in an embedded position).

In only 13 co-occurrences, the hierarchical relation occurs between two modal predicates. In these cases, the hierarchy is established when a modal verb governs another modal verb in the infinitive form or when an accusative with infinitive clause functions as the subject to an impersonal modal verb or construction (7 co-occurrences); when a clause introduced by *ut* or *quin* constructed with the subjunctive functions as the argument of an impersonal modal verb or construction; when a modal verb governs a modal verb in the subjunctive (the only case of indirect interrogative). Compared to cases of ADV + V, combinations of modal predicates in scope hierarchisation show more heterogeneity in terms of types of embedding and embedded modalities. Firstly, this is the only type of hierarchical relation that allows for the presence of epistemic modality in an embedded position. Epistemic modality is embedded twice in an infinitive clause, once by a marker of dynamic necessity (*oportet*, in example 229) and once by a marker of dynamic possibility (*possum*, in example 225). Epistemic modality in an embedded position is always expressed by the construction *dubium est*. There are three cases of scope hierarchisation where the epistemic construction *dubium est* embeds modal verbs expressing dynamic modality (*debeo*, *oportet* and *possum*, see e.g. example 224 for *oportet*). In all the other hierarchical co-occurrences between modal predicates, a dynamic marker embeds another dynamic marker. Markers of dynamic possibility (*possum* and the constructions *facultatem habeo/facultatem do* and *potestatem habeo*) frequently embed other markers of dynamic possibility (*possum* and in one case *facultatem do*) (see e.g. example 205 for *facultatem habeo* embedding *possum*). The specific type of construction depends on the syntactic pattern associated to the modal verb or construction in the sentence context. The epistemic construction *dubium est* is always constructed with *quin* and the co-occurring modal verb in the subjunctive form. In one case, *debeo* governs the present infinitive of *possum* (example 206). The construction *facultatem do* occurs with *ut* and the subjunctive form of the co-occurring marker.

8 Co-occurrences in absence of scope hierarchisation

Most of the references in the literature, whether implicit or explicit, to the co-occurrence of modal markers, pertain to cases of scope hierarchisation, as I defined it in this study. If one recalls the studies listed in the first two sections of Chapter 3, all references to diverse types of combinations e.g. between English modal auxiliaries, modal verbs, or modal adverbs with modal verbs, and the associated concepts of modal concord (Halliday 1970, 330) and modal harmony (Lyons 1977, 807) exclusively concern combinations in which one marker has scope over the other. I have described this type of relationship in Chapter 7, highlighting the fact that, although this type of co-occurrence is the main subject of the great majority of the studies on this phenomenon, it represents only 8,4% of the total number of co-occurrences in the corpus. In this chapter, I will discuss non-hierarchical co-occurrences i.e., combinations in which the two markers maintain separate scopes, which is in fact the most frequent type of co-occurrence in the corpus. When markers co-occur in absence of a clear scope hierarchy, the types of relationship observed between the markers (and types of modality) are different from the ones outlined in the previous chapter for hierarchical co-occurrences. As I will show in this chapter, their interaction in these cases exploits i) the logical relationships existing between the basic notions of necessity and possibility, and their negative counterparts ii) the scalar nature of certain modal notions like epistemic and deontic acceptability. Throughout this chapter, I will also show how these two aspects can be exploited for rhetorical-argumentative purposes or to bring out logical-cognitive processes of association between different modal concepts.

The analysis of the association of the types of modality described in Chapter 6 reveals that the types of modality tend to be positively attracted in co-occurrence to each other by macro categories: deontic with deontic (authority and acceptability); dynamic with dynamic; epistemic with epistemic. The results were shown in Figure 6.3 (page 196). Unlike the case of hierarchical co-occurrences illustrated in the previous chapter, the quantity of data available for non-hierarchical co-occurrences allowed me to compute attraction measures between the types of modality. Therefore I applied the same type of analysis to cases of co-occurrence in

absence of a scope hierarchy. Results are shown in Figure 8.1. The corresponding SIQ values are shown in Table A.7 in the Appendix, page 306.

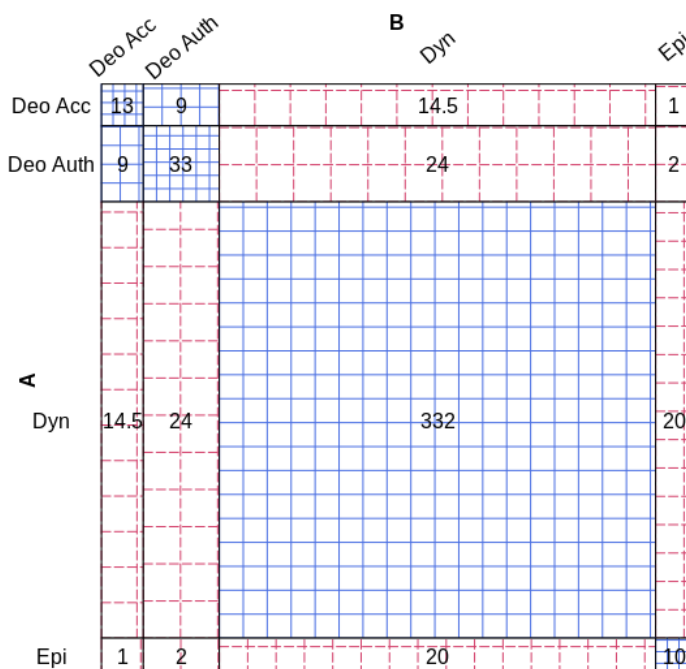


FIGURE 8.1: Symmetric independence quotient for the types of modality in relations that do not entail scope hierarchisation (sieve plot).

The results of the analysis on this type of co-occurrences are consistent with those obtained on the whole set of co-occurrences and illustrated in Chapter 6: macro-categories of modality tend to attract each other in co-occurrence. As explained in chapter 5, the results of the analysis are color-coded: blue indicates attraction between the two variables; red indicates repulsion. Therefore, deontic, dynamic and epistemic modality tend to attract each other in co-occurrence. Moreover, deontic acceptability and deontic authority attract both markers of their same type and markers of the respective sub-type of deontic modality i.e., deontic acceptability is also attracted to other markers of deontic authority and vice versa. The positive attraction between the same types of modality might remind the reader of the concepts of modal harmony illustrated in Chapter 3 (Lyons 1977; Coates 1983), which were sometimes picked up in the preceding chapter when discussing specific types of co-occurrences. However, it should be specified that the concept of modal harmony was developed based on the traditional notion of modal co-occurrence, namely the co-occurrence of a modal adverb with a modal verb. In particular, the initial definition of modal harmony and the most faithful use of the term refer to co-occurrences between epistemic markers, which are defined as harmonic or non-harmonic if the two co-occurring markers express, respectively,

the same or different degrees of epistemic modality. As explained in Chapter 3, the concept has sometimes been extended to broader applications, such as, in the case of Coates, non-modal expressions that suggest a certain modal interpretation (I am referring back to examples 151 and 152 at page 104). However, these are mostly exceptions. Therefore, there is need for developing another new way of analysing this type of co-occurrence, which does not imply a hierarchical influence of one marker on the other, but rather logical, scalar, or contrastive relationships, which are exploited in different ways depending on the type of syntactic structure and types of modalities used in co-occurrence.

The diagram shown in Figure 8.1 shows additional information about the co-occurrence counts (observed frequency) of each type of modality in co-occurrence. As a reminder, the co-occurrence score is given by the number of squares in each rectangle, which also appear in the figure as a digit. The combination dynamic + dynamic shows the highest co-occurrence score (332), whereas the combinations epistemic + epistemic and deontic acceptability + deontic authority have the lowest (respectively 10 and 9 co-occurrences). This is not entirely surprising: as I have shown in Chapter 6 the category of dynamic modality, and in particular dynamic possibility, is extremely frequent in the corpus. Epistemic and deontic markers are much less frequent. Moreover, in the specific case of epistemic modality, most of the co-occurrences of two epistemic markers together are observed in cases of scope hierarchisation (see Chapter 7).

At the sentence level, the attraction between the same modal categories may be encoded in a co-occurrence of the same marker (a phenomenon that I defined ‘loop co-occurrences’ or simply modal loops) or two different markers. I will show examples of both cases in the following sections, highlighting i) the type of logical relations on which co-occurrence is based and ii) if and when a rhetorical-argumentative use of each type of co-occurrence can be glimpsed.

Before illustrating each of these cases, it is important to introduce some key concepts that will be used throughout the analysis, and which concern the type of relationships that can be described by referring to the modal square. The square was briefly presented in the Introduction (I show again the diagram in Figure 1.1 to facilitate the reader), but I will describe it here in more detail. The square represented in Figure 1.1 builds on the general model of the square of logical oppositions, probably elaborated by the commentators of Aristotle Apuleius of Madaura and Boethius (see Londey and Johanson 1987). The diagrammatic representation for the modal notions was elaborated by two other commentators of Aristotle, Cajetan and Petrus Hispanus (see Orlandini 2001, 313). The same logical relations have been applied to a variety of other notions besides modality, e.g. quantification (Horn 1989 for an overview).

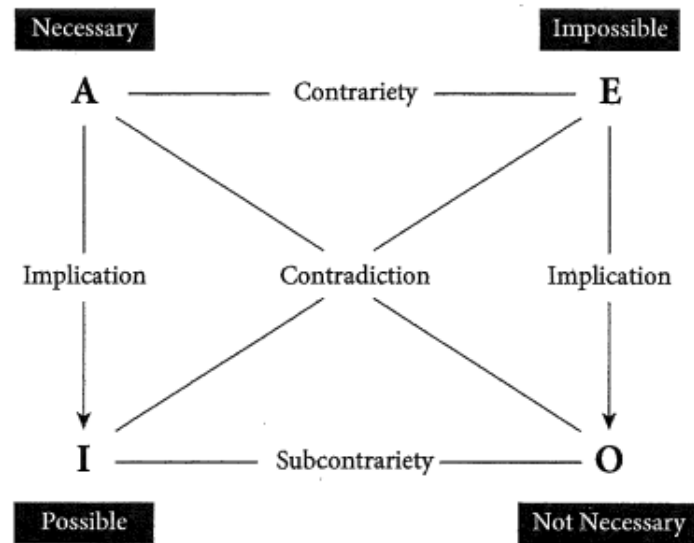


FIGURE 1.1: Aristotelian square for modality (van der Auwera and Aguilar 2016, 24).

The modal notions represented in the diagram are divided into notions with positive polarity (A and I) and notions with negative polarity (E and O). Each pair of vertices in the diagram hold different types of relations. Two of them are relevant to the analysis of modal loops: the relations of contradiction and contrariety.

The relation between notions across the main diagonal e.g. possible and impossible (I and E) is a relation of contradiction: if one is affirmative, the other one is negative, and vice versa. That is, if something is possible it cannot be impossible.

The relation between the notions in A and E i.e., necessary and impossible, is a relation of contrariety: both terms cannot be affirmative at the same time. That is, if something is necessary it cannot be impossible. On the other hand, they can both be negative: something can be neither necessary nor impossible. Contrary terms admit the presence of intermediate values among them (Horn 1989, 269–273).

An example of contrary terms are *red* and *black*. Both terms cannot be affirmative at the same time, but they can both be negative. That is, something can be neither red or black, but other values are possible e.g. it could be *blue*. The couple of terms *odd* and *even* instead is a couple of contradictories: middle values are not admitted. In the square of modal oppositions, possible and impossible are contradictories, whereas necessary and impossible are contraries.

Another relation that will be relevant to the analysis is the relation of implication, which involves the modal notions located on the vertices A—I and E—O in the square. More precisely, on the positive pole of the square, necessity (A) unilaterally implies possibility (I), and

on the negative pole, impossibility (E) unilaterally implies non-necessity (O).¹ A relation of implication typically exists between different values organised in a scale. In a scale, different expressions belonging to the same domain are ranked in a linear way, according to their semantic value. The scale can be based on quantitative or qualitative criteria. For instance, it can be a scale of quantifiers (*all, most, many, some*) or qualitative adjectives (*adore, love, like*) (Horn 1989, 232; Bertocchi 1999, 163). Based on the Maxim of Quantity, the speaker should make their “contribution as informative as is required (for the current purposes of the exchange)” (Grice 1975, 45). Therefore, a value on a certain degree of the scale entails all the weaker values on the same scale. Following this maxim, in the modal square the necessity to do something unilaterally implies the possibility of doing it.²

Scalarity is another relevant notion for this chapter. As explained in chapter 2, some modal categories show the property of being scalar: the types of modality deontic acceptability and epistemic can be further specified into different degrees of desirability and certainty, respectively. Based on the Maxim of Quantity mentioned above, the use of scalar concepts in discourse can generate scalar conversational implicatures (Horn 1989): if a speaker uses a value that sits on a lower degree of the reference scale, this generates the conversational implicature that all the other terms that are ranked higher on the scale could not be used in that context. Therefore, on a scale of informativeness, using a lower degree on the scale means that all the above values are excluded.³ The relation of implication between certain modal notions will turn out to be important for this specific analysis, because argumentative uses of non-hierarchical co-occurrences sometimes exploit such relation to enforce the winning argument.

As a reminder from the previous chapter, for the description of the sentences presented hereafter, I will adopt a finer scheme of analysis compared to the one outlined in Chapter 5, in order to highlight the relations established between the markers in co-occurrence. I will refer to different degrees of deontic or epistemic modality, and to the two types of dynamic modality, possibility and necessity.

¹ This is in accordance with the Law of Subalternation: I and O are defined as subalterns of, respectively, A and E (Horn 1989, 12).

² Although, as I will show later in this chapter, this does not necessarily hold true in all cases, and hardly works for the negative side of the square.

³ Verstraete (2005) argues that this model applies very well to epistemic modality, but has limitations on deontic modality, where the polar notions of the willingness (permission) and unwillingness (obligation) of the participant to perform the action also come into play.

8.1 Loop co-occurrences

Figure 6.1, presented in Chapter 6 (page 182) shows the network built on the co-occurrences retrieved from the corpus. One of the main features of this co-occurrence network is that it contains a certain number of loop co-occurrences, that is, of edges that start and end onto the same node. The presence of such type of edge in the co-occurrence network means that a marker co-occurs at least once with another instance of the same marker in the corpus. Based on this property, I defined these cases of co-occurrence as loop co-occurrences. The markers that present a loop in the corpus are *debeo*, *dubius* (used in the epistemic construction *dubium est*), *fortasse*, *licet*, *necesse*, *oportet*, *opus sum* and *possum*. Example 248 presents a loop retrieved from the corpus for the marker *possum*.

- (248) *Deinde id quod nos interpretemur et fieri posse et honeste,*
 then it that we interpret and be_done can and honestly
recte, lege, more, natura, bono et aequo fieri posse.
 rightfully lawfully custom nature good and equal be_done can.

Furthermore, that what we have interpreted **can** be done, and it **can** be done in honesty, rightly, in accordance with the law, with the custom, with nature, and in accordance with what is just and fair. (*Rhetorica ad Herennium* 2, 11, 16)

In this sentence there is a co-occurrence between two instances of the marker *possum*. The author here is giving advice to the reader about how to tackle ambiguous passages in a text. His recommendation is to offer an interpretation, and to show that the interpretation suggested by the reader in a hypothetical argument is practicable, as opposed to the interpretation given by the adversaries. The loop co-occurrence is hosted by a coordinate structure, and in both cases *possum* expresses dynamic possibility. The sentence can be read as: our suggested interpretation can be applied, and its application is in accordance with a series of official and non-official laws. In this case, the co-occurrence is expressed by a repetition of the verbal phrase *fieri posse* 'can be applied' (lit. 'to be possible to apply'). The repetition of this structure introduces new semantic material through the addition of the manner adverbs or adverbial expressions *honeste*, *recte*, *lege*, *more*, *natura*, *bono*, *aequo*. These serve to specify the parameters under which the author's suggested interpretation is applicable. Thus, the co-occurrence of the two *possum* in this case should be seen as a repetition used as a rhetorical expedient to emphasise the validity of the author's proposed interpretation.

Coordination is not the only type of syntactic structure that can host loops. These can also appear in more or less complex subordinate structures. One simple case of modal loop in subordination is illustrated in example 249.

