Veridicality in grammar and thought: modality, propositional attitudes and negation

Anastasia Giannakidou and Alda Mari
University of Chicago and Institut Jean Nicod, CNRS/ENS/EHESS/PSL

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Chapter 1

Truth, Veridicality, and the problem of grammatical mood

1.1 What this book is about

How are the concepts of truth, knowledge and, broadly speaking, belief reflected in the grammar of natural languages? Does language directly access the world, or does it do so via semantic representations of the world categories? These are important questions that philosophers of language and semanticists have struggled with since Ancient Greek thinkers such as Aristotle and the Stoics started addressing them systematically. In modern continental philosophy, the questions continue to be central, yet the answers given have been limited by the fact that philosophical discussion typically focuses on English. This almost exclusive focus affects negatively the decision of what counts as valuable phenomenon to study in order to give appropriate answers to these central questions.

In this book, we explore the interaction between truth, knowledge, and belief as these concepts manifest their relevance for the phenomenon of mood choice in European languages. Our main illustrators will be Standard Modern Greek, and the Romance language family with specific emphasis on Italian and French. Mood choice is a multi-dimensional phenomenon, as we shall see— involving interactions between syntax, semantics, and pragmatics—, and raises a number of issues that are literally invisible if we only pay attention to English, simply because Modern English lacks the morphological category of mood in complement clauses. Despite this absence, terms such as ‘subjunctive’ and ‘indicative’ continue to be routinely used for English, e.g., in the discussion of conditionals, often misleading us to think that what the terms refer to in English is akin to the analysis of morphological mood in complement clauses. The word ‘mood’ is also quite often used as equivalent to ‘modality’.
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On the other hand, mood has been studied by traditional grammarians and syntacticians as a mainly morpho-syntactic phenomenon, and in this tradition very little attention is paid to the semantics of propositional attitudes which are responsible for regulating mood choice. Traditional analyses are mostly interested in taxonomies and labeling of the verbal classes, with only a rough reference to ‘realis’ and ‘irrealis’ for indicative and subjunctive respectively. The intuition behind these two terms is that somehow the indicative refers to real (realis) events and actions, whereas the subjunctive is used for unreal (irrealis) events. But what does it mean real and unreal? The introduction of these terms stipulates a positive answer to the question of whether language directly accesses reality, but this is, as we will show, far from the truth. Language, it will turn out, mostly encodes subjective representations of truth and reality, subjective because they are construed by linguistic agents, i.e., the speaker or the individuals that bear propositional attitudes. In building these representations, linguistic agents able to reason not only about truth but, and indeed mostly, about the veridicality of sentences. Crucially, we will argue, it is this subjective veridicality that regulates the phenomenon of mood rather than direct access to the truth or reality.

Our goal in this book is to bridge the two (almost parallel) universes of philosophical and formal semantic jargon, on the one hand, and morphosyntactic jargon on the other, by pursuing a unified perspective of mood selection in complement clauses as a semantically driven syntactic phenomenon, with pragmatic implications about the anchoring of propositions in the context. Modal verbs are often assumed to be quite distinct from propositional attitudes— and certainly in English they do not take that or to complements as attitudes typically do. In Modern Greek, however, which lacks non-finite complementation, modals verbs pattern with attitude verbs, and select invariably the subjunctive. Unmodalized declarative sentences, on the other hand, appear in the indicative. Our starting point will be this dichotomy, and we will show that in fact modality and propositional attitudes are remarkably similar in a number of important respects, certainly much more similar than previously thought.

Another important aspect of mood choice that is often overlooked is the semantic interaction of the attitude and modal meaning with the tense of the embedded complement. Instead, and again because of the emphasis on English, research tends to focus on the finiteness distinction, i.e., the that or to contrast mentioned above. We will see that simply studying this contrast prevents us from understanding that the actual culprit of many apparent meaning shifts is the tense of the complement. We will distinguish between veridical tense (which is the past and present), and nonveridical tense which is what we will call nonpast. We will show that this simple dichotomy helps substantially in uncovering dimensions in the meaning of the embedding attitudes— and it determines fully the kinds of readings speakers extract with modal verbs.
1.2 Truth and veridicality

Since its central role in Classical Greek thinking as the goal of scientific inquiry, truth has been essential in the study of linguistic meaning, and has also been the foundation of axiomatization in modern scientific thought.

Aristotle gives a well-known definition of truth in *Metaphysics* (1011b25): ‘To say of what is that it is not, or of what is not that it is, is false, while to say of what is that it is, and of what is not that it is not, is true’. Very similar formulations can be found in Plato (Cratylus 385b2, Sophist 263b). The Aristotelian truth serves as the foundation for the modern approach to truth— advocated by Russell, Moore, and Tarski in the early 20th century— known as the correspondence theory of truth. Truth consists in a direct relation of a sentence to reality, i.e. a true sentence (or, more precisely, proposition) refers to a fact, and a false sentence does not refer to a fact.

This well motivated understanding of truth is central to natural language semantics, and is associated with metaphysical realism that acknowledges objective truth. Objective truth correlates, as we just said, with fact, but also with time: simple positive present and past sentences such as *Ariadne arrived in Paris last night*, *Ariadne is eating breakfast right now*, are true or false objectively, which means that the sentences denote facts of the world. Future sentences, on the other hand, such as *Ariadne will go to Paris next week* are objectively false at the time of utterance (since they have not happened yet), but could or must be true – depending on the strength of prediction– at a future time.

In linguistic pragmatics, it is further common to distinguish between assertions (expressed with declarative sentences), and non-assertions such as questions (expressed with interrogative sentences), and commands or wishes (expressed with imperatives, optatives, and unembedded subjunctives). Declarative sentences have truth values, but questions or imperatives do not. The latter also differ in their discourse function: declarative sentences typically provide new information, while interrogative sentences are typically used by speakers as requests for information, and imperatives as prerogatives for action. Non-declarative sentences cannot refer to facts. In a Gricean pragmatics, still the bedrock of analyzing conversation, truthfulness, in the maxim of *Quality*, is the foundation of co-operative conversation and absolutely necessary for interlocutors to trace accurately each other’s beliefs and intentions.

Given the centrality of objective truth, one may ask how truth is conceptualized in grammar. It is already observed in the present/past versus future distinction we just mentioned, and generalizes in the contrast between an unmodalized versus a modalized sentence. Consider the simple opposition below:

(1) a. It rained in Chicago yesterday.
b. It is raining in Chicago right now.
c. It may rain in Chicago tomorrow.
d. It must be raining in Chicago right now.

If true, only the present and past sentences can be understood as referring to facts. The modal sentences, even the one with *must*, do not make reference to actual facts. They do not entail that it is raining.

Truth is a property of sentences— that is, a sentence $S$ is true iff the valuation function $V$ assigns to the proposition $p$ that $S$ denotes the value true. It is then useful to define veridicality as the semantic property of linguistic expressions, or more generally functions $F$, that are truth bearing. Following Zwarts (1995), and Giannakidou (1994, 1998, 1999, 2013b), a function $F$ that takes a proposition $p$ as its argument is veridical if $Fp$ entails that $p$ is true, and nonveridical if it doesn’t entail that:

(2) Veridicality: A function $F$ is veridical iff $Fp$ entails $p$.

(3) Nonveridicality: A function $F$ is non-veridical iff $Fp$ does not entail $p$.

A function $F$ is veridical if it truth entailing, and non-veridical if it is not truth entailing. We can then say that past and present tense and past and present adverbials, for instance, denote veridical functions: *Yesterday, Ariadne flew to Paris* entails that *Ariadne flew to Paris*. Modal expressions, on the other hand, denote nonveridical functions: *It may rain in Chicago tomorrow* and *It must be raining in Chicago right now* do not entail that is is raining, or that will actually rain. Veridicality is objective in both cases, and depends on whether the adjacent $p$ is a fact of the world, in which case $F$ is veridical, or not, in which case $F$ is non-veridical. Veridical functions, are in this view factual or, as they are sometimes called, *factive*. Veridicality, therefore, is the formal counterpart of the traditional *realis* that we mentioned earlier.

Veridicality has also been understood as being about the existence of entities in the world (Montague 1969). Montague characterized direct perception verbs such as *see* as veridical because if *I see a unicorn* is true, then a unicorn exists. Thus seen, veridicality relates to existence, derived from truth, and Giannakidou (2013a) establishes a connection between truth and existence in her study of mood choice in relatively clauses. Labels such as ‘veridicity’ (Karttunen 2005) and ‘veracity’ has also been used to refer to veridicality as a property that relates to truth. The term veridicality has been used also in psychology and cognitive science, somewhat more broadly, but still anchored to the real, external world. In cognitive science, for instance, ‘veridicality’ can refer to the degree to which an internal representation of the world accurately reflects the external world. In psychology, ‘veridical perception’ is the direct perception of stimuli as they exist.
Linguistic agents, however, can be thought of as not simply assigning true or false to sentences, but as being engaged in a more complex judgement about the veridicality of functions and the truth of sentences. This move from truth assignment to veridicality judgment is justified from the perspective of Gricean co-operativeness, as we mentioned earlier: rational co-operative interlocutors must continuously trace the sentence meaning but also, and perhaps most prominently, speaker meaning, which consists in making assumptions about each other’s beliefs and intentions. The veridicality judgement can be therefore become quite complex, characterizing the speaker’s or attitude holder’s mental state. Our major goal in this book will be to unpack under what conditions a speaker choses to use a propositional attitude verb, and what mood choice reveals about the attitude meaning.

To start with, consider verbs of belief:

(4) Ariadne believes that Milan is the capital of Italy.

That Milan is the capital of Italy is false; however, the speaker can use this sentence to report Ariadne’s contested belief, and in Greek, the speaker would have to use the indicative mood, designated below by the mood particle *oti*, which in Greek surfaces as a complementizer element (equivalent to *that*). The Greek subjunctive particle *na* is, crucially, excluded:

(5) Αριάδνη πιστεύει *oti*/*na* to Μιλάνο in η *την* πρωτεύουσα της Ιταλίας.

‘Ariadne believes that Milan is the capital of Italy.’

The fact that indicative, and not subjunctive is used to convey this obviously false belief indicates that, despite what the speaker knows to be the case, when it comes to mood selection, grammar allows Ariadne to lay claim on the veridicality of her belief, and forces the speaker to follow suit, regardless of relation to actual truth. The selection of indicative with belief and doxastic verbs is observed not just in Greek, but seems to be the rule in most Romance languages (with the exception of Italian, which will discuss extensively in the book, but also some varieties of Portuguese). Indicative extends further to other un-reality classes such as attitudes of dream, imagination, fiction, and deception:

(6) Αριάδνη ονείρεται *oti*/*na* to Μιλάνο in *την* πρωτεύουσα της Ιταλίας.

‘Ariadne dreamed that Milan is the capital of Italy.’
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‘Ariadne dreamed that Milan is the capital of Italy.’

(7) Ἰ Ἀριάδνην ἐκβεβλάτηκε/ φαντάστηκε ὁτι/*να το Μιλάνο τὴν Ἀριάδνην ἐφθάσει/ ήμετέρα κατοίκο της Ἰταλίας.

‘Ariadne was deceived that Milan is the capital of Italy.’

The use of indicative in fictional contexts and with doxastic verbs to convey even objectively false beliefs forces us to distinguish the objective dimension of truth as referring to what is the case in the actual world from the subjective dimension of veridicality judgement, where truth is assessed relative to the internal cognitive states of doxastic agents. The need to appeal to ‘relative truth’ for mood choice has long been acknowledged since McCawley’s (1981) and Farkas’ (1985, 1992) work in the 80s and early 90s. Building on these pioneering works, Giannakidou (1994, 1997, 1999, 2009) used the terms relativized veridicality, and individual anchor to refer to the speaker or the attitude holder as the two main anchors for relativization of truth.¹ In unembedded sentences, the relevant individual anchor is the speaker who makes choices about what to say. Would expect the speaker to be crucial also for the veridicality of complement clauses. But this turns out to not be the case. Attitude reports report attitudes of the attitude holder; in complement sentences of propositional attitude verbs, therefore, it is the main clause subject, i.e., the attitude holder, that holds the key for mood choice.

Embedded sentences of attitude reports, we will argue in this book, create sub-contexts that by default anchored to the attitude holder, since it is this individual’s attitude that is being reported. With the exception of factive, and what we will define as anti-factive attitudes (corresponding to the desiderative meaning of ‘want’), doxastic verbs such as the English believe and Greek pistevo are not objectively, but subjectively veridical: the attitude holder is committed to the truth of the embedded sentence. The speaker might know the sentence to be actually false, but this is, apparently, irrelevant for indicative mood. The indicative, therefore, depends not on realis, or objective veridicality as we defined it in (1), but on subjective veridicality, built as a representation of the world by the attitude holder. Subjective veridicality is thus very naturally understood as the speaker’s commitment to the truth of p, irrespective of what actually holds in the world. When the world becomes relevant for mood choice, as will show, it does so only indirectly, via knowledge.

¹Other individuals might also have opinions about the truth of sentences, e.g. the hearer, or multiple hearers in the audience. What the hearer knows plays an indirect role in truth assessment, mostly in terms of what the speaker assumes to be part of the common ground, i.e., the knowledge shared among conversation participants. Common knowledge does not seem to affect the choice of indicative mood, but we will discuss its role when relevant.
Before we zoom into the problem of mood choice, we want to give the reader an idea of how far reaching the notion of veridicality, in both its forms, is for the study of grammar. Another linguistic dependency where we see the relevance of (non)veridicality is the distribution of polarity items such as negative polarity items (NPIs) and free choice items (FCIs). Both phenomena have been discussed extensively in previous work (Giannakidou 1994, 1997, 1998, 2001, 2011, a.o), we will therefore not expand on details here. But it is important to show the connection because we will see that crucial aspects of the polarity vocabulary will be used in our analysis of mood, and for good reasons.

NPIs and FCIs, like mood morphemes, are limited distribution expressions. They appear in nonveridical contexts only. Veridical past and present assertions, crucially, block NPIs and FCIs. We give here examples with the English word *any*, which has both NPI and FCI uses:

(8) a. Did Ariadne eat any cookies?
   b. Any student can solve this problem.
   c. Ariadne didn’t eat any cookies.
   d. Ariadne will eat any cookies.
   e. Any complains must be addressed to the manager.

(9) a. *Ariadne ate any cookies.
   b. *Ariadne is eating any cookies right now.
   c. *Ariadne believes that she ate any cookies.

As we see, *any* is excluded from the veridical past and present sentences, as well as from the subjectively veridical *believe* sentence. NPIs and FCIs, instead, require the presence of higher nonveridical operators such as modal verbs, the future, negation, and the question operator. These are all not-truth entailing in the objective sense, and they are also signals of uncertainty, they do not entail that the speaker is subjectively committed to the truth of the proposition.

Despite the label ‘negative’, NPIs appear in nonveridical, and not just negative, contexts. Negation can be understood as the logical strengthening of objective nonveridicality from *not entailing p* to *entailing not p*. Following Giannakidou (1998), we call this antiveridicality:

(10) **Antiveridicality**: A function $F$ is antiveridical iff $Fp$ entails $\neg p$.

It is obvious that antiveridicality is a subcase of nonveridicality, since if $Fp$ entails $\neg p$, it also does not entail $p$. Polarity items appear in the scope of nonveridical

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2Languages tend to distinguish empirically between NPIs and FCIs, and both appear in the contexts above (see extensive typological data in Haspelmath (1997), and Giannakidou (2001, 2011) for an overview.
and antiveridical functions $F$, and following standard practice, the dependency of NPIs is stated as a scope condition in terms of licensing:


An expression $F$ licenses NPIs and FCIs in its scope iff $F$ is nonveridical.