- (249) *Vellem adesset M. Antonius, modo sine advocatis – sed,*
 want be_present Marcus Antonius only without legal_assistants – but
ut opinor, licet ei minus valere, quod mihi heri per
 as think be_allowed he less feel_well which me yesterday by
illum non licebat.
 him not be_allowed

I would have wished that Marcus Antonius were here, only without his legal assistants–but, as I imagine, he **had the right** to feel unwell, which he **did** not **allow** me to do yesterday. (Cicero, *Philippicae* 1, 7, 16)

In this sentence, the modal loop is observed between the two instances of *licet*. The first occurrence of the modal verb *licet* is hosted in the main clause. The second occurrence *licebat* is the main verb of a relative clause introduced by *quod* and subordinated to *licet*. In the context of this sentence the two *licet* both express deontic authority (in the degree of permission). The two occurrences also present opposite polarity, as the second occurrence of *licet* is negated by *non*. As I will show in the following sections, polarity plays an important role in loop co-occurrences.

A more complex case of loop co-occurrence in subordination is given in example 209.

- (250) = (209) *Fruor dum licet, opto ut semper liceat.*
 enjoy while be_possible wish that always be_possible

I enjoy it as long as **I am able to**, I wish I **may** always **be able to**. (Cicero, *Epistulae ad familiares* 195, 2)

In this sentence, we observe again the co-occurrence of *licet* with another *licet*, but this time in a more complex syntactic structure, which can be represented by resorting to the diagram of co-occurrence presented in Figure 5.7, introduced in Chapter 5 (page 256). The two *licet* appear in two separate subordinate clauses, which depend on two different main clauses: the former from *fruor* ‘I enjoy’ and the latter from *opto* ‘I wish’. The two main clauses are juxtaposed and separated by a punctuation sign; the two subordinate clauses hosting the occurrences of *licet* are both on the same structural level, as shown by the diagram of co-occurrence in Figure 5.7.

Based on the examples presented so far, it is possible to conclude that loop co-occurrences can appear both in coordinate and subordinate structures. After having illustrated the syntactic features that this type of co-occurrence can have, I will turn to a more in-depth analysis

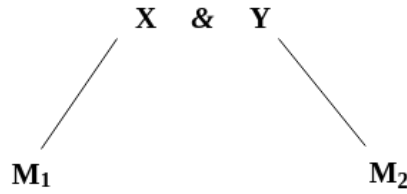


FIGURE 5.7: Diagram of co-occurrence for absence of scope hierarchisation.

of i) the types of modality expressed in such co-occurrences, and ii) the polarity of the two co-occurring markers.

8.1.1 Modality in loop co-occurrences

As anticipated by examples 248, 249 and 250 presented above, the two instances of the markers that appear in a modal loops show a strong tendency to express the same type of modality. The most striking example of this behaviour is represented by *licet*. In all cases of loop co-occurrences (15 sentences) this marker expresses the same type of modality (always deontic authority) in both instances, as shown above in examples 249 and 250.

The markers *debeo*, *oportet* and *possum* also tend to be associated to the same type of modality when they are found in a modal loop, although not as sharply as *licet*. In order to give a quantitative dimension of this phenomenon, I will present the values of association of each marker to each type of modality in cases of modal loops. As the numbers are quite low for this type of non-hierarchical co-occurrence, I will present both the SCS and the SIQ values for each marker involved in loop co-occurrences to give a complete picture of the phenomenon. As shown by the tables that follow, the strongest association is always recorded between modalities of the same type. Loop co-occurrences with *debeo* (Tables 8.1 and 8.2) imply most frequently the co-occurrence of two markers expressing deontic authority, followed by dynamic and deontic acceptability. In fewer cases, the two sub-types of deontic modality co-occur with each other.

	deontic acceptability	deontic authority	dynamic
deontic acceptability	4	0.5	1
deontic authority	0.5	1	0
dynamic	1	0	6

TABLE 8.1: SCS values for the types of modality expressed by *debeo* in loop co-occurrences.

	deontic acceptability	deontic authority	dynamic
deontic acceptability	1.9	0.9	0.4
deontic authority	0.9	6.2	0
dynamic	0.4	0	1.7

TABLE 8.2: SIQ values for the types of modality expressed by *debeo* in loop co-occurrences.

When *oportet* is in a modal loop (Tables 8.3 and 8.4), the two occurrences of the verb express most frequently both deontic acceptability or dynamic necessity. For *oportet* as well, a fairly significant association is recorded between the two sub-types of deontic modality.⁴

	deontic acceptability	deontic authority	dynamic
deontic acceptability	3	0.5	0
deontic authority	0.5	0	0.5
dynamic	0	0.5	3

TABLE 8.3: SCS values for the types of modality expressed by *oportet* in loop co-occurrences.

	deontic acceptability	deontic authority	dynamic
deontic acceptability	2	1.1	0
deontic authority	1.1	0	1.1
dynamic	0	1.1	2

TABLE 8.4: SIQ values for the types of modality expressed by *oportet* in loop co-occurrences.

Finally, for the marker *possum* (Tables 8.5 and 8.6) we can observe the same tendencies as for the other two markers. Furthermore, since all modal categories are present in the case of *possum*, it can be observed that the distribution of the values of the SIQ in Table 8.6 follows the tendency observed for the combination of types of modality in the entire corpus (Figure 8.1 above and corresponding Table A.7 in the Appendix, page 306). The attraction between modal types for *possum* loops is indeed recorded along and around the main diagonal of the matrix, i.e., between the same types of modality, and between the two types of deontic modality, just as it did for co-occurrences in the entire corpus. The strongest association is recorded for deontic authority, deontic acceptability and epistemic modality. There is

⁴ The case of *oportet* represents the only one in which the association of two different types of modality i.e., dynamic necessity and deontic authority is as strong as the attraction between same types of modality. However, this type of result should be interpreted with caution. The strong attraction is in fact due to the problem of data sparsity, which has been discussed in Chapter 6: there are 8 loops for *oportet* in the corpus, and only one of them shows the co-occurrence of dynamic necessity and deontic authority.

also a strong association between the two sub-types of deontic modality, and, with a lower attraction value, for dynamic possibility.⁵

	deontic acceptability	deontic authority	dynamic	epistemic
deontic acceptability	2	0,5	1	0
deontic authority	0,5	12	3	0
dynamic	1	3	170	1,5
epistemic	0	0	1,5	4

TABLE 8.5: SCS values for the types of modality expressed by *possum* in loop co-occurrences.

	deontic acceptability	deontic authority	dynamic	epistemic
deontic acceptability	32,7	1,8	0,3	0
deontic authority	1,8	10	0,2	0
dynamic	0,3	0,2	1,1	0,3
epistemic	0	0	0,3	26,4

TABLE 8.6: SIQ values for the types of modality expressed by *possum* in loop co-occurrences.

The adverb *fortasse* and the constructions *dubium est*, *necesse est* and *opus est* occur in modal loops only once each in the corpus. As it was observed for *debeo*, *oportet* and *possum* above, in loops of *dubium est*, *fortasse*, *necesse* and *opus est* both instances of the modal marker convey the same type of modality. Before showing the examples for these markers, it should be clarified that for *fortasse*, *dubium est* and *opus est* this behaviour does not seem to be specific to the loop co-occurrence structure. In Chapter 6, precisely in Figure 6.4 (page 199), I showed the association of the markers targeted in this study to each type of modality. In the co-occurrences extracted from the corpus the adverb *fortasse*, as other epistemic adverbs such as *certe* and *forte*, is always associated to epistemic modality. The same holds true for another epistemic marker, the adjective *dubius*, and the associated construction *dubium est*. Finally, *opus est* always conveys dynamic necessity in all the co-occurrences in which it appears, regardless of the presence of a modal loop.

Example 251 shows the loop co-occurrence found in the corpus for *opus*.

⁵ The case of *possum* can probably give a more precise idea of the strength of the combinations between types of modality in loop co-occurrences. This marker counts 208 loops in the corpus. Although they do not all show a combination of the same types (or sub-types) of modality, nevertheless these greatly exceed combinations between different types.

- (251) *Quod Cato ait, circum fundum ulmos et populos, unde fros ovibus*
 that Cato say around farm elm and poplar whence leaf sheep
et bubus sit et materies, seri oportere (sed hoc neque in
 and cow be and timber plant be_necessary but this and_not in
omnibus fundis opus est neque, in quibus est opus,
 all farms necessary be and_not in which be necessary
propter frondem maxime), sine detrimento ponuntur a
 because_of leaf primarily without damage place in
septentrionali parte, quod non officiunt soli.
 northern side because not stand_in_the_way sun

Concerning what Cato says, that it is necessary to plant around the farm elms and poplars from where there would be leaves and timber for the sheep and cows (but this **is** not **necessary** in every farm and, in those farms where **it is necessary**, it is mostly not for the leaves), they are placed without any risk in the northern side, so that they do not block the sun. (Varro, *De re rustica* 1, 24, 4)⁶

In the only loop in which it appears, *opus est* expresses dynamic necessity in both occurrences in the sentence. The co-occurrence appears in two coordinate clauses, conjoined by the correlative structure *neque...neque* 'not...not'. However, the two markers have opposite polarity: the first *neque* negates the first *opus est*, whereas the second occurrence has positive polarity. I will discuss the notion of polarity related to loop co-occurrences and associations of modality types later in this chapter.

Example 252 shows the loop co-occurrence in which the construction *necesse est* occurs.

- (252) *Igitur, inquam, et homines et pecudes cum semper fuisse sit*
 therefore say and man and flock because always be be
necesse natura-[...] necesse est humanae vitae ab summa memoria
 necessary nature-[...] necessary be human life from old memory
gradatim descendisse ad hanc aetatem eqs.
 gradually come_down to this age etc.

⁶ In this sentence there is a third co-occurring marker, *oportere*, which precedes the two *opus est* and introduces their scope *circum fundum ulmos et populos seri* 'elms and poplars to be planted around the farm'. As the focus of this section is on loops, I will leave that aside for the moment. For the co-occurrence of different markers of necessity see section 8.2.3.

Therefore, as **it is a necessity** in nature that men and flocks have always existed–[...] **it is a necessity** that from the oldest memory of human life they have gradually come down [...] to this age. (Varro, *De re rustica* 2, 1, 3)

The modal construction *necesse est* in this sentence expresses in both cases dynamic necessity. The two occurrences appear in a relation of subordination: the first *necesse est* is the main predicate of a causal clause that directly depends on the second occurrence of *necesse est*.

Finally, example 253 shows the loop co-occurrences for the adverb *fortasse*.

(253) = (194) *Fortasse, inquit, hanc nominavit ut veros conscios celaret,*
perhaps say this name so_that true accomplice hide

fortasse ut, quia acerrume instabat accusator, hoc metu
perhaps so_that because harshly press accuser this fear

territus finem tormentis inponeret, fortasse nimio dolore
frighten end torture set perhaps extreme pain

tormentorum stupefacta nescit quid loqueretur.
torture benumb not_know what say

“**Perhaps**,” he said, “she named this girl to hide the true accomplices, **perhaps**, as the accuser was pressing extremely harshly, in order to set an end to the torture by frightening him, **perhaps**, benumbed by the extreme pain of the torture, she did not know what she was saying”. (Seneca the Elder, *Controversiae* 9, 6, 20)

In this sentence there are three occurrences of *fortasse*, all associated with epistemic modality. The first two *fortasse* modify the two final clauses depending on the matrix clause *hanc nominavit: ut veros conscios celaret* and *ut ... hoc metu territorum finem tormentis inponeret*. The third *fortasse* modifies the clause *...nescit quid loqueretur*, which syntactically functions as a coordinate to the main clause *hanc nominavit*. The relation of this last clause to the preceding context is more complex, and it is related to the role of the three *fortasse* in this sentence. I will elaborate on this further in this chapter, when discussing the semantic and argumentative functions of loops.

With respect to what has been said so far, the following partial conclusions can be drawn. Co-occurrences in loops result in greater attraction between the same types of modality. A small difference with respect to this was registered for deontic modality: the two sub-types deontic acceptability and deontic authority also attract each other in loops to a certain extent, a tendency which is also confirmed in Figure 8.1, page 250. Based on these results, I

can conclude that the use of a modal loop in a sentence often entails the co-occurrence of the same types of modality, with the modalisation of two different representations. With respect to the notion of modal harmony (Lyons 1977; Coates 1983), modal loops may seem to represent, to some extent, an extreme application of this notion. However, it seems important to clarify that the use of the same marker within the same context with a repetition quite intuitively leads to the repetition of the same type of modality. Thus, classifying these co-occurrences in terms of modal harmony seems unnecessarily forced.

8.1.2 Polarity in loop co-occurrences

Another important feature to be considered in the description of loop co-occurrences is the polarity of the markers. With respect to this feature, modal markers in loops can combine in three different ways: the markers can have both positive polarity, both negative polarity, or they can have opposite polarity.⁷ Loop co-occurrences of markers with both positive polarity were presented earlier in this chapter, e.g. examples 248 and 252. Another example is given in 254, where the loop is observed between two occurrences of *oportet*, both with positive polarity.

- (254) *Si concederem aliena oportere adsumere exempla, vincerem*
 if grant someone_else be_necessary borrow example establish
unius oportere.
 only_one be_necessary

If I were granting that **it is necessary** to borrow examples, I would establish that **it is necessary** to borrow them from one author alone. (*Rhetorica ad Herennium* 4, 5, 7)

In this sentence, the two *oportet* both appear in infinitive clauses depending on two main clauses which are in turn in a relation of subordination (*si concederem...* is a subordinate to *vincerem*). Despite the syntactic complexity of the co-occurrence, the two *oportet* show a close semantic interaction. The occurrence of the second *oportet* in this context adds on the semantic contribution of the first one: the author specifies which types of examples should be selected. This type of co-occurrence seems comparable to the one illustrated in example 248. In fact, as it was observed for the verbal phrase *fieri posse* in example 248, the repetition of the marker *oportet* here also appears to be used as a rhetorical device, as it presupposes the repetition of the entire verbal phrase *adsumere oportere*, even though in the second clause the verb *adsumere* is not expressed.

⁷ This type of variation is not observed with epistemic 'commitment' adverbs, which do not fall under the scope of negation (Pinkster 2004, 2005; Orlandini 2001, 324–326).

A modal loop between markers with both negative polarity is shown in examples 255 and 256.

- (255) *nam et dimittere non debet quem distulit et accusare*
indeed and let_go not ought who postpone and accuse
propter hoc ipsum non debet quia distulit.
because_of this itself not ought because postpone

He **ought not** to let off the one who he postponed (i.e., postponed the accusation of that person), and he **ought not** to accuse him, precisely because he has postponed the accusation. (Seneca the Elder, *Controversiae* 10, 1)

In this sentence the two co-occurring *debeo* are both negated by *non*, and they co-occur in two coordinate clauses, in the correlative structure *et... et* 'and... and'. The repetition of *non debet* reinforces the prohibition over the representations *dimittere... quem distulit* and *accusare propter hoc ipsum... quia distulit*. In this case the emphasis is given to the two predicates *dimittere* 'let off' and *accusare* 'accuse' which appear in sentence-initial (and focalised) position.⁸ The use of a loop co-occurrence in this structure seems to serve rhetorical-argumentative purposes: the repetition strengthens the sense of prohibition expressed by *non debet*, but by using the same marker twice, the focus is shifted to the two scopes, that is, on the objects of prohibition. The same type of structure can be found in the previously mentioned example 209, where the repetition of *licet* allows the speaker to give prominence to the notions expressed by the two main verbs *fruor* 'I enjoy' and *opto* 'I wish'. Both predicates appear in sentence-initial, focalised position, as in example 255.