Licensing is a relation between a higher element, i.e., negation, the question operator, or a modal, which is called the 'licencer' in the literature, and which has a semantic property that is needed for the 'licensee' (i.e., the NPI and FCI) to appear. Licensing has been proposed as a condition on the semantics of the licenser: if an expression $F$ is nonveridical, $F$ will be able to license NPIs or FCIs. It can also be understood as a condition on the licensee: when we see an NPI or an FCI, we know that the context is nonveridical because it is the scope of a nonveridical operator $F$. Giannakidou (1997) schematizes the concept of licensing as follows:

(12) **NPI Licensing** (Giannakidou 1997)

$R (\beta, \alpha)$; where $R$ is the scope relation; $\alpha$ is the polarity item; $\beta$ is a negative or nonveridical expression which serves as the licenser

Licensing requires that the NPI $\alpha$ be in the scope of $\beta$. $R$ is a scope relation, and as such it is both a semantic relation— a matching relation of semantic and morphological features (Giannakidou 1997, Zeijlstra 2004)— and a syntactic relation, specifically c-command (as it appears in various NPIs in Greek, Romance NPIs, and in many other languages.) Nonveridicality allows unification of negative and non-negative polarity contexts as a natural class, something that no previous theory of polarity could afford.

There is much to be gained, as we shall see, by the generalization that negation, nonveridicality, and modality form a natural class. It takes little attention to notice that the licensing dependency of NPIs, i.e., a semantically driven syntactic dependency, is similar to the problem of restricted mood distribution that we will tackle. We will argue, in fact, echoing earlier formulations (Giannakidou 1997, 1998, 2009, Quer 2001, 2009, and references therein) that the two phenomena are closely related, and that the mood morphemes are subject to licensing by nonveridicality in a way similar to how NPIs and FCIs are.

Let us move on now to the empirical puzzles to be studied in the rest of this book.

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3 Individual distributions of various NPI and FCIs paradigms can of course differ, but NPIs and FCIs will always be in the scope of nonveridical operators. Positive assertions and the scope of veridical verbs, on the other hand, are veridical and block NPIs.
1.3 Mood selection in complement clauses: the basics

Mood selection is the case where a propositional attitude verb embeds a complement that needs to appear in a particular grammatical form, called traditionally mood. Mood is a morphological category. Indicative, subjunctive, and imperative are all grammatical moods.

While the imperative is indisputable in main clauses and occurs in all European languages, whether a language grammaticalizes mood distinctions in embedded clauses, and to what extent, is subject to crosslinguistic variation. Greek, Italian, Spanish, Catalan, Serbian, Romanian, and French systematically distinguish mood in embedded clauses, but English doesn’t. English does have a form that traditional grammar labels ‘subjunctive’, and we find it in clauses after ‘directive’ verbs such as require, wish, and in the conditional protasis (see Portner 1997, and 2018 for recent discussion). English, of course, also has the imperative mood in main clauses:

(13) a. The Dean requires that we be/are on time.
    b. I wish you were here.
    c. If I were rich I would buy a boat.
    d. Eat your vegetables!

What is labelled as ‘subjunctive’, however, is not a designated grammatical from specific to this category. The same, actually can be said for the English imperative. Morphologically, we see past tense and a bare infinitive; and while the imperative does have certain properties that grant it the status of independent mood (see Potsdam 1997 for syntactic arguments), it does not appear in embedded non-quotative contexts. The English ‘subjunctive’, however, is quite limited to a handful of verbs, and it has become optional. We do not, in other words, find a systematic and productive pattern of subjunctive vs. indicative choice in embedding in English. It is therefore accurate to say that English lacks mood as a productive grammatical category in embedded sentences. The mood distinction, instead, corresponds to finiteness (that) vs. non-finiteness (to, -ing) in English, a correlation that we will discuss in this book.

Greek, Latin, and its descendent Romance languages, on the other hand, employ the grammatical category of mood in a number of productive patterns with propositional attitude verbs—but also with adjuncts, for instances, with sentential connectives like, e.g, those meaning BEFORE and WITHOUT):4

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4In the book, we will employ upper case letter to designate the abstract meaning of actual words: BEFORE, e.g. is the abstract meaning of the temporal connectives such as English before, Greek prin, and Italian prima. Lower case italics will always refer to the actual words in the
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(14) Prin na/*oti vreksi, as pame spiti.
before that.SUBJ/*IND rain.3sg, OPT go.1pl home.
‘Before it rains, let’s go home.’

(15) Andiamo a casa prima che piova.
Go.IMP.1pl to home before that rain.SUBJ.sg.
‘Let’s go home before it rains.’

(16) Ekane tin metafrasi xoris na/*oti xrisimopiasi
did.3sg the translation without that.SUBJ/*IND use.3sg
leksiko.
dictionary.
He did the translation without using a dictionary.

Connective clauses are adjuncts and not complements. But the mood pattern is systematic, as we see: the indicative particles cannot be used. Regarding the subjunctive versus indicative contrast in complement clauses, observe the basic contrast, now in French and Italian:

(17) a. Marc sait que le printemps est/*soit arrivé.
‘Marc knows that the spring be.IND.3sg/ be.SUBJ.3sg arrived.’
b. Marc veut que le printemps soit/*est long.
‘Marc wants that the spring beSUBJ.3sg/be.IND.3sg long.’
c. Le printemps est/*soit arrivé.
The spring be.IND.3sg/be.SUBJ.3sg arrived.
‘The spring has arrived.’

(18) a. Marco sa che la primavera è/*sia arrivata.
‘Marc knows that the spring be.IND.3sg/be.SUBJ.3sg arrived.

b. Marco vuole che la primavera sia/*è lunga.
‘Marc wants spring to be long.’

The verb of knowledge savoir ‘know’ is said to select the indicative, but the volitional verb vouloir ‘want’ in (1b) selects the subjunctive. The indicative is the default mood of unembedded assertions, as indicated. In both main assertions and in the complements of know verbs, the indicative sentence denotes a true proposition, a fact; for this reason, traditional grammars, as we said earlier, characterize

various languages.
the indicative as the *realis* mood. The complement of a desire verb, on the other hand, merely expresses a desire, and the content of desire is not a fact (hence, *irrealis*). This is a typical pattern in all European languages; and in the cases above, the mood morphemes are in complementary distribution, i.e., one mood excludes the other.  

In French and most Romance languages the mood exponent appears on the verb, like tense and aspect. This was also the case in Ancient Greek. In contrast, mood can appear outside the verbal form in the subordinating particle—often characterized as a complementizer. The mood contrast in contemporary Greek is of that kind, as we mentioned already. All dialects of Greek have mood particles (*oti, na*), from Pontic Greek (spoken at the region of Pontos in Black Sea), Cypriot Greek (Sitaridou 2014, Pavlou 2018, and references therein) and to Griko (Lekakou and Quer 2016), i.e. the Greek dialect spoken in Southern Italy. Balkan languages including Romanian exhibit similar particle subjunctives (Farkas 1985, Rivero, 1994, Terzi, 1997, Giannakidou 1998, 2009, 2011, 2016, Roussou 2009, Bulatovic 2008, Todorovic 2012, among others). The particle strategy for mood appears to be a property of the Balkan *sprachbund*, but we will limit our attention here to Modern Greek.

Modern Greek has four mood particles that precede the tensed verb: three indicative *oti, pos, pu*, and the subjunctive particle *na*, which appear typically with volitionals and modals. The difference between *oti* and *pos* is stylistic, so we will not make much of it here. The difference with *pu*, however, is important: *pu* appears to be used with factive complements only, as is illustrated below with an emotive factive; but it can also appear with knowledge verbs:

(19) O Pavlos kseri otI/pos/pu/*na efije i the Paul know.PRES.3sg that.oti.IND/pu.IND/*SUBJ left.3sg the Roxani. Roxani. ‘Paul knows that Roxanne left.’

(20) O Pavlos lipate pu/*oti/*na efije i the Paul be-sad.PRES.3sg that.pu.IND/*oti.IND/*SUBJ left-3sg the Roxani. Roxani. ‘Paul regrets that Roxanne left.’

Though the indicative-subjunctive pattern has been most extensively described in Indo-European languages, it is by no means restricted to these. It appears in many of the world’s languages, including native American languages (see a recent article by Matthewson 2010 for Salish, and Wiltshko 2016). The contrast between subjunctive and indicative also correlates with evidentiality, especially in languages that have only one indirect evidential morpheme (Murray 2016, Smirnova 2013). The indirect evidential appears to be ‘irrealis’, parallel to the subjunctive.
Pu is also the complementizer used to introduce relative clauses, as we will see later, and in this case it might actually co-occur with *na.*

There is also an optative particle *as* used in main clauses only:

(24) As fiji/leave.NONPAST.3sg efevge leave.IMPRF.3sg o Janis!
    Let John leave!
    I wish John had left!

The optative is like the imperative in that it cannot embed. It does convey illocutionary force though, i.e., the above sentence is a wish or command, a force similar to the imperative. In embedding, the particles do not get associated with any special illocutionary force.

Mood choice has been a central issue in semantics, both formal and descriptive. Since this book is not a historical overview, and because a lot of the history on the topic has been addressed in previous works, including Portner’s (2018) recent rather comprehensive survey, we will not attempt a general overview here (see also earlier overview discussions in Farkas 1982, 2003; Villalta 2008; Quer 2009, also Portner and Rubinstein 2012; Smirnova, 2013; Giannakidou 1994,1998, 1999, 2009, 2011, 2016 specifically for Greek; Marques 2004, 2010 for Brazilian and European Portuguese; Mari 2016, 2017a,b for Italian; Quer 1998, 2001, for Catalan and Spanish; Sarigul 2015 for Turkish, Baunaz 2015 for French; Werner 2018 for German). Often a distinction is made between verbal mood and sentential mood (Portner 2009), with sentential mood referring to illocutionary force mood. However, Greek allows us to see that such a distinction is not essential, as the mood exponent appears both on the sentential C level as well as on the verb.

One of the recurring characterizations of the subjunctive mood is that it is *dependent,* as opposed to the indicative which is said to be independent, and is the mood par excellence of unembedded assertions. As Giannakidou (2009: 1883) notes: "A corollary of this distinction renders the subjunctive usable only in complement clauses of verbs that share a particular semantic characteristic, and which
select the subjunctive. In its strong form, the dependency thesis is not mere selection by a higher predicate, but claims that the subjunctive is triggered by certain semantic properties of the embedding context, pretty much the way polarity items (PIs) are triggered by their licensors; the subjunctive can thus be viewed as a PI of some kind."

Mood choice and polarity phenomena, as we noted before, are indeed similar in being syntactic dependencies that are motivated semantically. Just like with NPIs, the distributions of mood morphemes are constrained, and regulated by semantic properties of the higher structure. In both cases, we will show, the semantic property that plays the key role is (non)veridicality. The connection is further observed below, where we see that polarity item licensing happens in subjunctive clauses, but not in indicative ones, observation first noted in Giannakidou (1994).

(25) *O Pavlos pistevi oti idhe kanenan/ opjondhipote. 
   the Paul believe.3sg that.IND saw.3sg NPI/FCI. 
   ‘*Paul believes that he saw anybody.’

(26) *Kseri oti agorasa kanena/opjodhipote aftokinito. 
   know.3sg that.IND bought.1sg NPI/FCI car. 
   ‘*He knows that I bought any car.’

(27) I Ariadne tha ithele na milisi me 
    the Ariadne would like.3sg that.SUBJ talk.1sg with 
    opjondhipote/kanenan fititi. 
    FC/NPI student. 
    ‘Ariadne would like to talk to any student.’

(28) I Ariadne bori na milise me opjondhipote/kanenan 
    the Ariadne can that.SUBJ talked.3sg with FC/NPI 
    fititi. 
    student. 
    ‘Ariadne might have talked to any student.’

We see here that NPIs and FCIs are blocked in the indicative complements, but are allowed in subjunctive complements. Notice also that the contrast holds clearly in English too, and correlates with the that vs. to difference. NPIs, FCIs, and the subjunctive appear to depend on the presence of a higher expression to ‘license’ them.

Some basic questions arise at this initial stage. Why would a language exhibit dependencies such as mood and polarity? Why would Greek, French and Italian employ mood in complements and adjuncts, whereas English doesn’t? What do the Greek and Italian complements have, that the English complements lack, by having mood? Similar questions arise with other verbal categories such as tense
and agreement. Why would one language mark tense or agreement whereas another one would not? What is gained by having tense and agreement? Is there something missing if you don’t? Our discussions in this book must be seen as explorations guided by these questions.

We will investigate closely a number of propositional attitude meanings, and show that the mood patterns are instrumental in uncovering dimensions in the meaning of attitude verb that make necessary appeal to veridicality, nonveridicality, and commitment. Attitude meanings can be simple, or as we will call them solipsistic, and they can be more complex with presuppositional layers. Some verbs can be construed in both ways, resulting in variable mood patterns, or mood flexibility as we will call it. Mood marking, in our theory, emerges as a grammatical reflex of the concept of (non)veridicality, pretty much the way tense is a grammatical reflex of the notion of time, and agreement a grammatical reflex of the notion of person.

### 1.4 Strict selection patterns, and modal verbs

We talk about ‘strict’ selection when the mood is fixed and cannot vary. Flexible patterns, on the other hand, are observed when mood can be variable. Let us start in this section with the strict patterns. In Greek, we observe the following:

(29) Indicative selecting verbs in Greek

a. fiction verbs: onirevome (dream), fandazome (imagine)
b. doxastic verbs: pistevo (believe), nomizo (think), theoro (consider), vrisko (find)
c. epistemic and emotive verbs: ksero, gnorizo (know), metaniono (regret), xairome (be glad)
d. assertives: leo (say), dhiavazo (read), isxirizome (claim), dilono (declare, assert)
e. memory verbs: thimame (remember)
f. perception verbs: vlepo (see), akouo (hear)

(30) Indicative selecting verbs in Italian: sapere (know)

Interestingly enough, the only verb that strictly selects the indicative in the positive assertive form is sapere (know) in Italian. All the other factive and non-factive attitudes allow mood shift, as we will discuss in a few moments. Because Italian mood is considerably more flexible, it will be discussed in the next section.

Here is the list of verbs classes that strictly select subjunctive in Greek, and Italian:
1.4. STRICT SELECTION PATTERNS, AND MODAL VERBS

(31) Subjunctive selecting verbs in Greek
   a. volitionals: *thelo* (want), *epithimo* (desire)
   b. modal verbs: *prepi* (must), *bori* (may)
   c. try verbs: *prospatho* (try), *dhokimazo* (attempt)
   d. directive, future oriented verbs: *protino* (suggest), *simvulevo* (advise), promise
   e. implicatives
   f. permissives: *apagorevo* (forbid)

(32) Subjunctive verbs in Italian
   a. volitionals: *volere* (want),
   b. directives: *ordinare* (order)
   c. modal verbs: *esseere possibile, necessario* (to be possible, necessary)
   d. permissives: *impedire* (forbid)

The two languages are very similar in the strict subjunctive taking classes, as we see. Implicatives in Italian select the infinitive because of obligatory control, and will be considered as part of the subjunctive class in our analysis in chapter 6.

Here are some examples from the indicative class, recalled from earlier discussion:

(33) O Nicholas kseri oti/*na efije i Ariadne.
    the Nicholas knows.3sg that.IND/*SUBJ left.3sg the Ariadne.
    ‘Nicholas knows that Ariadne left.’

(34) O Nicholas onireftike/ nomize oti/*na efije i
    the Nicholas dreamt.3sg /thought.3sg that.IND/*SUBJ left-3sg the
    Ariadne.
    Ariadne.
    ‘Nicholas dreamt/thought that Ariadne left.’

(35) O Nicholas theori oti/*na to Milano ine i protevousa
    the Nicholas consider.3sg that.IND/SUBJ the Milan is the capital
    tis Italias.
    of Italy.
    ‘Nicholas considers Milan to be the capital of Italy.’

Nomizo ‘think’, pistevo ‘believe’, onirevome ‘dream’, theoro ‘consider’ are all
doxastic and take *oti, pos* complements. The striking thing here is that even with
an obviously, i.e. objectively, false sentence the indicative is required. Hence it
seems to be a robust generalization that, in Greek, epistemic and doxastic attitude
verbs pattern on a par in selecting indicative. The doxastic verbs appear to be
solipsistic, in that they are strictly anchored to the attitude holder’s doxastic space, ignoring what is in the common ground or the speaker’s mind, and lacking entirely factual commitments. It is for these cases that we need subjective veridicality and the notion of an individual’s commitment to a proposition.

By simply looking at the verb classes here, it becomes clear that indicative verbs are epistemic, doxastic, or variants thereof—considering that imagination, memory, or perception are kinds of belief inducing attitudes. The subjunctive class, on the other hand, includes modal verbs (including deontic and epistemic modals), verbs of volition, implicatives, and generally propositional attitude verbs with future orientation. This group of verbs appears often with the tense NON-PAST, which is also used with the future particle and which enables forward shifting. Notice below the case of WANT:

\[
\begin{align*}
36) & \text{I} & \text{Ariadne theli na} & \text{grapsi/egrapse}
& \text{the} & \text{Ariadne want.3sg} & \text{that.SUBJ write.PAST.3sg/write.NONPAST.3sg}
& \text{to} & \text{gramma.} \\
& & \text{the letter.} \\
& & \text{‘*Ariadne wants to write the letter.’}
\end{align*}
\]

\[
\begin{align*}
37) & \text{Maria vuole che} & \text{Susanna sia} & \text{contenta.}
& \text{Mary wants that Susan be.SUBJ.3sg} & \text{happy.}
& \text{‘Mary wants that Susan be happy.’}
\end{align*}
\]

\[
\begin{align*}
38) & \text{*Maria vuole che} & \text{Susanna sia} & \text{stata contenta.}
& \text{Mary wants that Susan be.SUBJ.PAST.3sg} & \text{been happy.}
& \text{‘*Mary wants that Susan had been happy.’}
\end{align*}
\]

We elaborate in chapters 2 and 3 on the nature of NONPAST and the role of the lower tense, as well as tense constraints imposed by the attitude, as observed here. Other subjunctive verbs, e.g. epistemic modal verbs, allow combinations with all tenses, we see below.\(^6\)

\[
\begin{align*}
39) & \text{Prepi na/ot} & \text{vrehi.}
& \text{must that.SUBJ/IND rain.3sg.}
& \text{‘It must be raining.’}
\end{align*}
\]

\[
\begin{align*}
40) & \text{Bori na/ot} & \text{vrehi.}
& \text{may that.SUBJ rain.3sg.}
\end{align*}
\]

\(^6\)While in Standard Modern Greek, na clauses can have temporal independence, some dialects, specifically Griko is said to feature only NONPAST. Lekakou and Quer (2016) take this to suggest that there is specialization of morphology in Griko for the marking of subjunctive on the verb. We will not explore the dialects of Greek here, but it should be noted that given that mood affects potentially two syntactic position, grammaticalization paths may be unstable. The semantic generalizations for the verb classes, on the other hand, seem to be pretty solid.
1.4. STRICT SELECTION PATTERNS, AND MODAL VERBS

‘It may be raining.’

(41) Prepi na*/oti evrekse.
    must SUBJ/IND rain.PAST.3sg.
    ‘It must have rained.’

(42) Bori na*/oti evrekse.
    may SUBJ rain.PAST.3sg
    ‘It may have rained.’

In Italian, modal verbs are also strict subjunctive selectors. Epistemic modal *essere possibile* allows past, but necessity modal *essere necessario* only allows future orientation, with a prominent deontic reading (and a parasitic epistemic interpretation, given uncertainty of the future).

(43) E possibile/*necessario che sia venuto.
    Is possible/necessary that be.SUBJ.3sg come.
    ‘It is possible that he has come.’

(44) E possibile/necessario che venga.
    Is possible/necessary that come.SUBJ.3sg.
    ‘It is possible/necessary that he will come.’

Greek has two modal verbs— a possibility modal *bori*, and a necessity modal *prepi* (see Staraki 2013, 2017 for recent extensive discussions on the Greek modals, and for the interaction with tense Giannakidou 2012, Giannakidou and Mari 2016a,b, 2018a). As can be seen in the examples above, both modals require the subjunctive and the epistemic reading is compatible with both tenses. The type of modality doesn’t seem to matter for mood choice: the above sentences are epistemic, but deontic modals also require subjunctive:

(45) Prepi na*/oti fas olo to fagito sou!
    (Mother must SUBJ/IND eat.NONPAST.2sg all the food yours.
to child).

    ‘You must eat all your food!’

(46) Ja na perasis ston epomeno giro, *prepi na*/oti
    for SUBJ pass.on.2sg to the next round, must SUBJ/IND
    apandisis tris erotisis.
    answer.NONPAST.2sg three questions.
    ‘In order to pass on to the next round (of the game), you must answer
    three questions.’

(47) Boris na*/oti klisis tin porta.
    must SUBJ/IND close.NONPAST.2sg the door
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‘You may close the door.’

The deontic uses also require the subjunctive, as we see, and past tense is excluded:

(48) Prepi na efage olo to fagito tou.  
    must that.SUBJ eat.PAST.3sg all the food his.  
    ‘He must eat all his food!’  
    ‘He must have eaten all his food.’

With past tense, we shift to an epistemic reading, suggesting that the tense below plays a crucial role in disambiguating the reading of the modals. This means that the lower tense can trigger a shift in the modal base: from epistemic to circumstantial (which is the one employed with deontics). Such a shift, we show in chapter 5, is observed also with propositional attitudes, specifically the ones of persuasion and assertion— and this will encourage us to say that modals and attitudes are much closer in meaning than people previously thought. The foundation of any theory of linguistic modality is Kratzer (1977, 1981, 1990) and Portner (2009) where modal verbs take modal bases and ordering sources, but we build a richer system for modality in chapter 2, extending our recent work (Giannakidou and Mari 2016a,b, 2018a,b).

We do not want to preempt the discussion here, but we need to make a simple but central point at this initial stage because this point will guide our investigation. Modals, possibility as well as necessity, we will argue, indicate that the speaker lacks knowledge of $p$. When the speaker actually does have such knowledge, she cannot use modals, as illustrated in the well known cases below:

(49)  
     **Context: Direct visual perception of rain**
     a. #It may be raining.
     b. #Bori na vrexi.  
        may that.SUBJ rain.
     c. #Può piovere.  
        may.3sg rain.

(50)  
     **Context: Direct visual perception of rain**
     a. #It must be raining.
     b. #Prepi na vrexi.  
        must that.SUBJ rain.
     c. #Deve piovere.  
        Must.3sg rain.

If I see the rain, I know that it is raining, and knowledge is veridical: if I know $p$, then $p$ is a fact. In addition, my epistemic knowledge space, i.e. the worlds
compatible with what I know, is such that all worlds in it are worlds where it is raining. We will call this epistemic state veridical. If I see the rain, I am in a veridical state, and apparently I cannot use modal verbs, not even necessity ones. Modals are therefore incompatible with the state of knowledge comes with direct perception. In Giannakidou and Mari (2016a,b), we used the continuation ‘but I am not entirely sure’ as a diagnostic for the absence of knowledge (in Italian, the observation is first found noted in Bertinetto 1979; Mari 2009, Giannakidou and Mari 2012b). Consider:

(51) Deve essere a casa, ma non sono totalmente sicuro.

‘He must be home, but I am not entirely sure.’

Observe the contrast with the bare positive assertion and the knowledge predicate which do not accept such continuation:

(52) a. #He is at home but I am not entirely sure.
b. #I know he is at home but I am not entirely sure.

Lassiter (2016) offers numerous attested examples where must is compatible with ‘I don’t know for sure’, and similar expressions challenging knowledge, belief, or remembering of p:

(53) This is a very early, very correct Mustang that has been in a private collection for a long time. ... The speedo[meter] shows 38,000 miles and it must be 138,000, but I don’t know for sure.

(54) I don’t know for sure, sweetie, but she must have been very depressed. A person doesn’t do something like that lightly.

(55) It must have been a Tuesday (but I don’t know for sure), I can’t remember"

(56) I have an injected TB42 turbo and don’t like the current setup. There is an extra injected located in the piping from the throttle body... Must be an old DTS diesel setup but I’m not certain. Why would they have added this extra injector?

These examples support the conclusion that even MUST does not entail knowledge of p (see also Goodhue 2018 for a similar conclusion). The use of modal verbs, then, serves as an anti-knowledge marker, i.e., an indication, a signal that the speaker does not know p. Modals, then, convey uncertainty, and we will identify uncertainty with the concept subjective nonveridicality and non-commitment
in our work.

To go back to the mood patterns, what becomes clear by looking at the morphological exponents of mood in Greek and Romance languages is that mood affects two positions in the embedded clause: the verb (Latin, Romance languages, Ancient Greek), and the subordinator C (Modern Greek, Balkan languages, including Romanian which is a Romance language). The subordinating C does not alter the illocutionary type of the complement to non-assertion. However, the embedded C position can be implicated to do some work regarding how to anchor or update the information coming from the embedded clause. We will propose that, since we have embedding, the C position can be understood as the introducer of local context, and the mood morpheme as giving instructions on how to anchor the embedded proposition to the local context. Assuming the two positions below, then, we will argue that Greek (particle) and Italian (verbal) mood jointly show that mood selection has implications both at the level of the nonveridicality of the selecting predicate, and at the level of embedding:

(57)

\[
\text{CP} \quad \begin{array}{c}
\text{C: na/oti/pos/pu} \\
\text{MoodP} \\
\text{V+Mood morpheme}
\end{array}
\]

One can think of the contrast between indicative and the subjunctive particles in Greek as *that* vs. *to* complements in English, bearing also in mind that in Modern Greek all complementation is finite (the language lacks infinitives).\(^7\) Since mood is not marked on the English *that* and *to*, one must ask the question of how to transfer our analysis of Greek and Italian moods to a language that lacks systematic mood distinctions such as English. Baunaz (2015) in some recent work on French argues for three different subordinator *que* explicitly reflecting the mood in C even though French, like Italian, does not mark the mood in this position. French, however, does mark mood. In a language like English, which lacks the systematic marking of mood, it is possible that what we will say (in chapter 4) about the update functions of the mood morphemes holds for the complementizers *that* and *to*.

---

\(^7\)Giannakidou (2016) further argues that the emotive C *pu* contains expressive meaning, a position that will not be motivated here.
1.5 Mood flexibility

Let us move on now to the issue of mood flexibility. In many cases, the speaker has a choice between indicative and subjunctive. This phenomenon is sometimes referred to as mood shift (Quer 2009), and it is both interesting (because mood may produce a semantic effect) and challenging. Besides complement clauses, there are many well documented cases where mood is optional. We will start with these.

1.5.1 Optional subjunctive

We summarize below some well known cases studied under the label of optional subjunctive (Giannakidou 2016):

(58) Optional subjunctive
   b. In relative clauses to convey uncertainty of existence (see Farkas 1985, Quer 1998, Giannakidou 1998, 2013a for recent discussion)
   d. Epistemic subjunctive in questions, equivalent to an epistemic modal (Giannakidou 2016)

The crucial thing in all these cases is that the choice matters: the speaker uses one mood or another for a reason. Giannakidou (2016) argues, therefore, that in these cases, the subjunctive has semantic contribution which she calls evaluation. Evaluation, it is shown, consists in most cases in contributing an epistemic modal.

Let us illustrate with some examples. Consider first the subjunctive after negation with doxastic verbs. This is a phenomenon attested in many Romance languages and in Greek:

(59) Dhen pistevo na erthi o Janis.
     not believe.1sg that.SUBJ come.NONPAST.3sg the John.
     ’I don’t believe that John will come.

(60) Dhen pistevo na iythe o Janis.
     not believe.1sg that.SUBJ came.3sg the John.
     ’I don’t believe that John come.’

The doxastic verb *pistevo* ’believe’ selects indicative, as we saw earlier, but with negation the subjunctive becomes possible. Notice that subjunctive, like in the
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case of epistemic modals is compatible with both past and nonpast, and the non-
past has a future oriented reading. As Giannakidou (1995, 2016) notes, in Greek
the phenomenon is highly restricted and depends crucially on first person singular.
A third person subject is unable to shift to subjunctive with negation:

(61) *I Ariadne dhen pistevi na erthi o Janis.
    the Ariadne not believe.3sg that.SUBJ come.NONPAST.3sg the John
    ‘Ariadne doesn’t believe that John will come.’

(62) *I Ariadne dhen pistevi na irti he o Janis.
    the Ariadne not believe.3sg that.SUBJ came.3sg the John
    ‘Ariadne doesn’t believe that John came.’

Romance languages are more flexible (Quer 2009), though the degree of flexibil-
ity varies. In Greek, when the individual anchor is not the speaker, the lexical
subcategorization of the doxastic verb remains robust, i.e., selecting indicative.

Consider now the subjunctive in relative clauses:

(63) Theloume na proslavoume mia gramatea [pu
    want.1pl that.SUBJ hire.NONPAST.1pl a secretary that.SUBJ
    na gnorizi japonezika.]
    know.3sg Japanese.
    ‘We want to hire a secretary that knows Japanese. But it is hard to find
    one, and we are not sure if we will be successful.
    #Her name is Jane Smith.’

(64) Theloume na proslavoume mia gramatea [pu gnorizi
    want.1pl that.SUBJ hire.NONPAST.1pl a secretary that know.3sg
    japonezika.]
    Japanese.
    ‘We want to hire a secretary that knows Japanese. Her name is Jane
    Smith.
    (#But it is hard to find one, and we are not sure if we will be successful.)’

Here we see that the subjunctive na can be licensed in a relative clause headed by
pu. Farkas (1985) studied the phenomenon in Romanian and called the subjunc-
the phenomenon in Greek, arguing that the subjunctive has an epistemic anti-
specificity effect. When a subjunctive is used, the indefinite nominal receives a
de dicto, narrow scope reading: we do not have a particular secretary in mind,
and there are worlds w where we find a secretary that speaks Japanese, but we do
not know if the actual world will turn out to be such a world. The subjunctive
statement says: there are doxastic alternatives w such that there is a secretary in w
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and she speaks Japanese. But there are also doxastic alternatives \( w' \) where there is no such secretary, and it may turn out that real world is one of those. So, we don’t know, at the time of utterance, if there exists in the real world a secretary who speaks Japanese that we can hire. Because we don’t know that, the continuation

*Her name is Jane Smith*, as indicated, is not permitted.

The indicative version, on the other hand, has a *de re*, wide scope, or specific interpretation, and it is about the specific person Jane Smith who we want to hire. As Giannakidou (2013a) emphasized, the triggering of this subjunctive, as well as the triggering of subjunctive under negation, suggest that the subjunctive is literally an NPI, i.e. subject to licensing by expressions that license NPIs (negation, the attitude WANT), and needing to be in the scope of those expressions. Moreover, whether you have subjunctive or not makes a difference in meaning. The narrow scope produces anti-specific reading of the indefinite, while the wide scope of indicative produces specific *de re* readings. The effect of the mood choice in relative clauses is thus, again, epistemic, and depends on whether the speaker knows that there exists a specific value to the indefinite or not. If a specific value is known to the speaker, indicative will be chosen. The subjunctive will be chosen when the speaker is uncertain about the value of the indefinite.