- (256) *Magis est veri simile non posse virtutem sine doctrina*
more is truth resembling not can virtue without culture
comparari, quoniam ne equus quidem indomitus idoneus possit esse.
obtain because not horse indeed untamed suited can be

It is more plausible that virtue **cannot** be obtained without culture, because **not** even an untamed horse **can** be serviceable. (*Rhetorica ad Herennium* 4, 46, 59)

In this last example, two negative instances of *possum* co-occur. The two markers are in a relation of subordination: the second *possum* appears in a causal clause introduced by *quoniam* and depending on *non posse virtutem sine doctrina comparari*. In this case, the second negative *possum* reinforces the argument introduced by the first one by adducing a second parallel

⁸ For the sentence-initial position as the focus position in the Latin clause see Spevak (2010) and Hoffmann (2010).

situation in which the same type of modality applies. This use of a loop in parallel structures to introduce a comparison to the main argument could be found already in example 252. In that case, the term of comparison (*sit necesse*) was introduced by *cum*. The repetition of the marker helps creating the parallelism and focalising the two representations.

When the co-occurrence is between two markers with opposite polarity, it is usually based on different types of logical and semantic relations. An example of loop co-occurrence between markers with opposite polarity was shown in 249. In order to analyse this type of relationships, it is useful to recall the Aristotelian square of logical oppositions applied to the modal domain. As described at the beginning of this chapter, a relation of contradiction holds between the notions of ‘possible’ and ‘impossible’ (not possible). Consider example 257.

- (257) *ideo quod omnium animalium natura, si frumenti fructu privata*
 therefore because all animal nature if corn use deprive
fuerit, arbustivo aut carne aut piscatu aut etiam qualibet ex his
 be tree or meet or fishing or even any from this
reliquis rebus escarum utendo poterit tueri vitam, sine aqua
 left things food use can preserve life without water
vero nec corpus animalium nec ulla cibi virtus potest
 but and_not body animal and_not any food property can
nasci nec tueri nec parari.
 originate and_not preserve and_not provide

And because the nature of all animals, if it was deprived of the use of corn, **will be able** to preserve life by relying on shrubs or meat or fish or even any other type of food, but without water, neither the body of the animals nor any property of food **can** originate, be preserved, or be provided. (Vitruvius, *De architectura* 8, 3, 28)

In this sentence, two coordinate clauses host a loop for *possum*, which occurs first with positive polarity and then with negative polarity.⁹ If we represent this co-occurrence by using the modal square, we find that the two markers are in a relation of contradiction i.e., they correspond to the vertices I (*poterit*) and E (*nec... potest*). The two terms have opposite values (possible vs. not possible) and in this context any other intermediate value is excluded. This type of co-occurrence builds an oppositional relationship between the two markers, and between the states of affairs that they modalise. Both markers express dynamic possibility, a possibility that is ascribed to the participants of each state of affairs: first to the

⁹ The external negation in the correlative structure *nec... nec... nec... nec* coordinates all the predicates modalised by the second *possum*.

nature of all animals (*omnium animalium natura*) and then to the animal frame and to the virtue of food (*corpus animalium* and *cibi virtus*).¹⁰ The former is assessing the possibility for animals to survive without corn; the latter is denying the possibility for both animals and any virtue of food to survive without water. As a result, the representations modalised by the co-occurring markers are also encompassed in the relation of contradiction. The logical relation between the two markers and the respective representations in the context of this example serves to describe the comparison between the two resources i.e., corn and water, and aims at emphasising the greater importance of having access to the resource water over corn. The oppositional adverb *vero* 'but', and the adverbial phrase *sine aqua* 'without water' in focalised position at the beginning of the second coordinate clause ensure the prominence of the second representation (having access to water) over the first one (having access to corn).

I observed the same type of relation for other types of modality in the corpus. Consider example 258.

(258) = (238) *Dicere fortasse quae sentias non licet, tacere plane*
 say maybe that think not be_allowed do however

licet.

be_allowed

Perhaps you **are not allowed** to say what you think, but you **are clearly allowed** to keep silence. (Cicero, *Epistulae ad familiares* 4, 9)¹¹

This example shows a loop with the marker *licet*. In the context of this sentence the type of modality expressed by the marker is, in both occurrences, deontic authority: Cicero is stating that his addressee is not allowed to speak his mind freely, but he is still allowed to keep silence. Again, the two *licet* in co-occurrence are linked by a relation of contradiction: E (*non licet*) and I (*licet*) in the square for modality. In this case, the two modalised representations in contradiction are the lack of permission to speak freely and the permission of remaining

¹⁰ The relation of contradiction between the two modal expressions excludes their interpretation with the notion of objective bilateral possibility (Orlandini 2001, 314–315). As a reminder to the reader, this notion describes a type of possibility which is based on the idea of non-exclusion i.e., 50% chances of the situation described in the state of affairs to be verified and 50% chances for it not to be verified (*poss p = poss non p*). As such, this notion cannot fall under the scope of negation. Sueur (1983, 181) comments on the impossibility of negating expressions based on non-exclusivity: negating an expression based on the relation *poss p = poss non p* would result into negating both alternatives, which would be a contradiction and in any case impossible, because they are antonyms.

¹¹ This sentence presents another co-occurring marker, which is the epistemic adverb *fortasse*. The relation between *fortasse* and the first occurrence of *licet* has been discussed in the previous Chapter. The next section in this Chapter will describe the role of *fortasse* in contexts such as the one illustrated in this sentence, and the type of relationship that it builds with the co-occurring markers.

silent. The two contradictory terms are used again by the speaker to support his argumentative strategy. Cicero aims at convincing his addressee that keeping silence is the safest and most convenient thing to do in those specific circumstances. Exploiting the contradiction between the two representations helps the speaker to corroborate his positions.

As in the previous example, the relation between the two contradictories is supported by the presence of other constituents in the sentence structure. The two markers co-occur in a relation of coordination which builds on a correlative structure instantiated by the adverbs *fortasse... plane*. Although the primary value of the adverb *fortasse* is epistemic, in this sentence, due to its co-occurrence with *plane*, the epistemic value paves the way to an argumentative use of this adverb. The use of these two adverbs in correlation builds an argumentative schema that works by opposing a foreground and a background, and placing the two arguments on each of the two plans. This type of argumentation is described by Rossari (2016;2020) with respect to some uses of French connectors such as *mais* 'but', especially in co-occurrence with *pouvoir* 'can, to be able' (see Chapter 3 for a more detailed description of the theoretical model used in her studies). In this sentence, *fortasse* projects a notion of (epistemic) possibility onto the negative contradictory term *non licet*: the speaker does not commit to the veracity of this term, and *non licet* is left in the foreground. The adverb *plane* 'clearly' responds to *fortasse* in the coordinate clause, and by characterising the second contradictory *licet* as indisputable, it indicates the commitment of the speaker towards the second argument. That way, the second term is promoted to the foreground, and works as the convincing argument for the conclusion that the speaker wants to reach i.e., in the present context, it is better to keep silence.

8.1.3 Some concluding remarks about loop co-occurrences

I have described so far the modal markers and the syntactic structures associated with loop co-occurrence in the corpus, and the uses of this type of co-occurrence in the sentence.

This part of the study revealed that in most cases loop co-occurrences involve the expression of the same type of modality by both markers. This may raise a question about whether the term modal harmony is appropriate to use in such cases, when dealing with two instances of the same marker, which, as shown by the examples presented so far, appear in the same context. As mentioned at the beginning of this chapter and in the previous sections, the notion of modal harmony shows its limitations when applied to non-hierarchical types of co-occurrences. This term, has always been applied to the co-occurrence of two different lexical units, but first and foremost to the combination at the level of the simple clause of two different parts of speech (adverb and verb) (Lyons 1977). Modal loops belong to a different type of co-occurrence, and, as it appears from the examples shown so far and from the

examples that will be shown throughout this section, non-hierarchical co-occurrences need to be analysed in a different perspective.

As described in the previous section, modal loops often seem to be used as a pure repetition of the same lemma, usually related to rhetorical and/or argumentative purposes:

- clarification, enrichment: the co-occurrence exemplifies or specifies the notion expressed by the first occurrence of the marker. This can be observed in examples 248 and 254;
- justification: the co-occurrence provides a reason or a cause for the instantiation of the necessity or possibility expressed in the main clause. This can be observed in examples 252 and 256;
- pivot to build the discourse: the co-occurrence is used for rhetorical purposes, to build the discourse around the modal notion expressed by the two markers. The repetition of *licet* in example 209 allows the speaker to emphasise the notions expressed by the two main verbs *fruor* 'I enjoy' and *opto* 'I wish', which appear in a sentence-initial (and focalised) position (see footnote 8, page 262). The same type of structure is observed in 255, where the objects of prohibition *dimittere* 'to let off' and *accusare* 'to accuse' are both in a focalised position in the two coordinate clauses;
- (for markers co-occurring with opposite polarity) argumentation: with the help of focalisers (e.g. *vero* in example 257) and/or correlative structures (e.g. *fortasse... plane* in example 258), the repetition of the same marker but with opposite polarity within the same sentence participates in a use of co-occurrence for argumentative purposes rather than purely rhetorical ones. As shown by examples 257 and 258, the negated marker and the representation that it modalises create a contrast with the other co-occurring marker and modalised representation. As a result, this contrast strengthens the argumentative force of the latter.

I wish to conclude this section by adding some remarks about the argumentative uses of loop co-occurrences in correlative constructions. Modal loops are often found in correspondence with correlative coordinate constructions, formed by coordinating conjunctions *et... et* 'and... and' as in examples 248 and 255, *neque... neque* 'and not... and not' in example 251. Correlative coordinate constructions of the type *et... et* mark that both representations are equally important (Pinkster 2021, 844).

Similar structures that build a relation between two constituents or representations in Latin typically are correlative adversative constructions such as *non solum... sed etiam, non modo... sed etiam, non solum... sed tamen* 'not only... but also' and variations on this pattern (Bertocchi 2001). These structures indicate that the representation introduced by *sed etiam* is more

important or more relevant than the first one introduced by *non solum* (Pinkster 2021, 844). In pragmatic terms, correlative adversative structures of this type modify the focus of the sentence and move it onto the second argument, marked by *sed etiam* (a function called ‘replacing focus’ (Pinkster 2021, 680). Some of the co-occurrences extracted from the corpus, both with the repetition of the same marker and with two different markers, were found in structures of the type *non solum... sed etiam*, with different results depending on the type of co-occurrence (being it a modal loop or not) and on the types of modality involved in the co-occurrence. I will describe here the use of this structure in loop co-occurrences, and go back to it for co-occurrences of different markers later in this chapter. Consider example 259.

- (259) *ut non modo nunc secunda sperare debeas sed etiam si omnia*
 so_that not only now favourable hope ought but also if all
adversa essent tamen conscientia et factorum et consiliorum
 adverse be however consciousness and action and decision
tuorum quaecumque acciderent fortissimo et maximo animo ferre deberes.
 your whatever happen strong and great spirit bear ought

so that, not only **do** you **have to** hope for a favourable outcome at the present moment but, even if everything were adverse to you, you **would need** to bear whatever may come with the strongest and greatest spirit, with consciousness of your past actions and decisions. (Cicero, *Epistulae ad familiares* 227, 5)

In this sentence, the modal verb *debeo* is in a loop co-occurrence expressing both times dynamic necessity. The addressee should both hope for a favourable outcome and bear future events with fortitude and magnanimity. The correlative structure *non solum... sed* here relates the two representations modalised by the two occurrences of *debeo*. The second constituent of the correlative adversative construction *sed* moves the focus from *nunc secunda sperare debeas* ‘you have to hope for a favourable outcome now’ to the second representation ... *quaecumque acciderent fortissimo et maximo animo ferre deberes* ‘you would need to bear whatever may betide with fortitude and magnanimity’. The second proposition is brought to the fore due to the use of the adversative particle *sed*, which moves the focus from the first to the second argument. The second argument corrects and enriches the conclusion suggested by the first one. The addressee needs to keep a stout heart not only in the present circumstances, but also in another hypothetically (subjunctive *deberes*) adverse moment.

Modal loops are sometimes used as components of a correlative structure. An illustration is given in example 260, already cited as example 194.

- (260) = (194) *Fortasse, inquit, hanc nominavit ut veros conscios celaret,*
 perhaps say this name so_that true accomplice hide
- fortasse ut, quia acerrume instabat accusator, hoc metu*
 perhaps so_that because harshly press accuser this fear
- terrītus finem tormentis inponeret, fortasse nimio dolore*
 frighten end torture set perhaps extreme pain
- tormentorū stupefacta nescit quid loqueretur.*
 torture benumb not_know what say

“**Perhaps**,” he said, “she named this girl to hide the true accomplices, **perhaps**, as the accuser was pressing extremely harshly, in order to set an end to the torture by frightening him, **perhaps**, benumbed by the extreme pain of the torture, she did not know what she was saying”. (Seneca the Elder, *Controversiae* 9, 6, 20)

In this sentence, the three *fortasse* qualify three different representations: respectively *ut veros conscios celaret* ‘in order to conceal her true accomplices’, *ut... finem tormentis inponeret* ‘in order to put an end to the torture’ and *nescit quid loqueretur* ‘she did not know what she was saying’. The clauses with *nominavit* and *nescit* as main predicates are on the same syntactic level, because they appear in two coordinate clauses. On a lower level of the syntactic structure, there are the two purpose clauses introduced by *ut*, with *celaret* and *inponeret* as main predicates. Although the three predicates *celaret*, *inponeret* and *nescit* are located on different levels of the sentence’s syntactic structure, they perform the same function at the semantic level: each one offers a possible reason for the action of a mother who accused her own daughter of being her accomplice. The representations under the scope of the three *fortasse* provide three possible hypotheses for the only representation reported as factual within the sentence i.e., *hanc nominavit*. The first two are introduced as a possible purpose that guided the mother (*fortasse ut*), while the last one is introduced as a possible cause with a sort of implicit causal subordinate. By occurring in this structure, the three *fortasse* instantiate three different possible frames that could explain the action of the mother. But the epistemic value of *fortasse* is also exploited to organise the discourse of the speaker. It is important to keep in mind that this sentence is uttered in the context of a controversy, and as such, it is an exercise in style and rhetorical argumentation. The repetition of *fortasse* focalises the three hypotheses offered by the speaker (Pinkster 2021, 843). Moreover, the three *fortasse* are all in a focalised position on the left, at the beginning of the sentence (even the first one, despite the fact that it qualifies the purpose clause and not the main verb *nominavit*). A similar cumulative use of this adverb was presented in section 3.3 (Chapter 3), for the co-occurrence of *fortasse* and *fortasse non* in a contrastive relation. However, the case shown in example 260

is different: the state of affairs modified by the three *fortasse* that co-occur all have positive polarity and are not set in contrast to each other. Instead, they are presented in a list of options, which is ordered by the various *fortasse* introducing the different hypotheses.

8.2 Absence of scope hierarchy with different markers

As mentioned at the beginning of this chapter, the co-occurrence of the same types of modality in absence of a scope hierarchy can also be expressed by two different markers. In this section I will analyse such combinations by types of modality.

8.2.1 Epistemic modality

In the corpus I could only retrieve two co-occurrences of different epistemic markers in absence of scope hierarchisation. In both cases, the markers involved are *fortasse* and *certe*, used as constituents of a correlative structure of the type shown in example 258 with *fortasse... plane*. Consider example 261.

- (261) *Animum tibi nostrum fortasse probavimus, ingenium diutina*
 spirit you our perhaps prove quality long-lasting
servitus certe, quaecumque est, minus tamen quam erat passa est
 servitude certainly whatever be less however than be let be
videri.
 seem

I **may** (lit. **perhaps**) have proven my spirit to you, however, my talent, whatever it is, **certainly** appeared less noteworthy than it was due to my long servitude.¹² (Cicero, *Epistulae ad familiares* 419, 2)

In this example the two adverbs express two different degrees of epistemic modality: *fortasse* conveys epistemic probability¹³, whereas *certe* conveys epistemic certainty. The use of these two adverbs in co-occurrence has the same argumentative function described for *fortasse* and *plane* in the discussion of example 258. However, this case is more relevant to this study because the argumentative force of this correlative structure arises precisely from the epistemic value of both co-occurring markers. In fact, although the two sentences are syntactically juxtaposed, the epistemic markers *fortasse* and *certe* are evidently correlated.

¹² In the data used to build the corpus this sentence had a comma instead of the semi-colon, which is the reason why the sentence was taken into account for the analysis.