Finally, consider the case discussed by Giannakidou (2016), where the subjunctive is licensed in questions. In this case, Giannakidou (2013a) argues, the subjunctive contributes an epistemic possibility modal:

\[
(65) \quad Ti \ na \ \text{that.SUBJ want-3sg} \\
    \text{‘What might he want?’}
\]

\[
(66) \quad \text{Na that.SUBJ he.GEN liked-3sg the food.} \\
    \text{‘Might it be the case that he liked the food?’}
\]

Such data were first mentioned in Rouchota (1994), who called subjunctive in questions ‘dubitative’. As indicated, the subjunctive behaves as if it contains a possibility epistemic modal *might*. Similar use of the subjunctive exists in Statimcats (Matthewson 2010). Importantly, these questions are ‘weaker’ than without subjunctive, as expected if the subjunctive is a possibility modal. Giannakidou calls this subjunctive epistemic, and has the following denotation:

\[
(67) \quad \text{Epistemic subjunctive as a possibility modal} \\
\quad [\ldots \text{(Subjunctive } p)]^{\text{M,1,S}} = ?(\exists w' \in M(i) : p(w')); \quad \text{where ‘?’ is the question operator}
\]

This is a case where we see the subjunctive to contribute actual modal meaning itself, i.e. an epistemic possibility modal. Notice that epistemic MUST is
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notoriously bad in questions (see Hacquard and Wellwood 2012 for some recent discussion and data):

(68)   a. #What must he want?
   b. #Must he be here already?

Our approach to explaining this contrast will be that possibility modals and questions have similar meaning which is characterized by nonveridical equilibrium. Necessity modals, on the other hand, convey positive bias towards the adjacent proposition \( p \); their use in question is disfavored, thus, because of this conflict.

German so-called modal particles are reported to have similar use in questions (the example is from Zimmermann 2011 with his translation):

(69)    Hat Hans wohl Maria eingeladen?
        has Hans PRT Mary invited.
        ‘What do you reckon: Has Hans invited Mary?’

Zimmerman says: ‘The question above is not about whether or not Hans has invited Mary, but by using wohl the speaker indicates her awareness that the addressee may not be fully committed to her answer.’ (Zimmermann 2011, p. 2020). This idea is resonates with Giannakidou’s 2016 analysis just discussed of the epistemic subjunctive.

Given the variability presented here, it is no surprise that we have flexibility with mood choice in complement clauses. Let us focus now on these.

1.5.2 Mood shift in Italian

Apparent flexible mood within a language has been challenging for almost all analyses of mood. The Italian data have only been treated in sections addressing open questions in the literature and, in spite of the pioneering work of Giorgi and Pianesi (1996) little progress has been made in the last 20 years to explain the flexibility in mood choice that this language allows. Generally speaking, Italian is a language that favors the subjunctive. We have just presented the subjunctive selectors. As for the indicative selectors of Greek, Italian features mood shift for most of the classes (see Mari, 2016).

(70)    Mood shift in Italian
       a.    emotive factives: essere contento, sorpreso (be happy, be surprised) mostly subjunctive, allow indicative. (101)
       b.    doxastic (non-factive): credere, pensare, trovare (believe, think, find) mostly subjunctive, allow indicative. (102)
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c. certainty: essere certo (be certain) mostly indicative, allow subjunctive. (103)
d. consciousness: essere cosciente (be aware) mood shift (104)
e. pure assertives: dire (say) mostly indicative, allow subjunctive (105)
f. verbs of denial: negare (deny) mood shift (106)
g. fiction verbs: immaginare (imagine) sognare (dream) mood shift (107)
h. memory verbs: ricordare/ricordarsi (remember) mood shift (108)

(71) Sono contenta che sia venuto.
‘I am happy that he has come.’

(72) Credo che sia bella.
‘I believe that she is cute.’

(73) Sono sicura che sia bella.
‘I am certain that she is cute.’

(74) Sono cosciente che sia bella.
‘I am aware that she is cute.’

(75) La gente dice che sia bella.
‘People say that she is cute.’

(76) Maria nega che sia bella.
‘Mary denies that Laura is cute.’

(77) Maria immagina che Laura sia bella.
‘Mary imagines that Laura is cute.’

(78) Maria ricorda che Laura sia bella.
‘Mary remembers that Laura is cute.’

This overwhelming flexibility is still in need to a principled and unified explanation and the new view of mood that we elaborate here is to account for intra and crosslinguistic variation in mood choice. Our starting hypothesis will be elaborated based on results of our analysis of modal MUST and Italian belief, which, we argue, is the counterpart in the domain of attitudes of the epistemic necessity modal.
1.5.3 Doxastic verbs in Italian and Portuguese

As we just mentioned, Italian is a notorious exception to the generalization supported by Greek, French, and the other European languages that we mentioned, namely that belief— and generally, doxastic— verbs are indicative selectors. Mood selection with doxastic verbs is flexible in Italian, as illustrated further below with the verbs credere (believe) and pensare (think):

(79) Credo/Penso che Maria sia incinta.
    believe/think.PRES.1sg that Mary be.SUBJ/IND.3sg pregnant.
    ‘I believe that Mary is pregnant.’

Indicative is also allowed with non-epistemic factives, but the subjunctive seems very common. Interestingly, even verbs of certainty can select subjunctive in Italian, and, as previously ever observed (see Mari 2016) fiction verbs.

(80) Sono sicura che Maria sia incinta.
    certain.PRES.1sg that Mary be.SUBJ/IND.3sg pregnant.
    ‘I am certain that Mary is pregnant.’

(81) Sono convinta che Maria sia incinta.
    convinced.PRES.1sg that Mary be.SUBJ/IND.3sg pregnant.
    ‘I am convinced that Mary is pregnant.’

(82) Immagino che Maria sia incinta.
    Imagine.PRES.1sg that Mary be.SUBJ/IND.3sg pregnant.
    ‘I imagine that Mary is pregnant.’

The pattern is thus in striking contrast to the Greek doxastics which rigidly selected indicative. Crucially, the epistemic Italian ‘know’ sapere never alternates:

(83) Sono sicuro che Maria sia incinta.
    know.PRES.1sg that Mary be.SUBJ/IND.3sg pregnant.
    ‘I know that Mary is pregnant.’

Italian is not alone among Romance languages in allowing both moods with doxastic verbs. Marques 2010 notes that in Portuguese, belief and assumption verbs may also allow the subjunctive. Here are examples from Marques, discussed in Giannakidou (2016):

(84) Acredito que a Maria está doente.
    believe-1sg that the Maria is-IND-3sg ill.
    ‘I believe that Maria is ill.’

(85) Acredito que a Maria esteja doente.
    believe.1sg that the Maria is.SUBJ.3sg ill.
‘I believe that Maria is ill.’

Notice the first person, neutralizing the difference between speaker and believer. Marques says that the selection of one or another mood is related to the ‘degree of belief’ being expressed. The indicative signals a high degree of belief, according to him, and the subjunctive a lower degree. "The concept of veridicality accounts for this case of mood variation. With the indicative, the inference follows that the relevant proposition is true (according to the subject of the main clause), contrary to what happens if the subjunctive is selected." (Marques 2010, p. 145). The same idea is also present in Homer (2008) who identifies subjunctive with belief as a cancellable inference of uncertainty. Giannakidou comments on that by saying that when the speaker chooses to utter the subjunctive version, she is making a point to distinguish between what she believes and what she knows for sure. "When she chooses the indicative version, the speaker is content with the belief ("higher degree of certainty"), but when she chooses the subjunctive, she seems to be aware that she her belief might not be justified as knowledge. The speaker, in the subjunctive version, has some uncertainty in her epistemic state and her commitment to Maria is ill is weaker, i.e. she allows for the possibility of not p." (Giannakidou 2016: 173).

The presence of subjunctive after first person belief indicates, this, a commitment weakening, observed also in English when we add a modal verb in the embedded clause:

(86) a. I believe that Maria might be sick.
   b. I believe that Maria is sick.

One of our main proposals in this book, however, is that lower degree of certainty is not sufficient to explain the choice of the subjunctive and that a more fine-grained distinction into the realm of what have been called epistemic state is needed. If the presence of the subjunctive merely indicated ‘uncertainty’, its use with verbs conveying certainty, as observed in Italian, is entirely unexplained. We will offer extensive discussion of this issue in chapter 4.

The term epistemic covers in the literature on mood, both doxa and knowledge. Following Mari (2016), we propose that these two need careful differentiation. Ultimately, we will argue that with subjunctive belief in Italian there is no doxastic uncertainty. Instead, following the proposal in Mari, we will argue that a fundamental difference is to be tracked between knowledge and doxa. As Mari writes:

Non-factive epistemic predicates allow us to see a systematic polysemy between what we call an expressive-belief (featuring only a doxastic dimension) and an inquisitive-belief (featuring both a dox-
astastic and an epistemic dimension conveying doxastic certainty (in the assertion) and epistemic uncertainty (in the presupposition)). (Mari, 2016, p. 61).

With Mari (2016), we will thus distinguish two layers: (a) belief, or doxa, can be pure, and in this case we have commitment of the believer without regard of knowledge, but also that (b) belief can be weaker when it is contrasted with knowledge. This distinction will play a central role in our theory, and we will show that it in fact generalizes across a number of ‘epistemic’ attitudes, including memory, imagination, perception, and fiction. We will call the stronger construals of belief solipsistic, and the latter suppositional. Solipsistic doxastics will select the indicative, and suppositional doxastics select the subjunctive. Italian and Portuguese (and possibly Icelandic and German) doxastic verbs are underspecified lexically as to which way they are construed. But Greek doxastics, as we will see further in chapter 4, select strictly the indicative and are therefore always solipsistic. Note that, unlike in Mari (2016), we will not consider attitudes polysemous. Instead we will consider that the notion corresponding to the predicate (and which we write in capital letters) can have different values that can be instantiated in different languages, and which are responsible for intra and cross-linguistic variation (see ch. 5 for discussion).

Based on the proposal that the trigger for subjunctive with belief is a presupposition of epistemic uncertainty – which is a presupposition of nonveridicality, in our terms – we will attempt to propose a unified view of mood flexibility, which cuts across languages to an extent that has been only rarely noted and considered.8

Note, right from the start, that the subjunctive is not triggered by the notional category ‘preference’. This is also manifest when we consider fiction verbs. In (58), the interpretation that the use of the subjunctive enhances, is one in which a conjecture is at stake. Once again, subjunctive correlated with a supposition and not preference. Across the chapters we will study the main predicate classes, including bouletic verbs, and we will argue that, even in this case, subjunctive correlates with a presupposition of epistemic uncertainty. With this caveat in mind we now proceed to present the other classes that feature mood flexibility.

1.5.4 Hopes, promises, and persuasions

There are some other interesting verb classes that allow both moods crosslinguistically. Consider verbs of the HOPE class. As we see, these verbs allows both moods in Greek and Italian:

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8See Farkas (2003) for a theory of mood choice with multiple layers; note, however, that Farkas cannot achieve full coverage, and notoriously does not explain subjunctive with Italian belief.
1.5. MOOD FLEXIBILITY

1.5.1. Equivalents of ‘hope’ are also flexible in other languages (see e.g. a recent discussion of French ‘hope’ in Portner and Rubinstein 2012, Anand and Hacquard 2013). The subjunctive versions, as we see, are used for future oriented propositions as well as past; the indicative versions only with past. Such cases of apparent flexible mood within a language are challenging for almost all analyses of mood. To deal with them, most accounts would have to say in some way or other that the verb is ambiguous, and that the meaning changes depending on the mood chosen.

The verb meaning PROMISE behaves similarly. Notice the exact parallel with promise to and promise that.

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The verb meaning PROMISE behaves similarly. Notice the exact parallel with promise to and promise that.

(87) a. Elpizo na kerdise/kerdise o Janis.
   hope.1sg that.SUBJ win.NONPAST/PAST.3sg the John
   ‘I hope for John to win/to have won.’
   b. Spero che Gianni abbia vinto/vinca.
   Hope.1sg.PRES that John have.SUBJ.3sg won/win.SUBJ.3sg
   ‘I hope that John has won.’

(88) a. Elpizo oti kerdise o Janis.
   hope.1sg that.IND won.3sg the John
   ‘I hope that John won.’
   b. Elpizo oti tha kerdisi o Janis.
   hope.1sg that.IND FUT win.nonpast.3sg the John.
   ‘I hope that John will win.’
   c. Spero che il Milan vincerà/ha vinto.
   Hope.PRES.1sg that the Milan win.FUT.IND.3sg/has won.
   ‘I hope that Milan AC will win/has won.’

(90) #I Ariadne ipoxethike oti efije noris.
   the Ariadne promised.3sg that.IND left.PAST.3sg early.
   ‘Ariadne promised that she will leave early.’
‘Ariadne promised that she will leave early.’

The verb meaning PERSUADE *pitho* behaves in a parallel way:

(91) a. I Ariadne epise-ton Nikola na

the Ariadne persuaded.3sg the Nicholas that.SUBJ

figoun noris.

leave.NONPAST/PAST.3pl early.

‘Ariadne convinced Nicholas (for them) to leave early.’

b. I Ariadne epise-ton Nicola oti i idea tou

the Ariadne persuaded.3sg the Nicholas that.IND the idea his

ine kali.

is.PRES.3sg good.

‘Ariadne convinced Nicholas that his idea is good.’

Notice the alteration in English between *convinced to* (equivalent to *na*), and *convince that* (equivalent to *oti*). The English difference is discussed in a recent paper by Grano (2018). *Pitho na* means convince to act, but *pitho oti* means to make someone believe the complement proposition. This difference is brought about in Greek by the mood, in English by the to vs. that choice.

It is important to also note that both mood patterns, just like with to vs. that, feel canonical and unmarked. This holds for all HOPE, PROMISE and PERSUADE. The choice of *na* and the ensuing nonpast correlates with action or thought of the future.

### 1.5.5 Verbs of saying

Here, mood choice correlates with different lexical choice of verb in English. Observe the verbs *leo*, and *arnoume* (examples from Giannakidou 2016, and Giannakidou and Staraki 2013):

(92) a. O Janis lei oti efijan noris.

The John says that.IND left.3pl early.

‘John says that they left early.’

b. O Janis lei na figoun noris.

The John says that.SUBJ leave.3pl early.

‘John wants them to leave early.’

(93) a. O Janis arnithike oti efijan noris.

The John denied that.IND left.3pl early.

‘John denied that they left early.’

b. O Janis arnithike na fiji noris.

The John says that.SUBJ leave.3sg early.
1.5. MOOD FLEXIBILITY

‘John refused to leave early.’

Lei ‘says’ with the oti complement has the expected reporting meaning, but with the na complement it acquires a volitional, directive meaning, and we translate it as wants. Likewise, with na, arnithike means refuse but with oti it means deny.

Verbs of assertion are also flexible in Italian, with the subjunctive version enabling a reportative interpretation.

(94) La gente dice che siaè bella.
    The people say that be.SUBJ/IND cute.
    ‘People say that she is cute.’

Likewise, verbs of denial are flexible in Italian. The descriptive characterization of this shift is that, with the indicative the matter is settled in the common ground, whereas with the subjunctive it is not. We will show how our framework accommodates this interpretation.

(95) Maria nega che Laura siaè bella.
    Mary denies that Laura be.SUBJ/IND cute.
    ‘Mary denies that Laura is cute.’

1.5.6 Factive verbs

Recall that Greek marks the complement of an emotive factive verb with pu. With imperfective aspect, na is also allowed:

(96) a. O Janis xarike pu episkeftike ti
    The John was-happy.PERF.3sg that.IND visited.PRF.3sg his jaja tu.
    grandmother.
    ‘John was happy that he visited his grandmother.’

b. O Janis xerete na episkeptete ti
    The John is-happy.IMPERF.3sg that.SBJ visit.IMPERF3sg his jaja tu.
    grandmother.
    ‘John is happy to visit his grandmother (but he only rarely gets the chance).’

Of the two sentences, only the pu version is factive: there is a fact that John visited his grandmother (hence that John visited his grandmother is true), and that fact made John happy. Notice the perfective in both the higher and the lower verb. The na version contains imperfective on both forms, and this renders the sentence
non-factive, as can be seen in the continuation that he only rarely gets the chance. Similar mood shifts with emotives are observed in many Romance languages (see Quer 2001, 2009 for recent overviews).

With emotive factives, we will ultimately establish a distinction between three types of languages:

(97) (i) Languages that require subjunctive (Spanish, French);
(ii) Languages that allow both subjunctive and indicative ((Brazilian) Portuguese, Catalan, Turkish, to a lesser extent, Italian);
(iii) Languages where emotives select indicative (Greek, Hungarian, Romanian, Bulgarian); the emotive complement may be distinguished in some other way as in Greek.

Note the rigidity in French and the flexibility (although with a strong preference for subjunctive) in Italian.

(98) Je suis contente qu’il soit/*est venu. (French)
I am happy that-he be.SUBJ.3sg/*IND.3sg come.
‘I am happy that he has come.’
(99) Sono contenta che siaè venuto. (Italian)
I am happy that-he be.SUBJ.3sg/IND.3sg come.
‘I am happy that he has come.’

Mood choice can also produce change in meaning with the verb *ksero* ‘know’, becoming equivalent to a how-to complement in English (see Varlokosta 1994, Giannakidou 2011):

(100) O Janis kseri na kolibai.
The John knows.3sg that.SUBJ swim.IMPRF.3sg.
‘John knows how to swim.’

Finally, the verb *ksero* ‘know’ may also combine with *pu*:

(101) O Pavlos kseri pu/oti/*na efije i Roxani.
The Paul knows.3sg that.IND-pu.IND-oti.SUBJ left.3sg the Roxani
‘Paul knows that Roxanne left’.

The compatibility of KNOW with *pu* should not be a surprise if, as we said, the generalization is that *pu* is the factive complementizer, selected by verbs whose complements denote facts. Crucially, *pu* can’t be used in the following context where the speaker doesn’t know *p*, *p* is not a fact. Question: How much did that book cost?
1.5. MOOD FLEXIBILITY

(102) Ksero *pu/oti kostise 25 dollaria.
know.1sg that.*IND-pu.IND-oti cost-3sg 25 dollars.
‘I know that it cost 25 dollars.’

In this context of seeking information, the person asking the question does not know how much the book costs. Hence that the book cost 25 dollars is not a fact, i.e., it is not part of the common ground. In this case, *pu cannot be used. We will suggest that *pu is a presuppositional complementizer. With indicatives, then, Greek seems to distinguish between the assertion of veridicality (indicative *oti) and the presupposition of it (*pu).

Finally, note that, when embedding a question, sapere also allows the subjunctive.

(103) Sai dov’è la macchina?
Know.2sg where-be.IND.3sg the car?
Do you know where is the car?
(104) Sai dove sia la macchina?
Know.2sg where be.SUBJ.3sg the car?
Do you know where is the car?

1.5.7 Memory and perception

Verbs of perception such as vlepo (see), and akouo (hear) take *oti complements when they combine with past:

(105) O Nicholas idhe *oti/*pu/*na efi je i the Nicholas saw.3sg that.IND-oti/*IND-pu/that.SUBJ left.3sg the Ariadne.
Ariadne.
‘Nicholas saw that Ariadne left.’
(106) O Nicholas akouse *oti/*pu/*na efi je i the Nicholas heard.3sg that.IND-oti/*IND-pu/that.SUBJ left.3sg the Ariadne.
Ariadne.
‘Nicholas heard that Ariadne left.’
(107) O Nicholas thimate *oti/*na ekleise tin the Nicholas remember.3sg that.IND/*that.SUBJ closed.3sg. the porta.
door.
‘Nicholas remembered that he closed the door.’
But when these verbs combine with PRES (imperfective non-past), *na* can be used:

(108) O Nicholas idhe tin Ariadne *oti/*pu/na the Nicholas saw.3sg the Ariadne that.IND-oti/*IND-pu/SUBJ kleini tin porta, alla den ine sigouros. close.PRES.3sg the door, but not is sure. ‘Nicholas saw Ariadne closing the door (but he is not entirely sure)’.

(109) O Nicholas thimate na kleini ti porta, the Nicholas remember.3sg that.SUBJ close.NONPAST.3sg the door, alla dhen ine sigouros. but not is sure. ‘Nicholas remembered closing the door, but he is not entirely sure.’

The *na*-version is compatible with a context where Nicholas is not fully sure about his memory or vision, and allows some doubt. He is, thus, in a nonveridical state. The *oti* clauses are incompatible with such context:

(110) #O Nicholas thimate oti eklise tin porta, alla den ine the Nicholas remember.3sg that.IND closed.3sg the door, but not is sigouros. sure. ‘#Nicholas remembered that he closed the door, but he is not entirely sure.’

Note the exact parallel with the English *-ing* clause. The *that vs. -ing* difference is reflected in Greek with the *oti vs. na* distinction.

Memory verbs, finally, can also take a *pu* complement. In this case, just as we saw with *ksero* ‘know’, they can’t be used in the following context where the speaker doesn’t know *p*. Question: How much did that book cost?

(111) Thimame *pu/oti kostise 25 dollaria. remember.1sg that cost-3sg 25 dollars. ‘I remember that it cost 25 dollars.’

In this context, the person asking the question does not know how much the book costs. Hence that the book cost 25 dollars is not known in the common ground. In this case, *pu* cannot be used. This supports our idea that *pu* requires that *p* to be part of the common ground.

(112) Thimame pu/oti to vivlio kostise 25 dollaria. remember.1sg that.IND the book cost-3sg 25 dollars. ‘I remember that the book cost 25 dollars.’
In this case, memory corresponds to common knowledge.

With no surprise, memory verbs are also flexible in Italian, where the subjunctive introduces a suppositional layer, as we will extensively explain in the rest of this book.

(113) Maria ricorda che Laura sia/è bella.

Mary remembers that Laura is cute.

‘Mary remembers that Laura is cute.’

We will discuss the patterns of memory and perception along with the other doxastics in chapter 4. We will also include in that chapter a discussion of semblance predicates (SEEM, APPEAR), which are not strictly-speaking attitudinal, but share key similarities with perception verbs.

Having taken a taste of all this variation, let us proceed now to ask one of the central question to be asked in this book: what regulates mood choice?

1.6 What regulates mood choice?

1.6.1 Our thesis for the indicative: veridicality in the truth condition

We have established that the realis vs. irrealis schema won’t work—since irrealis verbs such as doxastic, dream, and fiction verbs in Greek and most Romance take indicative complements systematically. Recall:

(114) O Nicholas nomizi oti/*na to Milano ine i protevousa the Nicholas thinks.3sg that.IND/*SUBJ the Milan is the capital tis Italias.

of Italy.

‘Nicholas thinks Milan is the capital of Italy.’

(115) O Nicholas theoriz oti/*na to Milano ine i the Nicholas considers.3sg that.IND/*SUBJ the Milan is the protevousa tis Italias.

capital of Italy.

‘Nicholas considers Milan to be the capital of Italy.’

The striking thing here is that even with an obviously, i.e. objectively, false sentence the indicative is required. Hence it seems to be a robust generalization that epistemic and doxastic attitude verbs do not care about objective veridicality or factuality. They are, rather, subjectively veridical, i.e., strictly anchored to
the attitude holder’s doxastic space, regardless of what is factually true, what the speaker thinks or what is known in the common ground.

There seems to be a relatively clear generalization, then, argued for in previous works (Giannakidou 1994, 1997, 1998, 2009, 2011, 2013b, 2016), that the licensing property of the indicative is not objective veridicality but subjective veridicality. What does it mean for an attitude verb to be subjectively veridical? We will spend considerable time explaining this in chapters 2 and 4, but just to give the basic idea here, a subjectively veridical attitude verb is a verb that involves in its truth condition an information state that is veridical:

\[(116)\] Information state of an individual anchor \(i\) (Giannakidou 2013b)

An information state \(M(i)\) is a set of worlds associated with an individual \(i\) representing worlds compatible with what \(i\) knows or believes.

\(M(i)\) is the private space of \(i\)’s thoughts, belief and knowledge. It is actually much richer than that, as we shall see. \(M(i)\) can include also one’s perceptions, expectations, memories, tastes, etc, and these different sets of worlds are determined specifically by the lexical meaning of the attitude verb. Veridicality can then be understood as being relative to that state. When there is no embedding, \(i\) is the speaker, in unembedded assertions therefore \(M(\text{speaker})\) is the space determining mood:

\[(117)\] Efije i Ariadne.
left.3sg the Ariadne.
‘Ariadne left.’

This sentence is true if and only if all the worlds in the speaker’s \(M(\text{speaker})\) are worlds in which Ariadne left. This is a veridical information state:

\[(118)\] Veridical information state

An information state \(M(i)\) is veridical iff: \(\forall w[w \in M(i) \rightarrow w \in \{w' \mid p(w')\}]\).

A veridical state is a homogenous state, and conveys settledness of \(p\), and certainty of the anchor that the sentence is true. A veridical state, in other words, entails \(p\). A co-operative speaker that does not want to deceive or lie to the hearer, in uttering the sentence Ariadne left follows Gricean quality (Be truthful), and this means that she knows or believes the sentence to be true:

\[(119)\] \[[\text{Ariadne left}]\]_{M(\text{speaker})} = 1 \text{ iff } \forall w[w \in M(\text{speaker}) \rightarrow w \in \{w' \mid \text{Ariadne } w'\}]\)

The requirement for a veridical state holds irrespective of mood, as can be seen, and is a prerequisite for assertion:
1.6. WHAT REGULATES MOOD CHOICE?

Veridical information state as a prerequisite for assertion
A sentence S is assertable if and only if the speaker is in a veridical state about S.

The use of indicative suggests that the indicative is the mood by default associated with a veridical state. As we discuss further in chapter 2, a veridical state is the foundation for the speaker’s—or, more broadly, the individual anchor’s—commitment to the sentence. A veridical state $M(i)$ entails $S$ because $M(i)$ is homogenous. Because veridicality is a prerequisite for assertion, continuations such as I don’t believe it give rise to Moore effects (Giannakidou and Mari 2016c):

(121) Efije i Ariadne, #ala dhen to pistevo.
     left.3sg the Ariadne, but not it believ.1sg.

‘#Ariadne left but I don’t believe it.’

In order to utter ‘Ariadne left’, the speaker must be in a veridical homogenous state of believing that Ariadne left; continuing by negating this belief is therefore infelicitous because it would ascribe contradictory beliefs to the same individual. At the foundation of Moore effects, we argued in Giannakidou and Mari (2016c), lies the concept of veridicality as a precondition on the assertability of sentences.

In embedding, $M$ (speaker) is still relevant, as is the Stalnakerian common ground $C$, i.e. the set of mutually known propositions or commitments. But the crucial anchor now will be the attitude holder, and mood will be anchored to $M$ (subject). Consider first a verb of knowledge. A verb of knowledge is veridical objectively because the complement of knowledge is a fact:

(122) O the Nicholas dhen kseri oti efije i Ariadne.
     the Nicholas not knows.3sg that.IND left.3sg the Ariadne.

‘Nicholas doesn’t knows that Ariadne left.’

Ariadne left, even if Nicholas doesn’t know it. But knowledge is also, and most relevantly here, veridical subjectively because the knowledge state is veridical: it is such that all worlds in it make the complement true:

(123) O Nicholas kseri oti/*na efije i Ariadne.
     the Nicholas knows.3sg that.END/*SUBJ left.3sg the Ariadne.

‘Nicholas knows that Ariadne left.’

(124) [Nicholas kseri /know $p$] will be defined iff the actual world $w$ is a $p$ world. If defined,
     [Nicholas kseri oti $p$] is true in $w$ with respect to $M(Nicholas)$ iff:
     $\forall w' [w' \in M(Nicholas) \rightarrow w' \in \{ w'' | p(w'') \}]$
KNOW thus combines an objective veridicality presupposition with a subjectively veridical assertion: the information state of the subject, M(Nicholas), is homogenous, i.e., all worlds are \( p \) worlds. Homogenous spaces are veridical and select the indicative. Importantly, the verb of knowledge does not assert that Ariadne left, unlike the unembedded assertion which does exactly that. Hence, the choice of indicative does not depend on assertion (as argued for, e.g., in Farkas 2003). Rather, it depends on subjective veridicality, i.e. the veridicality of the anchored state. In addition, the subjectively veridical verb can also be factive, which means objective veridical in the sense of our initial definition (1).

Unlike knowledge, belief does not have a presupposition of factivity, or any presupposition whatsoever. But it has a truth condition similar to knowledge in that it involves a veridical, homogenous, information state:

\[(125)\]  
\[\text{O Nicholas} \ \text{pistevi} \ \text{otil*na} \ \text{efje} \ \text{i Ariadne.} \]

\[\text{the Nicholas believe.3sg that.IND*SUBJ left.3sg the Ariadne.} \]

\[\text{‘Nicholas believes that Ariadne left.’} \]

Whether Ariadne actually left or not is irrelevant for Nicholas’ beliefs. For the sentence to be true, it is simply enough if \textit{Ariadne left} is a proposition believed by the subject, Nicholas. Given this basic similarity, and following the classical Hintikka treatment of belief (Hintikka 1962), the truth condition for a doxastic attitude verb such as ‘believe’ and its equivalents is the following:

\[(126)\]  
\[\left[ \text{Nicholas pistevi/believe} \ p \right] \text{is true in} \ w \text{with respect to} \ M(\text{Nicholas}) \text{iff:} \]

\[\forall w' [w' \in M(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}] \]

We will define in chapter 4 numerous other doxastic spaces that are veridical. An important observation here is that doxastic verbs that use such veridical spaces in their truth condition may actually lack any presuppositional layer that might involve knowledge or reference to the world, in contrast to epistemic verbs and factives. This makes non-presuppositional doxastic verbs ‘solipsistic’ because they are inward-looking, i.e. their truth condition depends solely on the main attitude subject. The solipsistic truth condition thus renders them equivalent to knowledge or unembedded assertion and this explains why they requires indicative mood. This is an important thesis that we will argue for in this book:

\[(127)\]  
\textit{Licensing condition: indicative mood and veridicality}

The indicative will be licensed in the complement of a propositional attitude that is veridical (objectively or subjectively), and lacks a non-veridical presupposition.
The choice of indicative, therefore, does not depend on actuality or factivity, or merely reals ((objective veridicality); rather, the indicative is the mood of veridicality, objective and subjective. The use of indicative in unembedded assertions, with epistemic verbs, and doxastics (including fiction verbs) can all be explained under this condition. The indicative, thus, can be understood as the grammatical reflex of this category, just like the past tense is the grammatical reflex of time prior to the utterance time.

The illusion of indicative being sensitive to assertion (Farkas 1992, 2013) is due to the fact that subjective nonveridicality is a prerequisite of assertion. Subjective veridicality allows us to say that an individual anchor is committed to a sentence, as we noted here, and we explore the tight relation between veridicality and commitment in chapter 2 where we develop a formal system for the ideas presented here.

1.6.2 Our thesis for the subjunctive: nonveridicality in the presupposition

While the indicative seemed relatively easy to handle, when it comes to subjunctive, generalizations might, as first glance, seem elusive. The literature indeed sometimes appears pessimistic (e.g., Witschko 2016). The subjunctive cannot be simply identified with a single label such as epistemic modality, or ‘bouletic modality’, it is said correctly, since the subjunctive used with both epistemic and dynamic modals. And the fact that the subjunctive behaves like a modal itself, but not always, adds to the complexity. The semantic effect sometimes is epistemic, as we saw in the questions and relative clauses, but it can also be bouletic. It seems impossible, thus, to say that the subjunctive itself associates with one modality—because it doesn’t.