¹³ Although the value of epistemic probability for *fortasse* is debated in literature, see Kühner and Stegmann 1962[1912], 812; Schrickx 2011, 220; Orlandini 1997.

Schricks (2011, 256) explicitly mentions that *fortasse* and *certe* (and other equivalent adverbs) are often used in correlative structures, suitable for highlighting a contrastive relation between two propositions. As described in chapter 2, epistemic modality is a scalar notion. In any semantic scale, the values belonging to that specific domain are ordered according to a linear principle. In the case of epistemic modality, that principle is represented by the degree of commitment of the speaker towards the factuality of the state of affairs. On purely semantic terms, the two markers express different degrees on the semantic scale: probability (*fortasse*) is ranked lower, and certainty (*certe*) is higher, if not at the very end of the scale. From an argumentative point of view, the semantic value of the two markers develops into two different argumentative forces. Just as was observed for *fortasse* and *plane*, the correlation between *fortasse* and *certe* sets up an argumentative pattern that works on the distinction of a background and a foreground (Rossari 2016). The adverb that is lower on the epistemic scale, *fortasse*, places the first argument on the background; the adverb that is higher in the scale, *certe*, places the second argument on the foreground, expressing the commitment of the speaker towards the second argument and the strongest argumentative power of the latter over the first one.

Another aspect worth noting in relation to *fortasse* in this type of co-occurrences is its role as a commitment marker, which also contributes to the argumentative function of the correlative construction. As described in section 2.4 (page 30), adverbial epistemic markers such as *fortasse*, *forsitan* and *certe* have been defined as commitment markers (Schricks 2011, 32), in that they express the commitment of the speaker towards the factuality of the state of affairs. Sometimes, their epistemic value can be exploited by the speaker in certain occasions to reinforce or nuance a statement so as not to come across as too straightforward and self-righteous (Schricks 2011). In example 261, the speaker nuances the statement *animum tibi nostrum... probavimus* 'I proved my spirit to you' by using *fortasse*, which suggests that he does not commit to this statement entirely; on the other hand, he qualifies the second representation i.e., his failure in proving also his talents with the adverb *certe*, which suggests a higher commitment to this statement on his part. By exploiting the contrast between the two levels of commitment, the speaker ensures that he does not come across as too audacious to the addressee. This imbalance then gives rise to the alternation of background and foreground that characterises the argumentative scheme described above.

8.2.2 Deontic modality

The sieve diagram in Figure 8.1 shows that deontic markers are positively attracted in co-occurrence. Deontic markers are attracted both to their same sub-type of modality and to the other one i.e., deontic authority is attracted to other markers of deontic authority as much as to other markers of deontic acceptability, and vice versa. Moreover, their observed frequency

is higher than the expected value under the hypothesis of independence (the density of the cells is higher for the combination of the two sub-types with other markers of the same sub-type). In this section I will analyse the combination of deontic authority with deontic authority; then deontic acceptability with deontic acceptability; finally, the combination of the two sub-types with each other.

Example 262 illustrates the combination of two markers of deontic acceptability, specifically *possum* and *debeo*.

- (262) *an pater ob ullam adoptionem accusari possit, an*
 whether father by_reason_of any adoption accuse can or
ob hanc debeat.
 by_reason_of this should

(Implied: he asked) if a father **could** be accused for any adoption, or if he **should** (i.e., be accused) for this one. (Seneca the Elder, *Controversiae* 2, 4, 7)

In this *controversia* the speaker is discussing a case in which a father is being accused for having adopted a child. Specifically, this father adopted the son that he had with a prostitute, and disinherited his own. The matter of debate is if and how appropriate it was for him to adopt the child he had with the prostitute, and how appropriate it was to disinherit his other son. The defense claims that the prostitute tricked him into making her pregnant, and forced him to disinherit the other son. At this point of the defense, the moral acceptability of accusing a father for having adopted his own child is being questioned. The two co-occurring markers *possum* and *debeo* belong to two different degrees on the scale of acceptability: *possum* expresses the degree ‘acceptable’ and *debeo* the higher degree ‘absolutely necessary’. The two markers occur in two separate indirect interrogatives, in a relation of asyndetic coordination and both introduced by *an*. I described the functioning of scalar notions and the notion of conversational implicature at the beginning of this chapter. The occurrence of *possum* in the first clause asserts a lower degree on the scale of acceptability (‘acceptable’), compared to *debeo*. Based on the principles described above, the assertion of this notion generates the conversational implicature that the higher degrees on the scale are not applicable. The occurrence of *debeo* in the following coordinate clause cancels the implicature and asserts the higher value ‘absolutely necessary’. With the assertion of both values consecutively in the two interrogatives, the speaker creates a climax-like structure (from the lower to higher degree) that contributes to the argumentative force of the sentence: is it acceptable to accuse him? And if that is the case, should he be accused? The implied argument is that the father should not be accused.

The co-occurrence of two deontic authority markers is illustrated in example 263. As opposed to the co-occurrence illustrated for deontic acceptability, in this sentence we observe a relation of contrariety between the two markers, due to the external negation *non* that scopes over one of them.

- (263) *an necesse fuerit illum patrem alere, et ob id*
 whether necessary be he father support and because_of it
- abdicari non possit quod fecit lege cogente.*
 disinherit not can which do law compel

(Implied: he asked) if he **had to** support his father, and whether he **couldn't** be disinherited for something he did because the law compelled him to do it. (Seneca the Elder, *Controversiae* 1, 1, 13)

This controversia describes a case of disinheritance of a son by his own father. The son was previously adopted by his uncle, because he helped him against the will of his father, who disinherited him. He decided not appeal against it. Now that the father has fallen into need, he wants to help him against his uncle (and stepfather)'s will, and for this reason he has been disinherited by his stepfather. In the sentence illustrated in example 263, the obligations of the son in this situation are being discussed. The two co-occurring markers *necesse est* and *possum* express both deontic authority, but they refer to two different situations. The former refers to the obligation that the son has towards his previous father; the latter refers to the legal possibility of accusing the son of breaking the law. The negative particle *non* negates *possum*, which becomes the contrary counterpart (vertex E in the modal square) of the modality expressed by *necesse est*. That is, this co-occurrence constructs a parallel between a legal obligation (*necesse fuerit*) and a legal prohibition (*non possit*).

Correlative adversative structures of the type *non modo/solum... sed/verum etiam* 'not only... but also' previously discussed for loop co-occurrences were also found with other markers. In the case presented in example 259, the structure was hosting the co-occurrence of two instances of *debere* expressing dynamic necessity and qualifying two different representations. Therefore, the correlation was occurring between the two modalised representations rather than between the two modal notions per se. In that case, the focus was replaced from the first to the second representation, indicating the attitude that the addressee was supposed to keep preferably. Consider now example 264.

- (264) *etsi intellegebam vestro senatus consulto non modo posse me id facere*
 although understand your decree not only can I it do
sed etiam debere.
 but also have_to

Although I was aware that under your decree not only **could** I do it but I also **had to** (i.e., to send some cavalry and cohorts from my army to the king of Cappadocia, Ariobarzanes). (Cicero, *Epistulae ad familiares* 105, 7)

In this case, the correlative structure connects two different expressions of deontic authority: *possum* refers to permission and *debeo* to obligation. When used with scalar predicates, correlative structures of the type *non solum... sed etiam* act as ‘blockers’: they cancel or block the upper-bounding implicature (Bertocchi 1999; 2001; Horn 1989, 235). As explained at the beginning of this chapter, the assertion of a lower value on a scale generates the conversational implicature that the higher values are not applicable, based on the Maxim of Quantity. But in this type of structures, the first part of the correlation *non solum* makes explicit and blocks the upper-bound implicature, and the second part *sed etiam* asserts that a higher value on the scale is in fact known to be true.

The presence of *posse* alone would generate the upper-bound implicature that the speaker has the right to send his troops to the king of Cappadocia, but he is not obliged to do it. However, the negative part of the correlative structure *non modo* focalises *posse* and deletes the implicature. Subsequently, *sed etiam* asserts the higher value of obligation with *debeo*. As described for the co-occurrence in loop, in this case too the use of the correlative structure *non modo... sed etiam* falls within an argumentative strategy. The second part *sed etiam* shifts the focus from the lower value (permission) to the higher value (obligation) of authority, which thus becomes the stronger argument for the speaker in the passage, leading to the conclusion that the participant of the clause will eventually provide his own troops to the king of Cappadocia.

The combination of markers of deontic authority with markers of deontic acceptability is more complex when analysed from the point of view of the relations between them. Consider example 265.

- (265) *divisit in ius et aequitatem, an abdicari possit, an debeat.*
 divide in law and equity if disinherit can or should

He drew a distinction between law and equity: whether he **could** be disinherited or whether he **should**. (Seneca the Elder, *Controversiae* 1, 1, 13)

This sentence belongs to the same controversia as the one shown in example 263. In this case, the discussion focuses on the contrast between what the law allows, and what morality suggests. The marker *possum* expresses deontic authority, and the co-occurring marker *debeo* expresses deontic acceptability. This change in sub-type of deontic modality is reinforced by the preceding context: the notion of possibility expressed by *possum* refers to the possibility given by the law (*ius*), and the notion of necessity expressed by *debeo* refers to a necessity established according to a principle of equity (*aequitatem*), which pertains to moral judgment. In the corpus, all the associations between a marker of deontic authority and a marker of deontic acceptability entail an association between the notion of possibility based on legal principles and the notion of necessity based on moral principles. The notions of legality and morality can thus be said to be constantly juxtaposed in this type of co-occurrences, and always in a contrastive relationship.

Highlighting the contrast between the law and the principles of equity is frequent in the genre of declamations, as illustrated by Bonner (1949, 46–47). Most co-occurrences of this type i.e., which insist on an opposition between deontic authority and deontic acceptability, come from the *Controversiae* by Seneca the Elder. Another representative instance of the contrast between the two modal domains in co-occurrence is shown in example 266.

- (266) *quomodo istam quaestionem putas in aequitatis tractationem cadere, cum*
 how this matter think into equity discussion fall when
quid liceat quaeratur, non quid oporteat?
 what be_allowed inquire not what ought

how do you think that this matter would fall into the discussion about equity, when what is being inquired is what **is allowed**, and not what **ought to** be the case? (Seneca the Elder, *Controversiae* 2, 5, 16)

In this sentence, the co-occurrence is between the modal verbs *licet*, for the domain of deontic authority, and *oportet*, for the domain of deontic acceptability. The case discussed in this controversia is a trial between a wife and her husband. She covered up his plot to kill the tyrant, and after her husband managed to kill him, she was divorced by him because she did not bear a child for five years. The matter here is if it is allowed by the law to divorce a woman for this reason in any circumstances, and if it is acceptable to do it. As in all the other cases, the deontic authority marker refers to the domain of possibility, whereas the deontic acceptability marker refers to the domain of necessity. In this case, the context explicitly indicates that the two notions expressed by *licet* and *oportet* belong to two different semantic scales. The speaker introduces first the notion of *aequitas*, to which the predicate *oportet* refers. Then, *oportet* is negated, whereas *licet* is asserted. The parallel construction with

quid liceat and *quid oporteat* emphasises the contrast between the two notions. The speaker is reinforcing his argument that, in this specific context, the foundation for reasoning is based on legal principles rather than on the principle of equity. I have tried to represent the relationship between the two deontic notions in the schema in Figure 8.2, based on the co-occurrences from the corpus.

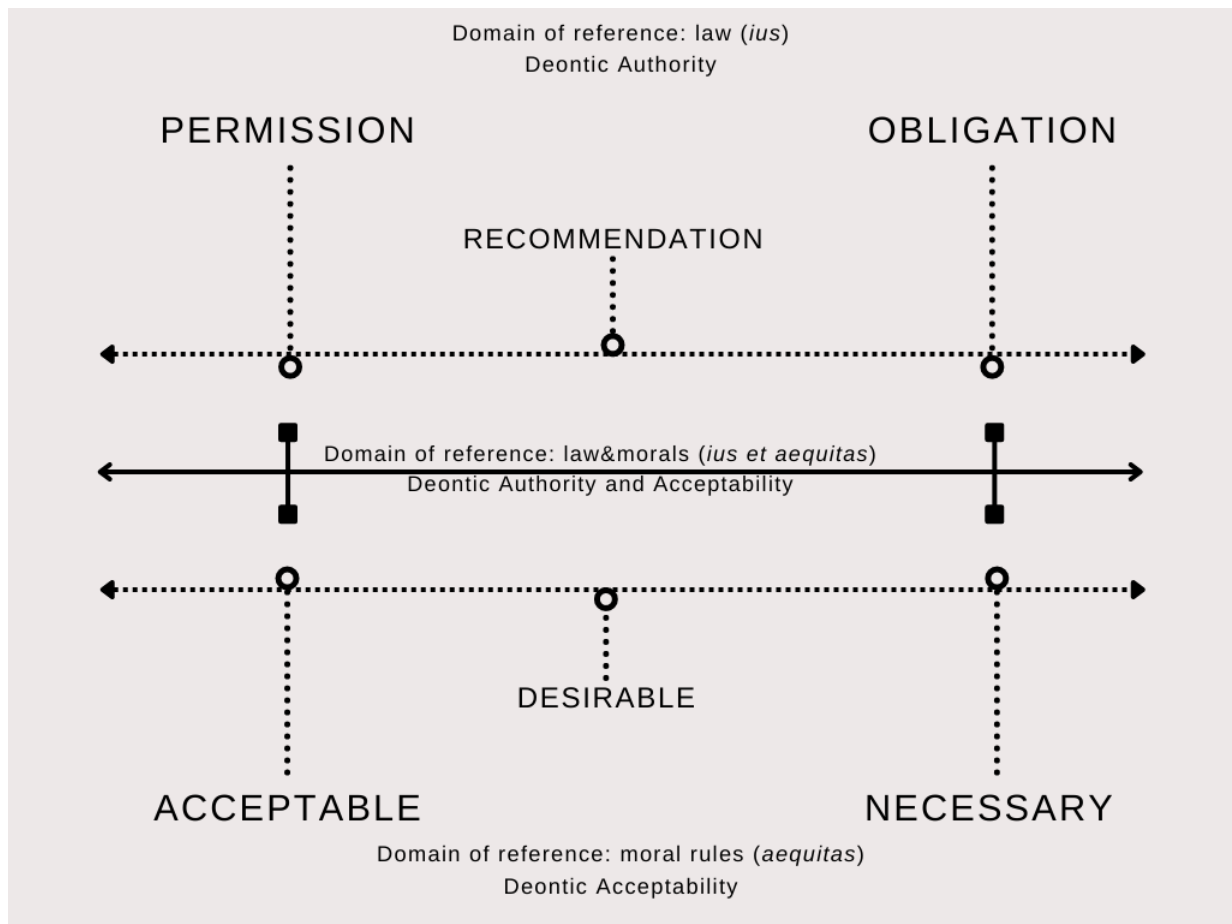


FIGURE 8.2: The co-occurrence of deontic acceptability and deontic authority and their reference domains (*aequitas* and *ius*).

In these types of co-occurrences, the concepts of deontic authority and deontic acceptability are compared. The two reference domains (*ius* for deontic authority and *aequitas* for deontic acceptability) are specified. When the two notions are lexicalised and co-occur in the same sentence e.g. *possum* and *debeo* in example 265, *licet* and *oportet* in example 266, a third scale is created as a result of a conversational implicature, in which the values of the two scales overlap. Consequently, what is permitted is also morally acceptable, and what is obliged is also necessary in the moral and ethical domain. In the co-occurrences presented in examples 265 and 266, this overlap between the two domains of authority and acceptability is denied, and the two are once again separated: what is permitted is not necessarily desirable, and

more broadly, what is prescribed by law (*ius*) does not always align with principles of equity and fairness (*aequitas*).

The notion of scalarity emerges also in another specific type of relation between the co-occurring markers, that is, in concessive constructions. In 17 cases of concessive relations out of 22, the concessive clause is introduced by the particle *etiamsi*, *etsi* or *etiam si*. These particles are the most typical markers of conditional concessive clauses of the scalar type. In this type of concessive clause, the concessive particle creates a pragmatic scale that instantiates a specific type of relation between the two utterances in the sentence. Consider example 267.