Efforts to unify the licensing factors of the subjunctive have been made under the concepts of preference or gradability (as in Villalta 2008 for Spanish subjunctive). Such efforts, however are bound to fail because they are reductionist and overlook the fact that the subjunctive, as we showed, is licensed by attitude verbs with epistemic meaning too (which is supposed to not be gradable). And, recall that both epistemic and deontic modals select the subjunctive and the infinitive. We also observed that the subjunctive has epistemic contribution in relative clauses and with questions in Greek and Romance languages, and noted that the subjunctive is used in adjunct clauses with BEFORE and WITHOUT clearly lacking a preference or gradability component. The subjunctive indeed seems to be a good option for gradable predicates, including emotive verbs which are gradable, but gradability and preference orderings characterize only a subset of subjunctive licensors. In our discussion in chapter 7 we will propose a formal mapping be-
between gradability and (non)veridicality that explains why we find this connection.

Portner (2018) presents a rather comprehensive survey of subjunctive theories, and we will not attempt a general overview here (see also earlier overview discussions in Farkas, 1982, 2003; Villalta, 2008; Quer 2009, also Portner and Rubinstein 2012; Smirnova, 2013; Giannakidou 2009, 2011; Marques 2004, 2010 for Brazilian and European Portuguese; Giorgi and Pianesi, 1996, Mari 2016,2017a,b for Italian; Sarigul 2015 for Turkish, Baunaz 2015 for French). Often a distinction is made between verbal mood and sentential mood (Portner 2009), with sentential mood referring to illocutionary force. However, Greek allows us to see that such a distinction is not essential, as mood exponents appear on the sentential C level. When mood is a verbal category, as in Romance languages, it is again like tense: it takes propositional scope despite the fact that it is associated with a lower position.

The association of mood with illocutionary forces comes from the illusion that moods are neatly distinguished via illocutionary forces. While in main sentences a classification based on illocutionary act may indeed seem possible—e.g., the indicative has assertive force, the subjunctive and imperative have directive forces—its applicability clearly breaks down in embedding: the embedded indicative is not an assertion of the sentence it introduces, i.e., it does not add that sentence to the common ground. The embedded subjunctive, likewise, is not a wish or command. And the imperative cannot be embedded. The same holds for adjunct clauses: recall that BEFORE and WITHOUT select the subjunctive, but they are in no way commands or wishes. An association of subjunctive mood with the illocutionary force of a wish or command would therefore fail spectacularly with sentence embedding (adjuncts included).

In recent work, we have pursued individually and jointly a view of mood as having an "epistemic substratum", as Giannakidou (2013a) puts it. The idea was evident already in our thesis that subjective veridicality regulates the distribution of indicative mood (an idea going back to Giannakidou 1994).

Giannakidou and Mari (2016a,b) point to the role of presupposition in mood choice with emotive factives (see chapter 7 for extended discussion), and Mari (2016) elaborates the idea that nonveridical presupposition with nonfactive epistemics is the key to understand mood flexibility across epistemic and fiction verbs in Italian and establishes a distinction between ‘solipsistic’ belief and what she calls ‘inquisitive’ belief, which we re-baptize here ‘suppositional’. She thus introduces the distinction between indicative belief as driven by the veridical assertion and subjunctive belief which feature a nonveridical presupposition.

These previous works will be our starting point for a comprehensive theory of mood where subjunctive triggers are considered to be modals akin to MUST, which, as we will argue in chapter 2 feature a nonveridical epistemic presupposition (Giannakidou and Mari, 2016). In this respect, the book offers a unified
1.6. WHAT REGULATES MOOD CHOICE?

view of modal across notional and grammatical categories as revealing, at a deep level of interpretation, a layer of nonveridicality and treat subjunctive as an à part entière manifestation of modality.

Our starting point in this book, therefore, will be that the subjunctive, embedded and unembedded, is a signal of epistemic weakening. The subjunctive sentence is epistemically weaker than the indicative one, and cannot be used unless the individual anchor is in a nonveridical information state (Giannakidou 2014, 2016, Giannakidou and Mari 2016c):

(128) Epistemic weakening (Giannakidou and Mari 2016c)
Epistemic weakening is the creation of a nonveridical information state.

What does it mean for an information space to be nonveridical? Unlike the veridical state which is homogenous and conveys settledness and certainty, the nonveridical state is non-homogenous and contains $p$ and $\neg p$ worlds:

(129) Nonveridical information state (Giannakidou 2013)
An information state $M(i)$ is nonveridical about $p$ iff $M(i)$ contains both $p$ and $\neg p$ worlds. A non-veridical $M(i)$ does not entail $p$.

In contrast to the veridical states, then, nonveridical states are non-homogenous states, containing $p$ and $\neg p$ worlds. They are, in other words, uncertainty spaces. The modal bases of modals, as we will show in chapter 2 are such nonveridical states, and modal verbs select subjunctive. Our main thesis for the subjunctive will therefore be the following:

(130) Licensing condition: subjunctive mood needs nonveridicality
The subjunctive will be licensed in the complement of a propositional attitude that obeys the Nonveridicality axiom, i.e., the attitude presupposes that the attitude holder $i$ does not know that $p$ is true.

(131) Nonveridicality Axiom
For any propositional attitude or modal expression ATT, ATT obeys the Nonveridicality Axiom iff $i$ ATT $p$ presupposes that $M(i)$ is a nonveridical state, i.e. partitioned into $p$ and not $p$ worlds.

The Nonveridicality Axiom will be shown to generalize over all modal verbs and attitudes that select the subjunctive, and are therefore epistemically weaker than the indicative selecting attitudes. Two things are very important here. First, an ATT that obeys the axiom has a presupposition of nonveridicality. This presupposition introduces uncertainty, therefore ATT with the nonveridical presupposition is weaker epistemically than an ATT that doesn’t have this presupposition. The subjunctive, crucially, is sensitive to the presupposition of ATT, unlike the
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indicative, which, as said, a the end of the previous section, is sensitive to the assertion of ATT. In other words, the subjunctive versus indicative distinction reflects not only the grammaticalization of the distinction between a veridical and a nonveridical information (or mental) state, it also reflects the difference between what an attitude asserts and what it presupposes.

Second, mood flexibility with doxastics indicates that some doxastic ATT verbs can be construed with or without the presuppositional layer (Mari, 2016). Recall the Italian facts:

(132) Credo/penso che Maria sia/è incinta.
Believe/Think.PRES.1sg that Mary be.SUBJ/IND.3sg pregnant.
‘I believe that Mary is pregnant.

Recall that the subjunctive is not an option for Italian ‘know’, sapere. Knowledge, in other words, cannot be weakened:

(133) *So che Maria sia incinta.
Know that Mary be.SUBJ.3sg pregnant.
‘I know that Mary is pregnant.’

Knowledge remains veridical. But the subjunctive will be taken as an indication that the Italian (and, recall, Portuguese) doxastic verb, can be construed with a nonveridicality presupposition and therefore obeys the nonveridicality axiom—unlike its Greek counterpart which doesn’t switch moods, and is, as we said, solipsistic.

One major conclusion from our work in this book will be to propose a general classification of attitudes, including modals, which is in line with the treatment of epistemic non-factives in Italian (Mari, 2016), as follows:

(134) Two kinds of attitudes ATT
i. Solipsistic ATT: no presupposition
ii. Presuppositional ATT: ATT has a mixed lexical entry with presupposition(s) and a truth condition.
ii. ATT includes propositional attitude verbs and modal expressions (verbs, particles, adjective, etc.)

(135) Veridical propositional attitudes
Solipsistic attitudes are veridical: they assert and entail that \( p \) is true in the attitude’s subject’s information space.

The above are key premises in the overall theory we will develop in the next chapters. In what follows, when we say ‘nonveridical’ attitude, we intend to refer to a propositional attitude that obeys the Nonveridicality axiom, i.e., the attitude...
presupposes uncertainty, namely that the attitude holder \( i \) does not know that \( p \) is true; and when we say a ‘veridical’ attitude, we intend to refer to a solipsistic attitude that expresses veridical commitment in the truth condition, and lacks the nonveridical presuppositional layer. In line with Mari (2016), we will assume that, in this case, truthfulness is irrelevant for the attitude holder.

Our view of attitude meanings and modals is that they are flexible. The variable mood patterns, crucially, motivate this stance (and epistemic non factives in Italian, rather than being seen as an exception become central to the theory) — and given how pervasive the variability is, it is surprising how monolithic the descriptions of attitude meanings in the relevant literature have been. We will find that our presuppositional attitudes are typically of mixed veridicality, combining a veridical state in the assertion with a nonveridical ‘do not know’ presupposition. In this case, nonveridicality always wins, and subjunctive will be licensed. The subjunctive, then, is fundamentally the mood of subjective nonveridicality, which means, in effect, the mood of uncertainty. It has, therefore, nothing to do with volition or preference \textit{per se}. The continuous emphasis on volition and preference for subjunctive taking attitudes has unfortunately prevented researchers from recognizing that volition and preference attitudes do come with uncertainty, and indeed that some of them with \textit{certainty that not}, as we will show in chapter 5.

1.7 Roadmap

Let us give now a brief outline of what we will do in each chapter.

In chapter 2, we build the formal framework of our theory, centering around the notions of veridicality, nonveridicality, commitment, epistemic weakening, and bias. We use modality as the illustrating grounds for our theory. As we said here, the presence of a nonveridical epistemic modal base renders all modals nonveridical — and the presence of such a nonveridical epistemic state is the regulating factor for the subjunctive. If a lexical entry contains a nonveridical epistemic space \( M \), it will be able to license the subjunctive. In the rest of the book, this simple idea will guide our analysis of the semantics of propositional attitudes and their mood choice properties.

In chapter 3, we discuss the correlation between mood and embedded tense. The tense of future orientation, we will argue, is the NONPAST, and it is the dependent tense that we find with future oriented subjunctives. This is also the tense of the bare infinitive in English, we will argue. In languages lacking productive morphological mood, the verbal correlate of mood is tense. In the C position we also find a difference between \textit{that} and \textit{to}. We will offer an explicit syntax seman-
tics of tenses that will explain also the observation about anaphoric tense in the subjunctive.

In chapter 4, we offer a detailed analysis of the mood choice with doxastic propositional attitude verbs in Greek and Italian. We use the label ‘doxastic’ to refer to verbs that express attitudes of belief, thought, consciousness, consideration, dream, imagination, fiction, and memory. These attitudes are also sometimes referred to as ‘cognitive’ (Bolinger). As it became clear already, there are two main patterns: (a) doxastic verbs strictly select the indicative which is the pattern observed in Greek and the bulk of European languages, and (b) doxastic verbs can flexibly allow both moods, with repercussions in meaning, as is illustrated in Italian and Portuguese. We develop here our notion of commitment as epistemic or doxastic commitment of an anchor to the truth of \( p \).

There are, we will see, two ways of conceptualizing doxastic attitudes: (a) as purely subjective, veridical, solipsistic attitudes with Hintikka-style truth conditions, that to do not engage with factuality and knowledge, or (b) as doxa, i.e. non-veridical suppositional states that engage with factuality and knowledge. Italian verbs are underspecified lexically, and can be construed either way. This explains why they are compatible with both indicative and subjunctive. Greek doxastic verbs, by contrast, we will argue, are lexically specified as solipsistic beliefs and select only the indicative. Doxa is sensitive to the unsettledness of \( p \) in the epistemic space of the attitude holder. By carefully distinguishing knowledge and doxa, we will argue that, just as Greek, Italian belief is strong doxa-wise but it is weak epistemic-wise.

Crucially, the flexibility in mood choice does not necessitate imposing ambiguity in the lexical entries of propositional attitude verbs. It rather shows that doxastic propositional attitudes exhibit the variability that we see typically with modals in being able to pick different modal bases. Presuppositional doxastics take two modal bases as arguments: a veridical doxastic one (assertion), and a nonveridical epistemic one (presupposition). Acknowledging flexible propositional attitude meaning offers a new way of understanding attitudinal meaning.

In chapter 4 we also discuss the pragmatic function of mood which is to anchor the complement proposition to the local information state. The assertive indicative \( oti \) adds \( p \) to \( M \), and the presuppositional indicative \( pu \) requires that \( p \) already be present in \( M \) or the common ground. The subjunctive does not add the complement proposition to \( M \) or the common ground. The fact that Greek lexicalizes an assertive and a non-assertive indicative gives further support to our idea that the indicative mood is not isomorphic to assertability.

In chapter 5, we discuss ‘classically’ subjunctive verbs such as verbs of volition and desire. We will argue that the truth conditions of these predicates require
the notion of bouletic commitment, as the counterpart of doxastic commitment in the realm of doxastics. Like pure belief— which can be construed solipsistically and selects the indicative— some volitional verbs (such as those meaning PROMISE, and PERSUADE) are also construed as solipsistic desires, defined on variants of bouletic models. When construed solipsistically, volitional attitudes select indicative as expected.

HOPE can also be constructed as having a nonveridical presupposition, in addition to the bouletic commitment. In this case, it will select the subjunctive, in agreement with what we expect. The suppositional and assertive layers are also featured by WANT. However, WANT selects the subjunctive strictly in all languages we know, and is never compatible with indicative— suggesting that WANT cannot ever be construed as solipsistic. Why is that? We will propose that WANT, in addition to the suppositional layer, also features an antiveridical presupposition that $p$ is not true, or is believed by $i$ not to be true, at the time of utterance. We call the presence of this antiveridical presupposition anti-factivity. Anti-factivity prevents the indicative, and forces subjunctive or other non-indicative moods such as the optative and imperative.

The emerging landscape of desiderative predicates is reminiscent of the landscape of doxastics presented in chapter 4— hence supporting our intended parallelism between the two realms and further strengthening our theory. Our two tier semantics for pure volition is novel, and includes no preference, no ordering. It is therefore quite different from the ordering semantics of Heim, Portner and Villalta, and the semantics proposed by Giannakidou in earlier work.

In chapter 6, we discuss implicative verbs and ability predicates, both selecting the subjunctive. In this chapter we want to accomplish two tasks: the first one is to explain why the subjunctive is chosen with ability modals and implicative verbs in Greek, and the infinitive in Italian (and Romance languages in general) instead of a finite tensed (past or present) clause. The selection of the subjunctive is expected with ability modals since, as modals, they obey the nonveridicality axiom. We propose a new analysis of ability modality by treating the modal ABLE as the dispositional counterpart of epistemic MUST, entailing action to $p$ only in the Ideal worlds. Implicatives, on the other hand, appear to pose a challenge for the subjunctive since it looks like—at least in Karttunen’s initial approach—they entail that $p$ is true. We offer an analysis of MANAGE as an aspectual operator on the eventuality $p$, which presupposes that a volitional agent $i$ tried to being about $p$, without, in fact, entailing actualization of $p$. This presupposition alone suffices to license the subjunctive, which, as we argued, is triggered by a nonveridical presupposition.

Under certain circumstances, ability modals do allow entailment to $p$, i.e., the entailment that the ability was actualized and led to $p$. This is often labelled in
the literature ‘actuality’ entailment. The actuality entailment renders the prejacent true at a past time, and depends crucially—we will newly argue—on ABLE being embedded under past. Our second task in this chapter is to offer a thorough analysis of this phenomenon, consistent with the fact that the choice of subjunctive mood is not affected, and with it the nonveridical analysis of ability. We show the actuality entailment to be the result of ability scoping PAST, and it does not arise with epistemic modals because these never scope under tense. In our analysis, implicative operators and ability modals in the veridical reading are not equivalent, contrary to popular claims in the literature (e.g. Bhatt 1999). The ability modal is a modal operator that lacks entirely the presupposition of trying that manage has. And, as we said, MANAGE is an aspectual operator taking the eventuality as its argument, and does not convey modality or propositional attitude in any obvious sense.

In chapter 7, we consider the mood patterns observed with propositional attitudes of emotion which include (a), attitudes known as emotive such as, e.g., the English be happy, regret, be surprised, be angry, (b) attitudes that we label ‘epistemic’ emotives, such as be aware, remember. Such attitudes combine an emotive component with an epistemic component in their meaning; and attitudes of fear, known also as verba timendi such as, e.g., the English fear, be afraid. These attitudes express the specific emotion of fear. Fear, in contrast to the the previous attitudes never relates to a fact.

Emotion attitudes utilize verbs and adjectives that are gradable. In dealing with emotion attitudes we articulate a precise semantics for emotion which capitalizes on their scalar nature. We propose a morphism between emotion scales and worlds which renders the emotive space nonveridical, thus sanctioning the subjunctive. Emotive predicates also have a presupposition of subjective veridity or factivity, which is responsible for licensing the Greek presuppositional complementizer pu. Languages that lack this complementizer typically resort to the subjunctive. Emotion predicates will come with lexical entries that are akin to the mixed veridicality patterns of modals, bouletic attitudes, and suppositional doxastics. Verbs of awareness can also be construed as containing emotive scales? and in this case they select subjunctive, as expected. This is the case of Italian. Again as expected, Greek grammaticalizes awareness as a knowledge predicate.

We distinguish, finally, three kinds of fear attitudes: fear to, fear that, fear lest. Fear is not a monolithic emotion in our framework. We offered a new semantics for fear predicates as denoting gradable emotion, and this semantics explained the variation in the mood patterns observed without appeal to expressive content (pace Yoon 2011).

Our work in this book brings together different levels of analysis—syntac-
tic, semantic and pragmatic– in order to develop a comprehensive theory of how (non)veridicality is reflected in grammar. We use mood choice in sentence complementation as a diagnostics for the a rich and flexible semantics of modal verbs and propositional attitudes, and we end up developing a compositional and fully transparent analysis of various propositional attitude meanings. Our semantics has implications about other languages too, including, of course, English. We conclude with a summary of our work, and crosslinguistic implications of our system in chapter 8.
CHAPTER 1. TRUTH, VERIDICALITY, MOOD
Chapter 2

A semantic framework for modalization with Nonveridicality and positive bias

In this chapter, we build the formal framework of our theory, centering around the notions of veridicality, nonveridicality, commitment, epistemic weakening, and bias. We put these concepts to work in the analysis of modalization. As we alluded to in the opening chapter, the presence of a nonveridical epistemic modal base renders all modals nonveridical—and the presence of such a modal base is the regulating factor for the subjunctive. If a lexical entry contains a nonveridical epistemic space $M$, it will be able to license the subjunctive. In the rest of the book, this simple idea will guide our analysis of the semantics of propositional attitudes and their mood choice properties.

We will uncover a number of layers in the structure of modal operators, including a layer of meta-evaluation function whose realization is a modal adverb. We will offer an analysis of modal adverbs as being the realizations of that function, thus offering a novel perspective on the phenomenon of ‘modal spread’ (often called ‘modal concord’). We use this analysis to explain the positive polarity of adverbs, i.e., why they need to scope above negation. Finally, regarding commitment and epistemic weakening, we see that it also has implications for informativity: veridical commitment observed in unmodalized unembedded sentences conveys maximum informativity, i.e., $p$ is added to the common ground. But epistemically weaker sentences such as those with modal operators and non-indicatives in general, are less informative about $p$, and do not add $p$ to the common ground.
2.1 Veridicality and commitment

The speaker has a chance to engage with truth by choosing to use a sentence in the simple past or present tense lacking modals, or by using a modal expression, e.g., a modal verb:

(1) a. It is raining.
   b. It must be raining.
   c. It may be raining.

Following standard practice, we call the assertion of a sentence without a modal a ‘bare assertion’. Consider this case first. The bare assertion requires that the speaker follows Gricean Quality, i.e., she does not have the intention to lie or deceive, and she intends to convey that she knows, or has grounds to believe that it is raining. By uttering the sentence ‘It is raining’, the speaker wants to share her knowledge with her audience. Sharing the knowledge means that the speaker intends \( p \) to be added to the common ground and become public knowledge. Upon adding \( p \) to the common ground, a listener might object to it if they know otherwise, e.g. if they just came back from outside and notice that it is no longer raining. But insofar as the speaker is concerned, and given what she knows at the time of utterance, it is true that it is raining. When the speaker has this knowledge, we say that the speaker is in a veridical state regarding the proposition \( \text{It is raining} \). And being in a veridical state means that the speaker has the attitude of being fully committed to the proposition \( \text{It is raining} \).

Likewise, when the speaker asserts a negative sentence, she is committed to the truth of \( \neg p \):

(2) It is not raining.

In this case, the speaker knows or believes that it is not raining; by asserting the sentence, therefore, we conclude that she is fully committed to \( \neg p \), and proposes to add \( \neg p \) to the common ground. The unmodalized negative assertion is epistemically stronger than the assertion of a modal sentence, we will argue, in that it reveals that \( \neg p \) is is known by the speaker, whereas the modal sentence implies that the speaker does not know. A useful concept here is epistemic settlement: one can settle a proposition positively (as in the bare positive assertion), or negatively (as in bare negative assertion). In both cases we talk about the speaker being committed, and in the case of \( \neg p \) e can talk about negative commitment, or commitment to the falsity of \( p \).

When the speaker decides to use an epistemic modal, she does so because she cannot be committed to \( p \); not positively, not negatively:
(3) It may/must/might/could be raining.

Depending on whether a possibility or a necessity modal is used, the speaker may have some or many reasons to believe that the prejacent $p$ could be true; but she is still in a state of uncertainty. By embedding a proposition $p$ under a modal, therefore, the speaker signals that she cannot be fully committed to it, i.e., her epistemic commitment is weaker than knowledge of $p$. She still has some commitment to *It is raining* because she is not denying it, but the speaker is not committed enough to add $p$ to the common ground.

As we see, there are two options: one is to use a possibility modal $\Diamond p$ (*It may be raining*), in which case the speaker is merely raising the possibility of $p$. The commitment in this case is pretty weak, and we will call it trivial (following Giannakidou 2013). If the speaker chooses to use a necessity modal, on the other hand, the commitment is stronger: the speaker has grounds to consider likely, or probably, the truth of the prejacent *It is raining*; but she still has some uncertainty, she might be aware that she doesn’t have all the facts to fully commit to the proposition, she still doesn’t know for sure. With a necessity modal, we will argue, the speaker is at best biased towards $p$, but she is not fully committed to it.

When we think of this weakened commitment with modals, it is helpful to also consider questions. Modalized assertions and questions are similar, and Giannakidou (2013) called modal assertions inquisitive, just like questions. Questions and modals are also similar in licensing NPIs. In this, they contrast with past or present veridical fully committed assertions, which block these items.\textsuperscript{1} Recall:

(4) a. Did Ariadne eat any cookies?
   b. At the party, Ariadne may/can talk to anybody.
   c. Any student can solve this problem.

(5) a. *Ariadne ate any cookies.
   b. *Ariadne is eating any cookies right now.
   c. *Ariadne believes/knows that Nicholas ate any cookies.

From the perspective of NPI-licensing diagnostic then, it is clear that modals and questions pattern on a par, and contrast with bare positive assertions and the complements of knowledge and belief. Recall also from chapter 1 that the subjunctive is licensed as a possibility modal in questions.

Recall also that NPIs appear in subjunctive classes of modal verbs, as illustrated below with the two modal verbs of Greek, but not in indicative clauses with epistemic or doxastic attitudes, and positive assertions:

\textsuperscript{1}Following standard practice, we take the English present progressive to be the semantic present, or PRES; see Giannakidou (2014) and references therein and more discussion in chapter 3.
CHAPTER 2. SEMANTIC FRAMEWORK FOR POSITIVE BIAS

(6) *O Pavlos pistevi oti idhe kanenan/opjondhipote.
   the Paul believe.3sg that.IND saw.3sg NPI/FCI.
   ‘*Paul believes that he saw anybody’.

(7) *Kseri oti agora kanena/opjodhipote aftokinito.
    know.3sg that.IND bought.1sg NPI/FCI car.
    ‘*He knows that I bought any car.’

(8) I Ariadne prepi na milise me opjondhipote/kanenan
    the Ariadne MUST.3sg that.SUBJ talked.3sg with FCI/NPI
    student.
    ‘Ariadne would like to talk to any student.’

(9) I Ariadne bori na milise me opjondhipote/kanenan
    the Ariadne can that.SUBJ talked.3sg with FCI/NPI
    student.
    ‘Ariadne might have talked to any student.’

(10) *I Ariadne milise me opjondhipote/kanenan fititi.
     the Ariadne talked.3sg with FCI/NPI student.
     ‘Ariadne talked to any student.’ 2

Yes-no questions, crucially, are licensing environments for NPIs, and also allow
the subjunctive (Giannakidou 2009, 2016; earlier discussion is found in Rouchota
1994):

(11) Milise i Ariadne me kanenan fititi?
    talked.3sg the Ariadne with any student.
    ‘Did Ariadne talk with any student?’

(12) Na milise i Ariadne me kanenan fititi?
    That.SUBJ talked.3sg the Ariadne with any student.
    ‘Might Ariadne have talk with any student?’

Giannakidou (2016) argue that the subjunctive in questions functions as an
epistemic possibility modal akin to MIGHT, as indicated in the translation. The
result is a weaker question that is conjectural, because it contain a modal. The
subjunctive here has a modal meaning— we thus see that the semantic category
‘modal’ maps onto something that is not necessarily a verb but a particle. This
holds also for the future (Mari, 2015b,2018; Giannakidou and Mari 2018a, as we
will discuss soon). Giannakidou (2013) further argues that genuine, non-biased in-
formation seeking questions themselves are, in fact, like possibility modals: they

2The negative assertion does allow NPIs: Ariadne didn’t talk to any student.
both convey partitioned \( p \) and \( \neg p \) spaces with no particular preference of \( p \) over \( \neg p \) or vice versa. Questions and possibility modals convey the state of *nonveridical equilibrium*. The inquisitiveness approach to questions defines questions as being of zero informativity (Ciardelli et al. 2013), and nonveridical equilibrium is the way we capture this generalization.

In earlier work, we proposed the concept of ‘commitment strength’ as a way to connect the knowledge/belief of the speaker with the informativity of \( p \). When the speaker knows or believes \( p \), she is fully committed to \( p \). We will call this state of full commitment ‘epistemic commitment’, e-commitment for short:

\[
\text{(13) Scale of epistemic commitment (Giannakidou and Mari 2016c)}
\]
\[
\langle p, \text{MUST } p, \text{MIGHT } p \rangle;
\]

where \( i \) is the speaker, \( p \) conveys e-commitment of \( i \) to \( p \); MUST \( p \) conveys partial commitment of \( i \) to \( p \), and MIGHT \( p \) conveys trivial commitment of \( i \) to \( p \).

The criterion for commitment is (non)veridicality: knowledge and belief denote veridical states, as we mentioned. A veridical state e-commits \( i \) to \( p \); MUST \( p \), and MIGHT \( p \), on the other hand, are nonveridical and reduce the commitment commitment. MUST \( p \) is stronger than MIGHT \( p \) because it entails partial commitment in the secondary, veridical modal base, we will argue, consisting of Ideal worlds, and this creates positive bias towards \( p \). Positive bias is weaker than knowledge or belief of \( p \).

In terms of informativity, e-commitment entails the following:

\[
\text{(14) E-commitment strength (Giannakidou and Mari 2016c)}
\]
\[
\langle p \rangle \text{ MUST } p \rangle \text{ MIGHT } p \rangle; \text{ where ‘’’ means ‘informationally stronger than’}
\]

Non-modalized \( p \) (speaker knows \( p \), \( p \) added to the common ground)\( \rangle \)
MUST \( p \) (speaker does not know \( p \), but is biased towards \( p \))\( \rangle \)
POSSIBLY \( p \) (speaker does not know \( p \), and there is nonveridical equilibrium)

The veridical, e-committed assertion of \( p \), adds \( p \) to the common ground. The assertion of the nonveridical (MODAL \( p \)) does not add \( p \) to the common ground, it is therefore informationally weaker when it comes to \( p \). Bias towards \( p \), in turn, is informationally stronger than nonveridical equilibrium.

In the discussion to follow, we will develop an explicit formal theory of modalization that uses the concepts above in order to explain both the semantic properties of modals as well as their mood patterns and polarity behavior.
2.2 The framework: objective and subjective veridicality

2.2.1 Objective (Non)-veridicality, semantic tense

In extensional contexts, sentences are assigned a truth value by a valuation function, and are true or false with respect to a time and the actual world. Veridicality in this case is ‘objective’, it is about what the expressions entail, irrespective of what agents believe (Zwarts 1995, Giannakidou 1994, 1997, 1998, 1999, 2013):

(15) Objective veridicality.
   (i) A propositional function F is veridical iff $Fp \rightarrow p$ is logically valid.
   (ii) F is nonveridical iff $Fp \not\rightarrow p$;
   (iii) F is antiveridical iff $Fp \rightarrow \neg p$.

Given that there is no modalization, objective veridicality is identical to actuality: if $p$ is entailed, it is a fact. A factive verb such as know entails (in fact: presupposes) that its complement is true, it is therefore objectively veridical:

(16) I know that Nicholas brought dessert.

*Know* is veridical because $know(p)$ entails that $p$ is true. But *believe, want* aren’t objectively veridical:

(17) Anastasia believes that Nicholas brought dessert.

*Believe* is not objectively veridical because if *Anastasia believes that p* is true, $p$ may or may not be true in the actual world.

Temporal operators such as the present (PRES) or the past (PAST), expressed by tenses or adverbials, are objectively veridical. Consider the following:

(18) Yesterday, Nicholas brought dessert.
(19) Right now, Nicholas is washing the dishes.
(20) Veridicality or temporal operators.
    Let F be temporal function, $t$ an instant or an interval.
    F is veridical iff $Fp$ at a time $t$ entails that $p$ is true at a (contextually given ) time $t' \leq t$; otherwise F is nonveridical. (Giannakidou 2002:23):
(21) PAST/Yesterday are veridical because (PAST/Yesterday $p$) at $t_u$ entails that $p$ was true at a time $t' \leq t$.
(22) PRES/Right now is veridical because (PRES/Right now $p$) at $t_u$ entails that $p$ is true $t_u$. 
2.2. THE FRAMEWORK: OBJECTIVE AND SUBJECTIVE VERIDICALITY

The future (FUT), however, is nonveridical:

\[(23) \text{FUT/tomorrow is nonveridical because (FUT/Tomorrow (p)) at } t_u \text{ does not entail that } p \text{ is true at } t_u \text{ or a time } t' \leq t.\]

Temporal veridicality is thus objective veridicality; the criterion is whether there is a time prior to \(t_u\), or \(t_u\) itself, where \(p\) is true. Future orientation—which typically comes with a future expression, but also with deontic modals and the semantic NON-PAST (Giannakidou 2009, Giannakidou and Mari 2018a)—is nonveridical under the above definition: a proposition cannot be true at a time that does not exist at \(t_u\). We will take more about future orientation soon.