(267) = (212) *Agere me=cum dementiae, etiamsi potes, <non debes>.*
 act me=against madness even_if have_the_right not should

You **should** not sue me for madness, even if you **have the right to** do it. (Seneca the Elder, *Controversiae* 2, 3, 16)

In this passage a marker of deontic authority expressing permission abide the law (*potes*), and a marker of deontic acceptability expressing necessity according to moral rules (*debes*) are combined in the same sentence. This controversia discusses the case of a ravisher who raped a girl and now has to win his own father and the girl's father over in order to avoid the death penalty. After the ravisher manages to win the girl's father, he tries to win his own, but he fails. In response, the ravisher accuses his own father of insanity (Winterbottom 1974b).¹⁴ In this passage, the father is addressing directly his son, reproaching him for the accusation that he made. His argument again relies on the contradiction between what is lawful and what is morally acceptable. The two modal predicates refer to two different modal domains: respectively, (legal) authority and (moral) acceptability. Please note that, as in this context *debeo* refers to the acceptability according to moral rules, it is translated with 'should', although it occurs in the present indicative and not in the subjunctive mood (i.e., *debes* and not *debeas*).

The overlap of the domain of authority with that of morality that was observed in the previous examples 265 and 266 is renewed in this passage, but is further emphasised by the

¹⁴ At the beginning of the controversia it is also explained that unless he manages to win against the two fathers, the ravisher should die, whence the accusation of insanity against his father. Winterbottom (1974a) explains that this controversia is total fiction, as in such cases the ravisher was obliged to marry the girl. Moreover, the accusation of insanity is another invention employed for the sake of the declamation. The *actio dementiae*, as the accusation of mental illness was called, was probably not part of the Roman juridical system (Bonner 1949, 93–94), and it was borrowed by the declaimers from the Greek one. It corresponds to the request for a guardian (*curator*) in cases of claimed mental illness, or if the accused had somehow wasted all the patrimony (Winterbottom 1974a).

presence of *etiamsi*. This subordinating conjunction *etiamsi*, which corresponds to the English ‘even if’, introduces a scalar conditional concessive i.e., a subordinate clause with a concessive value that implies a pragmatic scale based on the probability or improbability of the realisation of a certain condition, and focalises one of the poles of this scale (Bertocchi and Maraldi 2010, 37). In this case, the scalar notion underlying *etiamsi* seems to refer rather to the probability that an action that is acceptable from a legal standpoint is also morally acceptable. In this passage, *etiamsi* introduces *potes*, qualifying the legal possibility of accusing one’s own father of mental illness as extremely unlikely to be morally acceptable. In the main clause, *non debes* affirms the moral unacceptability of the accusation. The use of these two notions within the scalar concessive introduced by *etiamsi* translates into the following concept: the factuality, albeit extremely unlikely, of the legal possibility of launching the accusation (*etiamsi potes*), does not cancel in any case the moral unacceptability of the accusation itself (*non debes*). For this reason, *debeo* has negative polarity: the fact that the condition introduced by *etiamsi* is fulfilled, i.e., that there exists a way to legally proceed against one’s own father for mental illness, does not represent a sufficient condition for it to be morally acceptable. Therefore, even in this case, the implication that suggests the overlap of moral values and legal authority is cancelled.

8.2.3 Dynamic modality

Another case in which possibility and necessity strongly attract each other in co-occurrence is with markers of dynamic modality, as shown in Figure 8.1. Markers of dynamic necessity and possibility co-occur both in relations of coordination and subordination. When they co-occur in coordinate clauses, they always have the same polarity. In order to analyse this type of co-occurrences we have to refer back to the square of modality. Consider example 268 (presented in Chapter 5 as example 210).

(268) = (210)	<i>Non</i>	<i>enim</i>	<i>debet</i>	<i>nec</i>	<i>potest</i>	<i>esse</i>	<i>architectus</i>	<i>grammaticus,</i>	
	not	indeed	have_to	and_not	can	be	architect	scholar	
	<i>uti</i>	<i>fuerit</i>	<i>Aristarchus,</i>	<i>sed</i>	<i>non</i>	<i>agrammatus,</i>	<i>nec</i>	<i>musicus</i>	<i>ut</i>
	as	be	Aristarchus	but	not	illiterate	and_not	musician	as
	<i>Aristoxenus,</i>	<i>sed</i>	<i>non</i>	<i>amisos,</i>		<i>nec</i>	<i>pictor</i>	<i>ut</i>	
	Aristoxenus	but	not	unskilled_in_music		and_not	painter	as	
	<i>Apelles,</i>	<i>sed</i>	<i>graphidos</i>		<i>non</i>	<i>inperitus</i>			[...]
	Apelles	but	drawing_pencil		not	inexperienced			[...]

For an architect **does not need to** be and **cannot** be a scholar like Aristarchus,

but he cannot be an illiterate; he does not need to be a musician like Aristoxenus, but cannot be unskilled in music; he does not have to be a painter like Apelles, but he cannot be inexperienced with the drawing pencil;¹⁵ [...] (Vitruvius, *De architectura* 1, 1, 13)

In this passage, Vitruvius is listing the skills that a good architect should have i.e., knowing music, being able to draw, and many other abilities. At the same time, he does not need to reach the level of knowledge of critics, musicians or painters in each one of these fields. He needs to apply these skills in his profession. In the sentence illustrated in the example above, this is expressed by the co-occurrence of the two markers *debeo* and *possum*, both expressing dynamic modality. *Debeo* expresses the notion of dynamic necessity and *possum* the notion of dynamic possibility. Both markers have negative polarity. They are located on the two extremes E and O of the square of modality i.e., there is a relation of implication between the two which goes from the pole E to the pole O, but not vice versa. In practical terms, the assertion of *non debet* generates an upper-bound implicature: the fact that it is not necessary for the architect to gain those skills means that he does not lack the ability (*non potest*, not impossible in the square) to do it. However, the implicature is immediately cancelled by *non potest*, so that both notions are accessible for the speaker to support their argument i.e., that an architect does not need and is not able to be an excellent critic, an excellent musician, an excellent painter etc., but needs to have some knowledge in all these domains.

In example 269 (presented earlier in Chapter 5 as example 211), the two co-occurring markers have both positive polarity.

(269) = (211) *Postremo omnes aut de honoribus suis aut de praemiis*
 at_last everyone or about office their or about reward
pecuniae aut de persecuendis inimicitiis agebant, neque quibus
 money or about persecute enemy pursue and_not what
rationibus superare possent sed quemadmodum uti victoria
 way prevail can but how exploit victory
deberent cogitabant.
 should think

At last, everyone was pursuing their offices or monetary rewards or trying to get back at their enemies, and they were not thinking about with what strategies they would **be able** to prevail, but about how they **ought** to exploit their victory. (Caesar, *De bello civile* 3, 83, 4)

¹⁵ The modal verbs *debet* and *potest* are implied in the following clauses, but I repeat them in my translation for the sake of clarity.

Again, *possum* expresses dynamic possibility and *debeo* dynamic necessity.¹⁶ In this case, however, the relationship between the two markers is different with respect to the previous example: the two markers do not modalise the same state of affairs, but two separate ones. The first state of affairs 'to win by using certain strategies' is modalised by *possum*; the state of affairs 'how to use the victory' is modalised by *debeo*. The oppositive relation instantiated by the coordinating particle *sed* 'but' therefore creates a contrast that is not limited to the two types of modality, but involves the two modalised states of affairs. The focus is in fact on the actions described in the states of affairs, respectively the strategies to use and how to exploit their victory. The co-occurrence of modal markers expressing possibility and necessity in coordinate structures implies an oppositional relationship between the two notions themselves if the markers share the same scope, or between the two modalised representations if the scopes are independent.

So far, dynamic possibility and dynamic necessity were related by coordinate structures. However, as shown in Table 6.6 in Chapter 6 (page 199), the co-occurrence count in relations of subordination is much higher with respect to coordination. Among the types of subordinate structures in which dynamic necessity and dynamic possibility appear, syntactic structures that describe a relation of cause-effect are particularly interesting for the interaction that they establish between the two types of modality. In this type of co-occurrences the marker of dynamic necessity has always a positive polarity, regardless of the polarity of the marker of possibility. The type of logical relationship established within the sentence is that necessity paves the way to the possibility of a particular representation, or rather, that the accomplishment of a potential situation is necessarily linked to the satisfaction of a preliminary condition. Consider example 270.

- (270) *Tantum locum luminis habere oportet, ut aves videre*
 to_such_a_degree place light have be_necessary so_that bird see
possint, ubi assidant, ubi cibus, ubi aqua sit.
 can where sit where food where water be

it **should** have enough room for light so that the birds **could** see where to sit, where is the food and where is the water. (Varro, *De re rustica* 3, 5, 3)

Varro here is discussing how the aviary should be structured. In this sentence, the marker of dynamic possibility *possum* is in a consecutive clause introduced by the subordinating conjunction *ut*. In the main clause, the modal verb *oportet* expresses dynamic necessity. In this sentence, two different representations are modalised by the two predicates. The former describes the features of the aviary concerning the light. The latter describes a situation in

¹⁶ The negative polarity given by the conjunction *neque* scopes over the main verb *cogitabant*.

which the birds see where to perch, where to find food and water. The first representation is modalised by *oportet* as a necessity, whereas the second one is modalised by *possum* as a possibility, pertaining to the birds. As the relation between them is construed by the consecutive clause, the two modalised situations are linked by a relation of cause-effect. If we read the sequence in terms of cause-effect, this produces the following interpretation. The sequence describes a state of necessity, which scopes over an action that needs to be performed, a goal that needs to be reached. The accomplishment of this goal entails the possibility of realisation of an objective. At a cognitive level, this creates an implicature where there's a cause-and-effect relationship: the representation deemed necessary leads to the possibility of achieving the representation deemed possible. In other words, if the necessary condition is met, it makes the possible one achievable.

This type of relation is observed, although less frequently in the corpus, also in result clauses, as shown in example 271.

- (271) *Scholas autem labrorum ita fuerit oportet spatiosas, uti,*
 waiting_rooms moreover bath so be be_necessary spacious that
cum priores occupaverint loca circum, spectantes reliqui recte
 when first_comer occupy place all_around watch left upright
stare possint.
 stand can

Moreover, the waiting rooms of the baths **should** be spacious enough so that when the first comers have occupied the spots all around the place, the ones that are left watching **may** stand upright. (Varro, *De re rustica* 5, 10, 4)

As in the previous example, the main clause hosts the marker of dynamic necessity *oportet*, and the subordinate clause the marker of dynamic possibility *possum*. The conversational implicature in this sentence is 'the people waiting for their turn in the bathing tubs should be able to stand conveniently'. The result clause takes the function of the purpose clause in the previous example, and describes the outcome of the realisation of the state of affairs described in the main clause.

In other cases, the marker expressing dynamic possibility can have negative polarity. Consider example 272.

- (272) *In haris ostium esse oportet et limen inferius altum palmipedale,*
 in pigsty door be ought and foot-piece high a_foot_and_a_palm
ne porci, ex hara cum mater prodit, transilire possint.
 so_that_not pig from hog-stye with mother leave jump_over can

The pigsty **should** have a door and a foot-piece a foot and a palm high, so that the pigs, when the mother leaves, **cannot** jump over it. (Varro, *De re rustica* 2, 4, 14)

In this sentence, the purpose clause hosts the marker of dynamic possibility, *possum*, negated by the subordinating particle *ne*, which also introduces the final clause. In the main clause, the main verb is *oportet*, which expresses dynamic necessity. The two situations linked by the co-occurrence are I) the construction of the door of the sty and II) the pigs jumping over the door. The first situation is modalised with the notion of necessity conveyed by *oportet*. The second situation is modalised by the notion of possibility conveyed by *possum* i.e., there is the possibility that the pigs jump over the door. Moreover, the marker of possibility has negative polarity. The relation of cause-effect that underlies the notion of purpose clause builds the relation between the two modalised situations: the door should be built in such way that there is no possibility that the pigs can jump over it. The conversational implicature generated by the sentence as a whole is that the pigs should not have the possibility to jump over the door when the mother leaves the sty.

8.3 Crossing the modal categories

Beyond the attraction between similar or identical modal categories highlighted by the quantitative analysis, there are cases of co-occurrence in the corpus that, although they do not emerge from the quantitative analysis, are interesting for the way in which different types of modality are used in a contrastive manner for argumentative purposes. We have already encountered the use of the correlative adversative structure *non solum... sed etiam* to link markers belonging to the same modal macro-category. In some cases this structure can create a relationship between two notions that belong to two different domains. Consider example 273.

- (273) *Iam non solum licet sed etiam necesse est, nisi*
 now not only be_allowed but also necessary be unless
servire malumus quam ne serviamus armis animis=que
 be_in_slavery prefer than that_not be_slaves weapon spirit=and
decernere.
 decree

Now not only **is it allowed**, but it is even necessary,¹⁷ unless we prefer to be slaves rather than to decree with our weapons and our spirit that we would not be subject to a servitude. (Cicero, *Philippicae* 3, 13, 34)

The third Philippic is directed against Marcus Antonius. The context of this speech is that Marcus Antonius is menacing the province of Decimus Brutus, and then planning to occupy Rome with his army. Cicero is urging for the Senate to hurry and deliberate on the operations needed to defend the Republic against Marcus Antonius. In this sentence, the co-occurrence is between *licet* and the construction *necesse est*. The two markers qualify the same (implied) scope: to seek for action and bellic activity. The former, *licet*, refers to the modal domain of deontic authority: the Senate has expressed its favour in taking measures against Marcus Antonius, and for this reason it has granted permission to act against him. The construction *necesse est* refers to the modal domain of dynamic necessity: the situation has gotten so critical that it is now necessary to do something to stop Marcus Antonius and his plans to march towards Rome. In this case, the modalised representations are put in a contrastive relation for argumentative purposes, by using the correlative construction *non solum... sed etiam*, which, as explained earlier in this chapter, creates an unbalanced relation between two terms, of which one goes on the background and the other one is put in the foreground. In this passage, this construction does not operate on different degrees of the same scale, but on two different domains. As the two markers scope over the same state of affairs, the comparison established by the correlative structure is between the legal permission of seeking for action and the objective necessity of doing so. The argumentative scale on which the correlative structure operates consists of a matter of priorities: what is the most pressing argument to finally take action against Marcus Antonius? That the Senate deliberates and makes it legally possible to conduct an army against him, or that the situation becomes so dangerous that there is no time left for pondering which measures should be taken? The first part of the correlative structure *non modo* focalises *licet*. While the permission granted could be a convincing enough reason to initiate action against the enemy, *non modo* relegates this motivation to the background. Instead, *sed etiam* focalises *necesse est*: by asserting the objective necessity to act and bringing it to the foreground, this argument is given greater

¹⁷ Implied scope: to seek for action and (bellic) activity. Cf. the beginning of the Philippic: *Quod flagitabam equidem cotidie, quippe cum bellum nefarium contra aras et focos, contra vitam fortunasque nostras ab homine profligato ac perduto non comparari, sed geri iam viderem. Expectantur Kalendae Ianuariae; quas non exspectat Antonius, qui in provinciam D. Bruti, summi et singularis viri, cum exercitu impetum facere conatur; ex qua se instructum et paratum ad urbem venturum esse minitatur.* 'I was pressing every day for a meeting, inasmuch as I saw a wicked war not in preparation but in actual conduct by a profligate and desperate man against our altars and hearths, against our lives and property. We are waiting for the first of January: but Antonius does not wait for this date. He is attempting to invade the province of our noble and distinguished fellow countryman Decimus Brutus with an army, and from that province he threatens, when equipped and ready, to march on the city'.

persuasive power than the mere granting of permission by the Senate. That is, in an argumentative perspective the stronger argument leading to the conclusion the Romans will seek for action against Marcus Antonius is given by *necesse est* i.e., it is now necessary, because there is no time to take a calculated and cold decision. This type of relationship is interesting because one would expect that obtaining permission alone would be sufficient to justify the action. Instead, it is the objective necessity that drives the action, and this reversal of argumentative power is accomplished by the correlative adversative structure *non solum... sed etiam*.

Another case in which different modal categories combine with each other is with concessives. I showed above an example of conditional concessive with the co-occurrence of deontic acceptability and deontic authority markers (example 212). In that case *etiamsi* instantiated a pragmatic scale based on the notion of improbability. But another use of *etiamsi* resembles the alternative concessive conditionals. Consider example 274.

- (274) *oportuit iubente patre, etiamsi ipse posset occidere;*
 ought order father even_if himself can kill

he **ought** (implied scope: to have killed a hero's wife taken in adultery), as his father ordered him, even if he (i.e., the father) **was** himself **capable** of killing; (Seneca the Elder, *Controversiae* 1, 10, 6)

In this controversy, the characters are discussing the case of a son who has been disinherited by his father because he refused to obey his will. In fact, his father had commanded him to kill his own mother, whom he had caught in adultery. In this case, the two co-occurring markers refer again to two different modal domains. *Oportet* expresses deontic authority: it refers to the fact that the participant was obliged by the father to kill someone's wife taken in adultery; *possum* expresses dynamic possibility, and it refers to the fact that the father was able and in perfect conditions of killing the adulterer by himself. The use of *etiamsi* in this context does not create any pragmatic scale based on improbability. The main point here is not the degree of commitment to the factuality of the predicate *posset occidere*. That is, it is not the ability of the father to kill that is in question here. The predicate in question does not evoke a scale, but two representations at the two extremes of a polar scale (Sawada 2003): the ability and the inability of the father to kill the adulterer himself. The message of the sentence is therefore that the son should have killed the adulterer, whether the father was able or not. In this case, the two modal scales remain independent, and the dynamic scale is reduced to the contradictories of the square of modal oppositions 'possible' and 'non-possible'.

8.4 Co-occurrence for disambiguation: the case of *oportet*

The importance of the linguistic context for semantic disambiguation is well-known in linguistics. It is worth mentioning here the principle of contextualism, according to which “you shall know a word by the company it keeps” (Firth 1957, 11). Linguistic analysis should be centered on the real usage of language, in order to understand how the context shapes the features of the linguistic unit analysed. Therefore, in order to study the semantics of a lexical unit it is important to consider, among other elements, the semantic-syntactic contexts in which it occurs. I have mentioned in Chapter 3 (section 3.3, page 122), that one of the cases of co-occurrence that is mentioned the most in the literature about Latin modality concerns the co-occurrence of *oportet* with other modal markers, especially *necesse* and *licet*. This type of co-occurrence is found in what have been termed distinctive contexts (Bolkestein 1980; Núñez 1991), that is, contexts in which the co-occurrence of two modal markers emphasises the more or less subtle semantic differences between them. In particular, Orlandini (2001, 327) presents examples of co-occurrences between *oportet* and *necesse est*, to show how the presence of *necesse* could be used to determine the type of modality expressed by *oportet* and its degree, when relevant. In the analysis of the co-occurrences I found the case of *oportet* especially interesting because of its fluctuating status. As it was extensively explained in Chapter 2, section 2.4.15 (page 78), this modal verb can cover both deontic authority and deontic acceptability (and also dynamic necessity), and it can express both lower and higher degrees on the scale depending on the context in which it occurs. Its use in multiple modal domains is not at all surprising, as markers are often polyfunctional (Magni 2010, 212) (see Chapter 5); but *oportet* was the only marker that I could annotate both as expressing desirability or necessity, permission and obligation.

The ambiguity of *oportet* emerges in the co-occurrences in my corpus especially when it expresses deontic modality, more specifically concerning to the degree on the scale to which it should be assigned. In this regard, Orlandini (2001, 333) proposes a lexicalisation of the modal square with some Latin deontic markers, and places *oportet* in the position of weak deontic (*déontique faible* in figure). The schema is shown in Figure 8.3.¹⁸

In this schema, *oportet* is classified as a weak deontic (*déontique faible*), together with *possum* and *licet*. However, the status of deontic *oportet* is more complex. In my corpus I could find oppositional relations between *licet* and *oportet* for example, which show how *oportet* can

¹⁸ Orlandini works with the schema elaborated by Kneale and Kneale (1962, 86), where the vertices I (possible) and O (not possible) are unified. This new version of the logic square accounts for the notion of contingent or bilateral possibility, which represents a possibility that is 50-50: something can be as it cannot be, and does not generate any implicature towards necessity or impossibility (lexicalised as *fieri potest* ‘it can be’ in Latin Bertocchi and Orlandini 2001, 62). Consequently, it does not have a relation of contradiction with impossibility, nor of implication with necessity, and the square becomes a triangle.

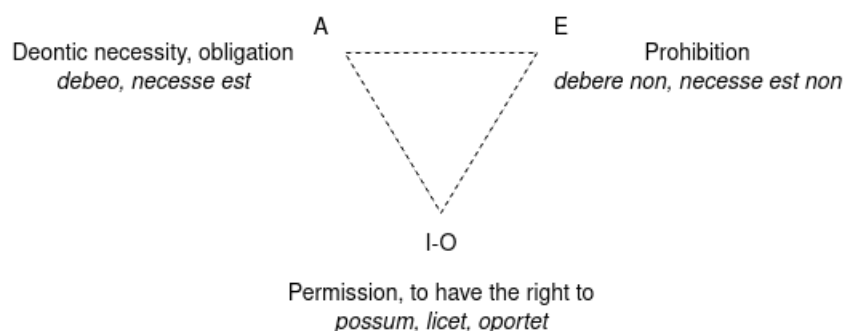


FIGURE 8.3: The schema proposed by Orlandini (2001, 333) for Latin deontic markers (the schema in Orlandini's work had French labels; the English version is mine).

reach the pole of deontic necessity, depending on its co-occurrences, or hold the place of weak deontic in other cases. Consider example 275.

- (275) *Haec enim lex quid oporteat quaerit, aliae quid liceat.*
 this indeed law what ought consider other what be_allowed

This law considers what **should** be done, others what **would be allowed**. (Seneca the Elder, *Controversiae* IX, II, 17)

This sentence is an example of co-occurrence between two deontic authority markers, *licet* and *oportet*. The context is clearly deontic (in the type authority): *haec lex* 'this law' clarifies that the two modal markers refer to the legal domain i.e., what a law compels and allows doing. *Licet* is included among the weak deontics in the schema proposed by Orlandini (2001, 333). In this example it is put in relation with *oportet*. In this case, the correlative opposition between the respective referents *haec lex* (for *oportet*) and *aliae* (for *licet*) suggests that the two notions express different degrees on the deontic scale. Given the information suggested by the context, and that in this context *licet* cannot express anything else but legal permission, we are left with an interpretation of *oportet* which expresses deontic obligation and occupies the pole A of the schema. The co-occurrence of *oportet* with a weak deontic seems to suggest the interpretation of *oportet* as a strong deontic in this case.

This relationship seems to be maintained when the two markers express one acceptability and the other authority. In example 266, which I repeat here as 276, I presented the co-occurrence of *oportet* with a verb of possibility as *licet*.

(276) = (266) *quomodo istam quaestionem putas in aequitatis tractationem cadere,*
 how this matter think into equity discussion fall

cum quid liceat quaeratur, non quid oporteat?
 when what be_allowed inquire not what ought

how do you think that this matter would fall into the discussion about equity, when what is being inquired is what **is allowed**, and not what **ought to** be the case? (Seneca the Elder, *Controversiae* 2, 5, 16)

As a reminder, in this case the co-occurring markers *licet* and *oportet* express respectively deontic authority and deontic acceptability. I have explained in the previous section how this kind of co-occurrence generates by a conversational implicature a third scale in which the values of acceptability and authority overlap and correspond. Again, on the implied scale of overlap, the co-occurrence influences the interpretation of *oportet* in such a way that, while *licet* indicates the possibility of performing an action according to the law, *oportet* is placed on a higher degree of the scale, to indicate the appropriateness (if not the moral necessity) of performing it. Again, this example shows that distinctive contexts play on the polyfunctionality and sometimes ambiguity of the markers in co-occurrence, by selecting different shades of meaning i.e., types of modality in this case, by means of specific contextual elements. The cue in this example is the reference to the principle of *aequitas*, which selects the deontic acceptability type of modality for *oportet*, and puts it in contrast with the value of deontic permission expressed by *licet*.

Another interesting co-occurrence for *oportet* is shown in example 277.

(277) *nunc auctoritate et prudentia tua prospicias oportet, ne*
 now authority and good_sense your see_to have_to so_that_not

inimici nostri consulibus sublati sperent se convalescere posse.
 enemy our consul remove hope himself recover can

Now, with your authority and good sense, you **must** see to it that our enemies, now that our consuls were removed, do not hope that they **can** recover. (Cicero, *Epistulae ad familiares* 11, 9)

In this context, *oportet* occurs with a dynamic meaning of necessity, and co-occurs with a dynamic *possum* which expresses possibility. This is a classic case, observed earlier in this chapter, where a certain representation is framed as necessary and followed by another representation framed as possible, the two being in a consequential relationship with each other: the attainment of the former leads to the attainment of the latter. This type of context thus encourages the modal interpretation of *oportet* towards the dynamic modality of necessity,

despite it being a less frequent type of modality for this verb compared to the deontic and epistemic ones, at least according to what has been stated by Magni (Magni 2010) and others (see section 2.4.15 on *oportet*, page 78).

Unfortunately, the occurrences of *oportet* in combination with other markers do not cover all cases mentioned in the literature and laid out in section 3.3. Speaking of epistemic modality, none of the occurrences of *oportet* in combination with other markers was annotated as epistemic. Therefore, I could not observe the behaviour of *oportet* with other markers of epistemic modality, expressing perhaps different degrees of epistemicity, as shown in example 191 presented in section 3.3, page 128. Namely, I could not observe *oportet* in co-occurrence with markers of obligation e.g. *necesse est* with deontic meaning.¹⁹ Most of the co-occurrences of deontic *oportet* with other deontic markers were with *licet* or other markers expressing permission, namely *possum* and *potestas*, to which I applied the same type of analysis as illustrated for the examples in this section.

Bearing in mind that the study of *oportet* would benefit from a more thorough investigation with more data available, the preliminary results obtained on the corpus confirm that this marker maintains a non-static nature from a semantic point of view. Given that this marker is inherently vague, as shown by very recent studies (see McGillivray et al. 2022), however, in some cases, the co-occurrence can help revealing a tendency towards a higher or lower degree on the deontic scale. In the specific case of deontic modality, this marker, when co-occurring with markers of deontic possibility, acquires a value different from the one assigned by Orlandini (2001) of weak deontic, moving towards the domain of necessity.

8.5 Concluding remarks about co-occurrences with separate scopes

Co-occurrences in which the markers keep separate scopes are much more frequent in the corpus than co-occurrences that instantiate a scope hierarchy in the sentence that hosts them. Unlike other types, this kind of co-occurrences is based on existing logical and scalar relationships among different modal notions. These relationships can also support argumentative patterns that utilize correlative structures such as *et... et, non modo/solum... sed/verum etiam*. Example 264 showed the co-occurrence of deontic markers in a correlative adversative structure (*non modo... sed etiam*); example 266 showed the correlative use of deontic authority and deontic acceptability markers in a parallel structure (*quid liceat... non quid oporteat*). The co-occurrence itself can instantiate a correlative structure for argumentation. Example

¹⁹ All the co-occurrences with markers of necessity shown in Tables A.3 and A.4 (pages 304 and 305) are occurrences of dynamic modality, as the one presented in example 274.

261 showed the correlative use of two different degrees of epistemic modality to create an argumentative schema which creates a background/foreground alternation.

A pivotal notion to the analysis of the co-occurrences in literature has been the notion of modal harmony. In the previous chapter, the first limitations of this notion in the wider context of a corpus study emerged, albeit applied only to cases of hierarchical co-occurrences, i.e., the type of co-occurrences upon which this model was formulated. This chapter, however, shows that this notion is not applicable to the vast majority of co-occurrences emerging from the corpus data, namely those in absence of a scope hierarchy. First and foremost, both hierarchical and non-hierarchical co-occurrences have been shown to encompass all types of modality, not just the epistemic one. Moreover, in cases of non-hierarchical co-occurrences it seems that not only the type and/or degree of modality expressed by the co-occurring markers matter, but also the semantic-syntactic context in which the co-occurrence occurs and its potential rhetorical-argumentative uses.

When the co-occurrence is observed between different markers, regardless of the type of modality, whether it is dynamic, deontic, or epistemic, in the majority of cases a marker of necessity and one of possibility occur together. This phenomenon is also observed across diverse syntactic structures. The passages illustrated in examples 264, 266 and 261, as well as the great majority of the other examples in this chapter, all show co-occurrences of, respectively, markers of epistemic modality, deontic acceptability and deontic authority. As previously mentioned, this has multiple effects. The first one is to create a logical and cognitive connection between two domains that are categorised differently at a theoretical level. The most striking example is the overlap of the domains of authority and acceptability into a single scale (Figure 8.2). The second effect, which builds on the first one, is the argumentative function of such co-occurrences, both through the use of correlative structures and syntactic structures that exploit the scalar nature of some of these notions, as in the case of *etiamsi* (as shown in e.g. example 212). Logical relationships of lexical consequentiality have also been observed in co-occurrence in final and consecutive structures, where necessity systematically paves the way to possibility (see e.g. example 270).

In section 8.3 I have also shown cases of co-occurrence between markers belonging to different macro-categories. Cases of co-occurrence like the ones illustrated in examples 273 and 274 show that this type of combinations, which do not align with the tendency of macro-categories to co-occur with each other, are used to create contrastive relationships. For instance, legal possibility will be opposed with objective necessity, and legal obligation with internal ability, i.e. capability. This sets up a contrast between the deontic environment of obligation and permission and the domain of possibility and necessity that are not tied to any source of authority.

9 Conclusions

In the final chapter of this work on the co-occurrence of modal markers in Latin, I will conclude by going back to the goals of this research, highlighting the main theoretical and methodological contributions to the study of this phenomenon. I will then elaborate on the limitations of my research and possible ways for improvement. Finally, I will discuss further research perspectives that have been opened up in this study, and that could contribute not only to research on the co-occurrence of modal markers, but also to a better understanding of the Latin modal system.

9.1 A new perspective on the co-occurrences

In this work, I presented a study on the co-occurrence of modal markers in Latin. I focused specifically on Latin lexical markers, including about 40 markers among verbs, nouns, adjectives, and adverbs that express the notions of possibility and necessity in Latin. The study is based on a corpus of Classical Latin texts, including various genres and authors and balanced with respect to both axes to ensure that the results are not biased by an excessive amount of data for a specific author or genre. The co-occurrences were automatically extracted from the corpus, relying on the results of the automatic annotation and sentence segmentation performed in the previous steps of data pre-processing. The manual annotation of the sentences extracted from the corpus includes the following layers of information: modal value of the markers in co-occurrence; type of text from which the sentence was extracted; syntactic relationship between the two markers; coordinating or subordinating conjunction that links the two markers (or type of punctuation); presence of scope hierarchisation; semantic scope of each marker. Based on the manual annotation, a first quantitative analysis was carried out, aimed at i) determining how widespread the co-occurrence of modal markers is in Classical Latin; ii) identifying which markers were found in co-occurrence and which were not; iii) identifying particularly interesting combinations from a statistical point of view through appropriate attraction measures. Starting from the results of the quantitative analysis and the manual annotation of the co-occurrences, I proceeded with a closer analysis of the sentences. The results of this analysis show that lexical modal markers can co-occur in two different types of relation. In the first type of co-occurrence one marker

scopes over the other and therefore projects its modal value onto the value expressed by the co-occurring marker. In the second type of co-occurrence the two markers maintain separate scopes and interact at the syntactic level, revealing or building on logical-cognitive relationships that exist between the notions included in the modal domain, as well as on the scalar nature of some of the modal categories. The two types of co-occurrences raise different questions at the theoretical level, and require different types of analysis.

The study was structured as follows. Firstly, I briefly introduced the theory of modality and the theoretical framework adopted in this study, as well as the main studies on Latin modality and the list of modal markers targeted in this work, with associated modal passages to illustrate their use in context (Chapter 2). In Chapter 3, I presented a survey of the literature on the co-occurrence of modal markers cross-linguistically, and I dedicated a section to the few mentions to the co-occurrence of Latin modal markers that can be found in literature. Chapter 4 was devoted to the description of the steps for building the corpus, to the description of the corpus and of the texts included in it, and to outlining the process of co-occurrence retrieval. In Chapter 5 I described how the co-occurrences extracted from the corpus were annotated. This included the description of the annotation of the types of modality, of the presence or absence of scope hierarchy, and of the type of syntactic relation between the co-occurring markers. The qualitative analysis of the relations between co-occurring modalities was supported by a quantitative study described in Chapter 6, which laid the foundation for the application of the same metrics especially on the co-occurrences without scope hierarchisation, for which I could rely on more data. Specifically, I illustrated the methodological choices that led to a representation of co-occurrences in a symmetric matrix, the selection and use of attraction measures, and the techniques used for constructing and exploiting data and to create visualisations of results. To conclude, Chapters 7 and 8 were dedicated to the close study of the two types of co-occurrence identified and described above. Quantitative data were used, where possible, to complement the qualitative study, in order to ensure an integrated and thorough discussion of the phenomena presented in the two chapters.

Based on the summary presented above, I will now outline some concluding remarks on the contribution that this work provides to the research field of Latin modality and specifically to the studies on the co-occurrence of modal markers. In this regard, I will first present the theoretical contributions and then the contributions to the methodology.

The survey outlined in Chapter 3 reveals that the body of studies on the co-occurrence of modal markers is not very large, especially when compared to the vastness of the studies on modality. Moreover, research on this phenomenon in Latin and in historical languages in

general is far behind or altogether absent. More generally speaking, existing studies in modern languages almost entirely focus only on cases of hierarchical relations. Oftentimes these studies concern combinations of a modal adverb with a modal verb, and sometimes, as in the case of studies on the English language, combinations of multiple modal auxiliaries. Advancing research on this type of combinations is relevant to the study of modal hierarchies and of the scope properties inherent to different types of modality. On the other hand, as it was shown by the analysis outlined in Chapter 8, non-hierarchical co-occurrences have implications on the use of modal notions within argumentation patterns and can be viewed as a tool for disambiguation, especially in a language for which we cannot rely on the linguistic knowledge of native speakers.

In order to showcase the main contributions of this work on the topic, I will first start by summarising the main features of co-occurrences in scope hierarchisation. Despite the tradition of studies focussed on the combination of modalities, this type of co-occurrence was found to be rare in the corpus. Nonetheless, the findings seem to align with previous studies on modal hierarchies in other languages in the cognitive-functional framework (Nuyts 2004; Narrog 2009). Epistemic modality shows the widest scope properties, appearing as embedding modality in combinations with all types of modality, including itself. Dynamic modality shows some embedding properties to a limited extent, while deontic modality (both authority and acceptability) is never found in an embedding position, at least in the corpus data. These results should definitely be verified on a larger sample to determine, for example, whether there is a possibility of embedding between the two types of deontic modality. Nonetheless, the results obtained on the (few) co-occurrences of this type confirm Narrog's view that a less rigid model is needed to describe modal hierarchies more accurately with respect to corpus data (Narrog 2009, 177;236, cf. van Valin and LaPolla 1997; Cinque 1999 among others). For instance, modal markers that belong to the same modal category frequently embed each other (something that emerged already in Narrog 2009, 236 for Japanese), and their position in the hierarchy is only determined by the type of part of speech or syntactic relation in which the two markers co-occur, as it is the case for modal adverbs and modal verbs. Moreover, in some (rare) cases, dynamic markers can embed epistemic markers. Therefore, a less clear-cut definition of the positions of the categories in the hierarchies seems to be preferable to the application of this model to Latin modal categories. I have also attempted to outline the syntactic structures in which these types of combinations occur and the types of markers involved. As mentioned earlier, co-occurrences between an adverb and another type of marker, typically a verb, always generate a modal hierarchy in which the semantic scope of the first one includes the second marker and its own scope (the case of 'double modals' described by 1970). In a minority of cases, hierarchisation is found in the relation between two modal predicates. These can be combined in different types of

syntactic structures. In the corpus I could find various cases of argument clauses i.e., clauses that fill the obligatory slots of the construction pattern associated with a modal predicate. Examples are accusative and infinitive clauses functioning as subject to an impersonal modal predicate; clauses introduced by *quin* or *ut* with the subjunctive; or cases of asyndetic subjunctive. A modal verb in the present infinitive could occur as the infinitival complement of another modal predicate that behaves as an auxiliary, typically with the modal verbs *debeo* and *possum*. Different distributions in the types of embedding and embedded modality are also associated with the two types of relation in hierarchical co-occurrences. In the relation ADV + V the embedding adverb is typically epistemic, whereas the co-occurring verb can express any type of modality. When two modal predicates are combined in a hierarchical relation, epistemic modality is found in an embedding position in only one case, whereas in all other co-occurrences of this type dynamic modality typically embeds other dynamic or epistemic markers.

In the second type of co-occurrence, the two markers keep separate scopes and do not have a hierarchical semantic relation. The part of this study dedicated to this type of co-occurrence expands the limited amount of data currently available about it and shows, as mentioned above, the limitations of a theoretical discussion that so far has been almost exclusively based on hierarchical co-occurrences. Concerning the analysis of this type of relation, this study provides an argumentative interpretation of non-hierarchical co-occurrences and a new perspective on the logical-cognitive relationships among the types of modality in the modal domain. The quantitative analysis of cases of absence of scope hierarchisation revealed a strong attraction between modalities belonging to the same category. Based on this result, I carried out a closer analysis of actual examples of co-occurrence in this type of relation. First of all, a strong presence of co-occurrences of the same markers (loop co-occurrences) emerged. This type of configuration is almost absent in cases of scope hierarchisation. Loop co-occurrences rely on the repeated expression of the same type of modality with the same lexical item, without instantiating a scope hierarchy. Such type of co-occurrence was interpreted as an anaphoric repetition that serves purely rhetorical purposes, which is used by the author or the speaker to emphasise a specific message. The modal loop often plays on lexical items repeated with opposite polarity, or in structures that facilitate a contrastive relation between the two representations modalised by the co-occurring markers. With regard to cases of co-occurrence of different markers, firstly it was noted how their combination sometimes also serves rhetorical-argumentative purposes. Previous studies on the use of modal forms for this purpose focussed exclusively on cases of scope hierarchy (Rossari 2016; Hütsch 2020). Such uses as found in the corpus mainly concern the co-occurrence in the same sentence of markers expressing different degrees of epistemic modality, which modalise two different representations. The two markers operate on two

different argumentative plans, putting the weaker argument on the background (lower degree of epistemic confidence) and the winning argument on the foreground (stronger degree of epistemic confidence). The use of co-occurrences of this type in cases of dynamic and deontic modality instead highlights logical-cognitive relationships underlying these categories, which are also often exploited for argumentative purposes. This is especially true for the co-occurrence of deontic authority and deontic acceptability markers. This co-occurrence relies on the cognitive association of the notions of legality and morality which underlie, respectively, deontic authority and deontic acceptability. In co-occurrences of this type, the combination of the two deontic markers implies an implicit overlap of two scales respectively based on the two principles. In such cases, this overlap is constantly negated through oppositional structures. More specifically, the co-occurrences build on the implication that morality coincides with legality (Figure 8.2), and then deny this implication by using the co-occurrence typically in concessive structures. This supports the speaker's argumentative purposes, who aims to demonstrate the moral wrongness of a specific action and condemn it despite the law. The other type of relation, between dynamic markers, had already emerged in some co-occurrences in scope hierarchisation, that is the relationship of logical consequence between necessity and possibility. In these cases the two markers are linked by a relation of subordination, in which the possibility marker is in a final or a consecutive clause, that is, in types of subordination that presuppose a consequential relationship, if not a cause-effect relationship, between two propositions.

Although to a partial extent, it is possible to make some observations about the phenomenon in the genres represented in the corpus, which include historiography, letters, oratory, and treatises. It is important to note that the quantity of data present in the corpus does not allow for generalisations on specific genres. However, as it will be discussed in the next section, certain genres appear to have a greater number of co-occurrences compared to others, and they also differ in terms of the types of relationships. Historiography is by far the genre with the fewest co-occurrences (only 61 in the entire sample). The other genres have a comparable number of co-occurrences, but there are peculiar characteristics in specific literary texts concerning the type of co-occurrences. In particular, the distinction between the deontic modality of acceptability and authority, based on their presupposed implicational relationship, is typical of Seneca's *Controversiae*. As mentioned in Chapter 8, the discussion around the contrast between the notion of legality and that of moral equity is one of the *topoi* of the *controversiae*. The characters appear to use the co-occurrence of deontic markers belonging to different deontic subcategories to condemn specific events by contrasting legal rules (deontic authority) with moral principles (deontic acceptability). The contrast is often built in concessive contexts, where the argumentative force is given to the marker of deontic

acceptability. Another type of co-occurrence that seems to be almost a pattern is the consequential relation between dynamic markers of possibility and necessity. This is typically found in the texts belonging to the treatise genre. When the author gives instructions to the reader to perform a certain activity e.g. build some structure to host specific animals, the expression of dynamic necessity marks the instruction given by the author, and the expression of dynamic possibility marks the result of the action. The two are usually linked in a purpose or result clause. This was shown e.g. in example 270, page 279.

A final remark should be made concerning the notion of modal harmony, traditionally applied in previous studies on modal co-occurrences. Previous research has shown that combinations of the type ADV + V (modal adverb with a modal verb) can be harmonic or non-harmonic. The concept of modal harmony has been applied initially only to combinations of epistemic markers (Lyons 1977): modally harmonic combinations describe co-occurrences in which the two markers express the same degree of epistemic modality; vice versa, modally non-harmonic combinations indicate the co-occurrence of different degrees of epistemic modality. The notion has been subsequently applied to the combination of dynamic and deontic markers with other constituents that would e.g. reinforce their modal meaning, such as the adverb 'legally' with the verb 'can' with a deontic value (Coates 1983). However, I found that, already in the cases of scope hierarchisation extracted from the corpus, this notion seems to be overly restrictive, as this type of relation can host combinations of markers other than epistemic, and can be applied to modal categories that are supposed to be polar and non-scalar, such as dynamic modality. Rather than just relying on the labels of harmonic and non-harmonic combinations, it seems more interesting to focus on the analysis of the combination itself. In some cases, the epistemic adverb seems to take on an argumentative function, in collocations with *si* and *nisi*, where e.g. *nisi forte* introduces in most cases a counter-argument to the previous statement. The speaker in these cases nuances their commitment to the counter-argument by using the epistemic adverb of uncertainty *forte*. In other cases, the epistemic adverb in co-occurrence does express the certainty of the speaker concerning the modalised state of affairs. On the other hand, most cases of hierarchical co-occurrence in combinations of two modal predicates are pairs of dynamic markers. In these cases, a marker expressing necessity embeds another marker expressing possibility, or a possibility marker embeds another one, in combinations that seem almost redundant. The notion of modal harmony shows its limitations even more evidently if one tries to apply it to the analysis of non-hierarchical co-occurrences. This type of co-occurrence has been overlooked by most studies and does not fit neatly within the definitions of harmonic or non-harmonic combinations. These concepts can hardly be applied to this type of configuration, as the markers in co-occurrence are not strictly speaking combined with each other, but co-occur within a wider semantic and syntactic context which needs to

be taken into account. That is to say, that for the analysis of this second type of co-occurrences, it is important to consider not only the types of modality that co-occur (which extend beyond epistemic modality and, in general, scalar modal categories), but also more generally the syntactic context of the co-occurrence and its rhetorical-argumentative uses. One of the main objectives of this study is to demonstrate that this type of co-occurrence deserves equal attention, and to pave the way for targeted research aimed at further exploring it in Latin and in other languages. In order to do this, the analysis of non-hierarchical co-occurrences must shift its focus towards their rhetorical-argumentative uses, and to their role in the organisation of discourse.

Based on this summary of results, I hope to have shown that, beyond the mere description of the linguistic phenomenon, studying how different types of modality can interact at the sentence level can be revealing on some uses of modality in language on different plans. A close analysis of cases of scope hierarchisation can shed light on broader theoretical topics such as the hierarchical structure of the clause and the organisation of qualificational categories within this structure. On the other hand, the study of co-occurrences without scope hierarchisation can pave the way for new types of analysis that focus both on the rhetorical-argumentative uses of the co-occurrence on one hand, and on the logical-cognitive relationships underlying the modal domain on the other hand. This would provide new material to overcome the model of modal harmony, and develop a different type of analysis for this type of co-occurrences.

Having outlined the contribution of this work to the theoretical discussion, I will now address the main methodological aspects. As already mentioned in Chapter 3, the use of corpora is extremely valuable in linguistic research, since relying on introspective data unfortunately has significant limitations and the availability of digital resources allows for easier statistical analyses of corpus data. Moreover, in the case of historical languages such as Latin, using a corpus is mandatory, as we cannot rely on our own linguistic knowledge. From a quantitative point of view, this study has first of all confirmed the rarity of co-occurrences of modal markers that had been observed in other cases (Nuyts 2004 for Dutch), and has made it possible to record the extreme disproportion between the two different types of co-occurrences described above. In addition, the analysis performed on the list of markers targeted in this study has given a general picture of their presence in the corpus, both alone and in co-occurrence. For example, the study of attraction through the SIQ led to a reconsideration of the overwhelming presence of *possum* within co-occurrences, in light of its overall presence in the corpus, which is more than two times the presence of almost all other markers in the corpus. Similarly, attraction measures highlighted interesting co-occurrences among much less common markers such as epistemic ones, which, as it was discussed earlier, play an important role both in modal hierarchies and in the argumentative use of co-occurrence.

Concerning the types of modality, the SIQ value has unveiled a relation of attraction across the same macro-types of modality in the whole corpus, and specifically in the case of co-occurrences in the absence of scope hierarchy. The data on the co-occurrences emerging from the quantitative analysis has guided the qualitative analysis of the co-occurrence of different types of modality, grouped by macro-categories. It is important to recall that when we talk about attraction between co-occurring markers, we are not referring to combinations typically studied in the literature, i.e., of the hierarchical type, but rather to co-occurrences at the sentence level where the markers are not hierarchically ordered. Depending on the type of syntactic structure in which they co-occur, these instances can manifest argumentative or rhetorical uses of the co-occurrence.

9.2 Limitations and further research perspectives

This study presents some limitations, mainly concerned with the methodological choices involved within the research process. The first limitation concerns the constitution of the corpus, which, although I aimed at keeping it as balanced as possible, has probably proven to be too small for the rarity of the phenomenon under study. Only 2% of sentences contain a co-occurrence, a trend confirmed by tests on other types of corpora and Latin texts from different genres and epochs (see Marongiu 2024). The low quantity of data has led to problems of data sparsity, which have weakened the quantitative analysis, especially for some specific phenomena e.g. the co-occurrences in scope hierarchisation. As a result, in some cases it has been impossible to determine the relevance of a certain phenomenon with respect to others. For instance, dynamic necessity appears as an embedding modality only once in the corpus. However, given the low number of co-occurrences with scope hierarchisation in general in the corpus, it was not possible to establish to what extent this was an isolated phenomenon or whether it was simply not well represented in the results due to data sparsity issues. One other aspect that might have been worth deepening having more data available is the degree of association between a certain combination of modalities and specific syntactic structures. For instance, it has been observed that in hierarchical co-occurrences epistemic modality is almost always in an embedding position in relations ADV + V, but almost disappears in hierarchical relations between two modal predicates. However, introducing so many variables reduces the number of co-occurrences to such an extent that only a simple count is possible.

Another issue concerns sentence segmentation and the extraction of the sentences with co-occurrence. As explained in Chapter 5, the output of the automatic annotation presents some errors. Additionally, the choice of the type of delimitation that includes colons and semicolons, based on the criterion of the presence of two main predicates, could still lead to the loss of potentially interesting co-occurrences in some cases. It should be noted that every

segmentation criterion has its limitations. Including sentences delimited by full stops introduces more than one main predicate, which moves the co-occurrence to the inter-sentential level. This would imply comparing different cases of co-occurrence: between two sentences and within the same sentence. Adopting a pertinence span, as in some of the studies mentioned so far (Rossari 2016; Hütsch 2020), might exclude cases in which the markers are exceptionally far apart, especially in a language with such a free word order as Latin.

Lastly, excluding verbal mood from the analysis of the co-occurrences is certainly a limiting factor in the analysis, as the modal value expressed by a marker also depends on its verbal mood. I have explicitly mentioned this interaction in specific cases throughout the analysis of the examples, but expanding the study to verbal mood as a modal marker and including it in the quantitative and qualitative analysis would certainly provide a more complete picture of the combinations studied. Firstly, all cases of co-occurrence where modality is not expressed through two lexical markers but, for instance, through one lexical marker and a verbal mood, would be included, leading to a bigger data sample. Moreover, as mentioned in Chapter 2, the polyfunctionality of certain modal markers like *possum* and *debeo* is also expressed through the use of these markers with various verbal moods. Other studies more focussed on co-occurrence, and specifically hierarchical co-occurrences, such as Hütsch (2020), have considered cases of co-occurrence where the epistemic adverb modifies the main verb in different verbal moods. On this perspective, it would certainly be an interesting research direction to understand how this phenomenon occurs in Latin and whether and how non-hierarchical co-occurrences can be expressed solely through verbal moods (for example, the alternation of background and foreground with argumentative function with the alternation of verbal moods).

I will now conclude by outlining some further research perspectives that remained unexplored but might be worth investigating in the future. The first ones arise from some of the limitations discussed above. Using a larger corpus would allow for the collection of a larger quantity of data, but above all, expanding it to different stages of the language would enrich this research with a diachronic approach which is currently missing. Adopting a diachronic perspective would enable the identification of evolutionary trends, if any, in the co-occurrence of modal markers. For example, as explained in chapter 6, some markers e.g. *possibilis*, *possibilitas*, *probabilis*, were not captured at all in this study because they emerged later than the period represented by the corpus. Expanding the corpus would also allow for a more specific study on genres. In this work, some trends have been roughly identified, such as the tendency to observe in treaties and rhetorical works the opposition of specific modal notions. A more targeted study on genre-specific co-occurrences could shed light on the uses of co-occurrence according to the genre, in a diachronic and contrastive perspective. This would render the study more valuable for literary-oriented research as well.

Another aspect that emerged from the quantitative analysis but received very limited attention is that markers and types of modality can not only attract, but also repel each other. It would be interesting to conduct a contrastive study on types of modality or markers that do not tend to co-occur, and identify the differences from a semantic and syntactic perspective with cases of attraction.

Finally, a targeted and more in-depth analysis of some specific markers could shed light on their sometimes hazy interpretation. As mentioned several times, polyfunctionality and ambiguity are cross-linguistically typical of modal markers in general, but here I refer in particular to the cases of *fortasse* and *oportet*. I mentioned in the analysis of *oportet* presented in chapter 8 how the analysis of the modal value of a marker can benefit from the study of the semantic context in which the marker is found. Although I attempted a description of the case of *oportet*, elaborating on the co-occurrences for this verb, these two markers would benefit from a dedicated analysis, perhaps in a diachronic perspective, of their co-occurring markers, in order to determine if and how the co-occurring marker impacts the type of modality and especially the degree that they express.

A Appendix

This Appendix contains supplementary material to the main text.

A.1 Example of a CONLL-U file

In Chapter 4 I introduced the concept of a CONLL-U file. This is the format for the results of the automatic annotation with the Stanza parser. Figure A.1 shows an example of annotation in a CONLL-U file. The passage was illustrated in example 192 in Chapter 4 (repeated here for clarity in example 278), from Vitruvius' *De architectura*.

(278) = (192) *Praeterea de rerum natura, quae graece φυσιολογία dicitur,*
 moreover about thing nature which in_Greek φυσιολογία say
philosophia explicat.
 philosophy explain

Moreover, philosophy explains the nature of things (which in Greek is called φυσιολογία). (Vitruvius *De architectura* I, 7)

[illegible]

FIGURE A.1: A passage from Vitruvius' *De architectura* annotated in a CoNLL-U file.

A.2 Terminology

Table A.1 summarises the technical terms and definitions used throughout this work.

Table A.2 summarises the terms used in the illustration of the method used for the quantitative analysis, illustrated in Chapter 6, with a brief explanation for each term.

A.3 Co-occurrence of modal markers

In this section I will show tables that have not been presented in Chapter 6, either for reasons of space or so as not to overly burden the chapter.

Table A.3 shows the symmetrised co-occurrence score (SCS) for all the markers that show a modal value in the corpus.

Table A.4 provides the symmetric independence quotient for all the combinations between the modal markers in the corpus.

Double modals	Non-standard combinations of two modal auxiliaries e.g. <i>*might would</i> , observed in southern varieties of American English (Labov et al. 1968, 261)
Double modality	Combinations of a modal auxiliary and a non-verbal modal marker (typically an adverb, Halliday 1970, 331)
Hedge	Expressions such as <i>I think, I suppose</i> (Coates 1983) or modal expressions and tag-questions (Lakoff 1972) that convey the degree of commitment of the speaker towards the propositional content of the utterance
Loop co-occurrence	Two occurrences of the same modal marker in the same sentence
Modal harmony	Harmonic combinations: two markers (Lyons 1977) or two expressions such as a modal marker and another expressions e.g. <i>I think</i> (Coates 1983) that convey the same degree of epistemic modality (Halliday 1970; Coates 1983). Non-harmonic combinations: two modal expressions that express different degrees of epistemic modality (Lyons 1977; Coates 1983; Halliday 1970). In modally harmonic combinations the markers reinforce each other; in modally non-harmonic combinations they are cumulative in meaning, as they express two different degrees of epistemic modality. Although this notion is traditionally applied to epistemic markers, Coates (1983) partially applies it to co-occurrences of markers belonging to other modal domains, notably dynamic and deontic modality. However, the range of co-occurrences observed in this study demonstrates the limited flexibility and narrowness of this notion compared to the possible cases of co-occurrence.
Scope hierarchisation	In this type of co-occurrences, the modal markers are in a hierarchical relation: one marker (<i>embedding</i> marker/modality) scopes over the other (<i>embedded</i> marker/modality). This relation is typical of co-occurrences ADV + V, where the adverb scopes over the modal verb, but it can also be found in certain types of subordination. The relation of scope hierarchisation between two types of modality e.g., epistemic and deontic acceptability was represented with the scheme [EPI[DEOACC[SOA]]]

TABLE A.1: Key terms and concepts mentioned in this study.

Marker	Marker count in corpus	How many times the marker occurs in total in the corpus
	Marker count in co-occurrence ($n_{i\bullet}$)	How many times the marker appears in co-occurrence with another marker in the corpus
	Marker co-occurrence rate	Ratio of the marker count in co-occurrence to the marker count in corpus, expressed in %
Type of modality	Modality count in corpus	How many times the type of modality occurs in total in the corpus
	Modality count in co-occurrence ($n_{i\bullet}$)	How many times the type of modality appears in co-occurrence with another type of modality in the corpus
	Modality co-occurrence rate	Ratio of the modality count in co-occurrence to the modality count in corpus, expressed in %
Pairs in co-occurrence	Co-occurrence count (n_{ij})	How many times a specific pair of markers or types of modality appears in the corpus in a certain order
	Symmetrised co-occurrence score (n_{ij}^S)	The average of the co-occurrence counts of a pair of markers or modalities, computed in both directions
	Symmetric independence quotient ($q_{ij}^S = q_{ji}^S := \frac{n_{ij}^S n_{\bullet\bullet}^S}{(n_{i\bullet}^S)^2}$)	Ratio of the observed counts to their expected value under independence, applied to the symmetrised co-occurrence score. The independence quotient measures the attraction or repulsion between two variables.

TABLE A.2: Terminology introduced in Chapter 6 for the quantitative analysis.

	aequus	aptus	certe	certus	debeo	deceit	dubius	facultas	forsitan	fortasse	forte	incertus	iniquus	licet	necessario	necessarius	necessesse.sum	necessitas	oportet	opus.sum	possum	potestas	probabiliter	quo
aequus	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0
aptus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	1	0	0	0
certe	0	0	0	0	2.5	0	0	0	0	1	0	0	0.5	0	0	0	1	0	0.5	0.5	10.5	0	0	0
certus	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.5	0	0
debeo	0	0	2.5	1	16	0	0.5	0.5	0	1	0.5	0	0	2	0	0	1	0.5	3.5	0	34.5	0.5	0	0
deceit	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0	0.5	0	0.5	0	0	0
dubius	0	0	0	0	0.5	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0.5	0	0
facultas	0	0	0	0	0.5	0	0	0	0	0	0	0	0.5	0.5	0	0	0	0	0.5	0.5	5	0	0	0
forsitan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
fortasse	0	0	1	0	1	0	0	0	0	2	0	0	1	0	0	0	1	0	0	0	6	0	0	0
forte	0	0	0	0	0.5	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0.5	4.5	0	0	0
incertus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0
iniquus	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
licet	0	0	0.5	0	2	0	0	0.5	0	1	0	0	15	0	0	0.5	3	0	5	0	14.5	0	0	0
necessario	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0.5	0.5	4.5	0	0	0
necessarius	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0.5	0	0.5	0	1	0	0	0
necessesse.sum	0	0	1	0	1	0	0	0	0	1	0	0	3	0.5	0	0.5	1	0	1	0	6	0	0	0
necessitas	0	0	0	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0
oportet	0	0.5	0.5	0	3.5	0.5	2	0.5	0	0	0	0	0	5	0.5	0.5	1	0	8	0.5	33	1.5	0	0
opus sum	0	0	0	0	0	0	0	0.5	0	0	0	0	0	0	0.5	0	0	0	0.5	1	4	0	0	0
possum	0	1	10.5	0.5	34.5	0.5	2	5	1	6	4.5	0.5	14.5	0	4.5	1	6	0.5	33	4	208	2	0.5	0.5
potestas	0	0	0	0.5	0.5	0	0.5	0	0	0	0	0	0	0	0	0	0	1.5	0	0	2	0	0	0
probabiliter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0
quo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0

TABLE A.3: Symmetrised co-occurrence score (SCS) for all the markers that show a modal value.

	aequus	aptus	certe	certus	debeo	deceit	dubius	facultas	forsitan	fortasse	forte	incertus	iniquus	licet	necessario	necessarius	necessitas	oportet	opus sum	possum	potestas	probabiliter	queo
aequus	0	0	0	0	0	0	0	0	0	0	0	0	1194	0	0	0	0	0	0	0	0	0	0
aptus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.5	0	1.2	0	0	0
certe	0	0	0	0	1.4	0	0	0	0	3.0	0	0	0	0.4	0	0	0	0.3	2.6	1.1	0	0	0
certus	0	0	0	0	4.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	29.9	0	0
debeo	0	0	1.4	4.7	2.3	0	0.7	0.6	0	0.8	0.8	0	0	0.4	0	0	4.7	0.6	0	0.9	0.9	0	0
deceit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.2	0	0.9	0	0	0
dubius	0	0	0	0	0.7	0	14.1	0	0	0	8.3	0	0	0	0	0	0	3.2	0	0.5	9.2	0	0
facultas	0	0	0	0	0.6	0	0	0	0	0	0	0	0	0.9	6.1	0	0	0.7	5.7	1.2	0	0	0
forsitan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8	0	0	0
fortasse	0	0	3.0	0	0.8	0	0	0	0	8.3	0	0	0	1.2	0	0	0	0	0	0.9	0	0	0
forte	0	0	0	0	0.8	0	8.3	0	0	0	0	0	0	0	0	0	0	0	0	1.4	0	0	0
incertus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8	0	0	0
iniquus	1194.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
licet	0	0	0.4	0	0.4	0	0	0.9	0	1.2	0	0	0	5.1	0	2.8	0	1.2	0	0.6	0	0	0
necessario	0	0	0	0	0	0	0	6.1	0	0	0	0	0	0	0	0	0	0.8	1.2	1.2	0	0	0
necessarius	0	0	0	0	0	0	0	0	0	0	0	0	0	2.8	0	0	0	2.1	0	0.7	0	0	0
necessitas	0	0	2.4	0	0.6	0	0	0	0	3.3	0	0	0	0	0	7.96	0	0.7	0	0.7	0	0	0
oportet	0	3.5	0.3	0	0.6	5.2	3.2	0.7	0	0	0	0	0	0	0.8	2.1	0	0	0	0.9	0	0	0
opus sum	0	0	2.6	0	0	0	0	5.7	0	0	0	0	0	0	6.6	0	0	0.7	12.2	1.0	0	0	0
possum	0	1.2	1.1	0.4	0.9	0.9	0.5	1.2	1.8	0.9	1.4	1.8	0	0.6	1.2	0.7	0.9	1.0	1.0	1.1	0.7	1.8	1.8
potestas	0	0	0	29.9	0.9	0	9.2	0	0	0	0	0	0	0	0	0	0	3.1	0	0.7	0	0	0
probabiliter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8	0	0	0
queo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.8	0	0	0

TABLE A.4: Symmetric independence quotient (SIQ) for the markers that show a modal value in co-occurrence in the corpus.

A.4 Co-occurrence of types of modality

The tables presented in this section provide the numeric values for the visualisations presented in Chapters 6 and 8 for the combination of the types of modality. In particular, Table A.5 presents the symmetrised co-occurrence score for the types of modality in the whole corpus. Table A.6 shows the corresponding symmetric independence quotient, which was presented as a sieve diagram in Figure 6.3 in Chapter 6.

	deontic acceptability	deontic authority	dynamic	epistemic
deontic acceptability	13.0	9.0	16.0	2.5
deontic authority	9.0	37.0	25.0	3.0
dynamic	16.0	25.0	348.0	36.5
epistemic	2.5	3.0	36.5	15.0

TABLE A.5: Symmetrised co-occurrence score (SCS) for the types of modality in the corpus.

	deontic acceptability	deontic authority	dynamic	epistemic
deontic acceptability	4.7	1.8	0.6	0.6
deontic authority	1.8	4.0	0.5	0.4
dynamic	0.6	0.5	1.1	0.9
epistemic	0.6	0.4	0.9	2.8

TABLE A.6: Symmetric independence quotients (SIQ) for the types of modality in co-occurrence in the corpus.

Finally, Table A.7 shows the symmetric independence quotient for the combination between types of modality in co-occurrences in absence of scope hierarchisation. The corresponding visualisation is the sieve diagram in Figure 8.1, shown in Chapter 8.

	deontic acceptability	deontic authority	dynamic	epistemic
deontic acceptability	4.9	1.9	0.5	0.4
deontic authority	1.9	3.8	0.5	0.5
dynamic	0.5	0.5	1.2	0.8
epistemic	0.4	0.5	0.8	4.9

TABLE A.7: Symmetric independence quotients (SIQ) for the types of modality that co-occur without scope hierarchisation.

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Diachronic maps of Latin modal markers

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— . 2021d. *certus*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-certus.html>.

— . 2021e. *debeo*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-debeo.html>.

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— . 2021i. *dubium* (*adverb*). v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-dubium-adv.html>.

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— . 2021l. *facultas*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-facultas.html>.

— . 2021m. *forsitan*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-forsitan.html>.

— . 2021n. *fortasse*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-fortasse.html>.

— . 2021o. *incerta*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-incerta.html>.

— . 2021p. *incerte*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-incerte.html>.

— . 2021q. *incertim*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-incertim.html>.

— . 2021r. *incertus*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-incertus.html>.

— . 2021s. *ineptus*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-ineptus.html>.

— . 2021t. *iniquus*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-iniquus.html>.

- . 2021u. *ius*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-ius.html>.
- . 2021v. *licet*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-licet.html>.
- . 2021w. *meum*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-meum.html>.
- . 2021x. *necessarius*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-necessarius.html>.
- . 2021y. *necesse*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-necesse.html>.
- . 2021z. *necessitas*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-necessitas.html>.
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- . 2021ab. *oportet*. v.1.0. WoPoss. <https://woposs.unine.ch/maps/map-oportet.html>.
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Tools and programs

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