Modal verbs, crucially, appear to ‘remove’ the veridicality of the tensed sentence:

\[(24) \text{Nicholas might/must be sleeping now.}\]
\[(25) \text{Nicholas might/must have slept earlier.}\]
\[(26) \text{MUST (PRES/PAST (p)) does not entail that } p \text{ is true at a time } t' \leq t\]
\[(27) \text{MAY (PRES/PAST (p)) is does not entail that } p \text{ is true at a time } t' \leq t\]

We discuss the interactions of modals with tense later. Here, consider simply that modal verbs are veridicality blockers: they objectively nonveridical, and do not entail the truth of the prejacent proposition (at a time, and in the actual world). This holds for possibility as well as necessity modals, as we see, and for the future modal. Epistemic necessity modal verbs are thus to be distinguished from alethic necessity modals, which indeed validate the principle T that guarantees veridicality: \(\text{necessarily } p \text{ entails } p\). Epistemic necessity does not validate this principle (as stated already in Giannakidou 1998, 1999, and in our earlier discussion in chapter 1).

When we consider the veridicality of modals, it soon becomes obvious that modal verbs are nonveridical also with respect to what the speaker knows—which is the way relevant for our discussion of commitment.

2.2.2 Subjective Veridicality

Speakers and hearers form judgements about the veridicality of a sentence given what they know or what they believe (Giannakidou 1994, 1998, 1999, 2009, 2013; Harris and Potts 2010; de Marneffe et al. 2012; Mari 2015c on perspectival generics). That such relativization is needed becomes particularly visible with modals, propositional attitude verbs (know, believe, imagine, etc) and their complements (Farkas 1985, Giannakidou 1994, 1998, Mari 2016, Giannakidou and Mari 2016a); but the role of the individual in assessing truth is apparent even in
unembedded sentences, as we noted, and is expressed lucidly in Harris and Potts’ assertion that "all sentences are perspectival".

When a speaker asserts a positive unmodalized sentence in the present or past, unless she is lying, she asserts $p$ because she knows or believes that $p$ is true\(^3\); but when a speaker uses a modal verb, she may think that $p$ is possible or even likely, she may have some evidence supporting that $p$ is true, but she doesn’t know for sure that $p$ is true. When speakers make assertions or assess assertions of others, they make veridicality judgments about the truth of the sentence—and the veridicality judgement, as we said, is more complex than truth assignment: it depends on what speakers know and how they extract information from context (see especially Giannakidou 1998, 2013, Mari 2003,2005, Giannakidou and Mari 2016; de Marneffe et al. 2012 confirm this complexity with corpus data).

It makes sense, then, to talk about objective and relative veridicality for all sentences. Objective veridicality depends on what is the case or not in the world, and corresponds to actual truth; but in relative veridicality an individual is making her or his own judgement subjectively, and becomes the individual anchor (Farkas 1992, Giannakidou 1994, 1998, et sequ.), or the epistemic agent (Giannakidou 2013). The veridicality judgment relies on what the anchor knows or believes to be the case, i.e. on what we called in chapter 1 ‘information state’.\(^4\)

For unembedded sentences, the individual anchor is always the speaker. For an unmodalized assertion of $p$, $p$ is assertable only if the speaker knows or at least believes $p$ to be true. Veridicality, thus, is a condition on the speech act of assertion and we will make this precisely below. Another way to understand this, as we emphasized already, is to say that in order to co-operatively assert $p$, the speaker must be epistemically committed to $p$. Moore paradoxical sentences $\#p$ and I do not believe that $p$ are infelicitous exactly because the assertion of $p$ says that the speaker knows or believes $p$ to be true, and then she goes on to deny that (for more recent discussion see Lauer, 2013; Giannakidou and Mari 2016c, Mari, 2017a,b).

Giannakidou (1994, 1997) was among the first to offer a system of relativization of veridicality to individual anchors $i$ and their epistemic states. In main clauses the anchor is the speaker; in embedded clauses the anchor is the attitude holder. Individual anchoring of truth should be seen on a par with other kinds of anchoring of propositional content, i.e. temporal anchoring or event anchoring (e.g. Hacquard 2006, 2010); we will have more to say about this in chapter 3.

‘Models of evaluation’ are defined to describe the information states of an-

\(^3\)The relation between assertion and belief is complex, and currently under close scrutiny (see Lauer 2013; Krifka 2015; Mari 2017b). We will take up this question in chapter 4.

\(^4\)With sentences containing predicates of personal taste (Lasersohn 2005; Stephenson 2007) veridicality is determined not by knowledge but by taste or experience, and the individual anchor is called the judge.
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Anchors (see Giannakidou 2013 for updated discussion; the concept of individual anchor originates in McCawley 1980, Farkas 1985). These models are sets of worlds, relative to i, corresponding to what i believes or knows; what i dreams, imagines, remembers, is aware of; what i wants or desires, etc., depending on the nature of the propositional attitude, as we show in the course of this book. In Giannakidou (1999:45) these models are called epistemic states, and we have also been using the term information states in Giannakidou (2013). Recall the definition from Chapter 1:

\begin{equation}
\text{Information state of an individual anchor } i
\end{equation}

An information state M(i) is a set of worlds associated with an individual i representing worlds compatible with what i knows or believes in the context of utterance.

We can think of M(i) conveys the i’ worldview, i.e., what i knows or thinks about the world. It is a non-trivial, non-singleton set that encompasses i’s beliefs and knowledge about the world. Another way of thinking about these states is as mental states. As our analysis develops in this book, we will see that there are many kinds of information states that are relevant for propositional attitudes, and some of them really look like cognitive states such as memory, perception, awareness, emotion.

Given M(i), we can now identify (non)veridicality subjectively as follows:

\begin{equation}
\text{Subjective veridicality and homogeneity (non-final)}
\end{equation}

i. A function F that takes a proposition p as its argument is subjectively veridical with respect to an individual anchor i and an information state M(i) iff Fp is homogenous.
ii. M(i) is homogenous iff \(\forall w’[w’ \in M(i) \rightarrow p(w’)]\).

Subjective veridicality reflects knowledge or belief of i that p is true, as in the classical treatment of Hintikka (1962), and requires homogeneity of the entire M(i). This is crucial. When all worlds in M(i) are p worlds, M(i) is a veridical state, and p is entailed in M(i).

\begin{equation}
\text{Veridical information state}
\end{equation}

An information state M(i) is veridical about p iff it is homogenous: \(\forall w[w \in M(i) \rightarrow w \in \{w’ | p(w’)]\}].

From the definition of subjective veridicality we can now derive (E)pietemic commitment as follows. E-commitment is a property that characterizes the individual anchor when he or she is in a veridical state M that entails p:

\begin{equation}
\text{E-commitment of } i \text{ to a proposition } p
\end{equation}
An individual anchor \( i \) is e-committed to \( p \) iff \( M(i) \) is a homogenous veridical state. In that case, \( M(i) \) entails \( p \).

In chapter 1, we said that the veridical homogenous state conveys, broadly speaking, settledness and certainty, and that a co-operative speaker that does not want to deceive, or lie to, the hearer will only utter \( p \) if she knows or believes the sentence to be true. The requirement for a veridical state holds irrespective of mood, and is a prerequisite for assertion. Recall:

\[(32) \quad \text{Veridical information state as a prerequisite for assertion} \]

A sentence \( S \) is assertable if and only if the speaker is in a veridical state about \( S \).

In terms of commitment, the above means that an individual anchor \( i \) can assert \( p \) only if \( i \) is e-committed to \( p \). For example:

\[(33) \quad \text{Flavio is a doctor} \text{ is assertable by speaker } i \text{ if and only if } \forall w'[w' \in M(i) \rightarrow \text{doctor}(Flavio)(w')]. \]

The co-operative assertion of an unmodalized unembedded positive sentence relies on the speaker’s belief or knowledge of \( p \). Now, if the prejacent sentence is negative, in a parallel manner, assertability relies on the speaker’s commitment to \( \neg p \):

\[(34) \quad \text{Giacomo is not a doctor} \text{ is assertable by speaker } i \text{ if and only if } \forall w'[w' \in M(i) \rightarrow \neg \text{doctor}(Giacomo)(w')]. \]

Again we have homogeneity: all worlds in \( M(i) \) be \( \neg p \) worlds. We can therefore say that the assertion of unmodalized sentences, positive or negative, expresses veridical states of e-commitment of \( i \) to the prejacent, be it a \( p \) or its negation \( \neg p \). We will thus revise our initial definition of subjective veridicality as follows:

\[(35) \quad \text{Subjective veridicality (final)} \]

i. A function \( F \) that takes a sentence \( \phi \) as its argument— where \( \phi \) stands for \( p \) or \( \neg p \)— is subjectively veridical with respect to an individual anchor \( i \) and an epistemic state \( M(i) \) iff \( F \phi \) is homogenous.

ii. \( M(i) \) is homogenous iff \( \forall w'[w' \in M(i) \rightarrow p(w')] \), or \( \forall w'[w' \in M(i) \rightarrow \neg p(w')] \)

In other words, a subjectively veridical function entails commitment to \( p \) or \( \neg p \).

At this point, it is useful to relate veridicality to epistemic settledness:

\[(36) \quad \text{Epistemic settledness in } M(i) \]

\( M(i) \) is epistemically settled about \( \phi \) iff \( (\forall w' \in M(i)p(w')) \lor (\forall w' \in \neg p(w')) \).
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\[ \text{M}(i) \neg p(w') \]

The notion of epistemic settledness is useful to understand the implications of veridicality and homogeneity for entailment: when all worlds are \( p \) worlds, the epistemic state is positively settled and entails \( p \); when all worlds are \( \neg p \) worlds, the epistemic state is negatively settled and entails \( \neg p \). When \( \text{M}(i) \) entails \( p \), we can say that \( \text{M}(i) \) supports \( p \) (a term that we used in earlier work). \( \text{M}(i) \) entails \( \neg p \), \( \text{M}(i) \) supports \( \neg p \). In terms of commitment, when \( \text{M}(i) \) supports \( p \), we will say that \( i \) is e-committed to \( p \); when \( \text{M}(i) \) entails \( \neg p \), \( i \) is said to be e-committed to \( \neg p \). E-commitment to \( \neg p \) is rejection of \( p \). Asserting \( p \) and rejecting \( p \) reveal both veridical, homogenous states conveying settlement (or support) of \( p \) or \( \neg p \) in \( i \)'s epistemic state \( \text{M}(i) \). We can summarize:

(37) Veridicality of epistemic states and settledness

\[ \text{a. An epistemic state } \text{M}(i) \text{ is veridical about } p \text{ iff it is positively settled:} \\
\quad \text{i.e. } \forall w' \in \text{M}(i) : p(w') \]
\[ \text{b. An epistemic state } \text{M}(i) \text{ is veridical about } \neg p \text{ iff it is negatively settled:} \\
\quad \text{i.e. } \forall w' \in \text{M}(i) : \neg p(w') \]

The verb know, as we mentioned in chapter 1 already, is subjectively veridical given all the above:

(38) \[ [\text{Nicholas knows that } p] \text{ is true in the world of the utterance context } w \text{ iff:} \\
\quad \forall w'[w' \in \text{M}(\text{Nicholas}, w) \rightarrow p(w')] \]

In addition, know is objectively veridical since its complement is a fact, i.e. true in the actual world \( w \), hence \( \text{KNOW } p \) entails \( p \) in \( w \).

(39) \[ [\text{Nicholas kseri /know } p] \text{ will be defined iff the actual world } w \text{ is a } p \text{ world. If defined,} \\
\quad [\text{Nicholas kseri oti } p] \text{ is true in } w \text{ with respect to } \text{M}(\text{Nicholas}) \text{ iff:} \\
\quad \forall w'[w' \in \text{M}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}] \]

\( \text{KNOW} \) thus combines an objective veridicality presupposition with a subjectively veridical assertion: the information state of the subject, \( \text{M}(\text{Nicholas}) \), is homogenous, i.e., all worlds are \( p \) worlds. Factivity is the objective veridicality condition that \( w \) is a \( p \) world.

(40) Factivity as a presupposition of objective veridicality

A propositional function \( F \) is factive iff \( Fp \) presupposes that \( p \) is true.

In other words, an objectively veridical \( F \) can simply entail \( p \), or presuppose it, in
which case F is factive.

Veridical functions, however, need not be factive like the epistemic one. Subjective veridicality simply requires that the individual anchor is in a state M that supports p, regardless of whether p is actually (i.e. objectively) true. For instance, Nicholas believes that Ariadne is a doctor reflects a veridical epistemic state (with respect to Nicholas = i and Nicholas’s belief state = M(i), but the sentence Ariadne is a doctor can be objectively false, i.e., Nicholas might have a false belief:

(41) \[ [Nicholas believes that p] \] is true in the world of the utterance context w iff:
    \[ \forall w'[w' \in \text{Dox}(Nicholas, w) \rightarrow p(w')] \]

Here we are using Dox to refer specifically to a doxastic state. The truth condition of believe does not entail actual truth. However, (41) renders believe subjectively veridical, because the whole M(Nicholas) entails p. As we shall see in this book, other verbs denoting private epistemic spaces such as dream, imagine are subjectively veridical because they denote variants of Dox that entail p without entailing actual truth.

Subjective veridicality (thus also: commitment and homogeneity), we will argue, is the prerequisite property for the licensing of the indicative mood. This is why verbs of belief and knowledge both select the indicative. Our thesis will be the following, as can be recalled from the conclusion of chapter 1:

(42) Licensing condition: indicative mood and veridicality
    The indicative will be licensed in the complement of a propositional attitude that is veridical (objectively or subjectively), and lacks a nonveridical presupposition.

Verbs of negative assertion (briefly mentioned in chapter 1) are also veridical and select the indicative:

(43) O Nicholas arnithike oti/*na i Ariadne ton voithise.3sg that.IND/*SUBJ the Ariadne him helped.3sg.
    ‘Nicholas denied that Ariadne helped him.’

At first, the indicative might surprise us given that DENY p does not entail p. But negative assertive verbs express commitment to \( \neg p \), and it makes sense that they select indicative:

(44) \[ [Nicholas denied that p] \] is true in the world of the utterance context w iff:
    \[ \forall w'[w' \in M(Nicholas, w) \rightarrow \neg p(w')] \]
In other words, if \( i \) denies that \( p \) and \( i \) is truthful, then \( i \) knows \( \neg p \) to be true. The condition might be weakened to \( i \) believes \( \neg p \) to be true. Regardless of which version we chose, the point here is that subjective veridicality explains why we get indicative with even negative assertives.

Let us move on now to subjective nonveridicality, which is the licensing property, we will argue, of the subjunctive mood. Crucially—and contrary to what most literature assumes—the indicative and the subjunctive are both dependent in our approach.

### 2.2.3 Subjective nonveridicality

Nonveridicality is a property of a function \( F \) that does not entail that \( i \) is committed to \( \phi \). Nonveridicality creates a state of uncertainty, as we said. We define it as below:

\[
\text{(45) Subjective veridicality} \\
\text{A function } F \text{ that takes a proposition } p \text{ as its argument is subjectively nonveridical with respect to an individual anchor } i \text{ and an epistemic state } M(i) \text{ iff } F p \text{ is not homogenous, i.e., iff } \exists w' \in M(i) p(w') \& \exists w'' \in M(i) \neg p(w').
\]

In other words, a subjectively veridical function does not entail that \( i \) knows or believes \( p \), or that \( i \) is committed to \( p \) in any way. The nonveridical state is partitioned:

\[
\text{(46) Nonveridical epistemic state} \\
\text{An epistemic state } M(i) \text{ is nonveridical about } p \text{ iff } M(i) \text{ contains both } p \text{ and } \neg p \text{ worlds.}
\]

Nonveridical epistemic states \( M(i) \) are non-homogenous, containing \( p \) and \( \neg p \) worlds. They are therefore epistemically unsettled, not entailing \( p \). A veridical state expresses weaker commitment to \( p \) than a veridical state, which is full commitment (homogeneity).

Inquisitive spaces such as questions also denote nonveridical epistemic states. Statements with possibility modals and modals generally reveal such nonveridical states, as we will show. We will move on to examine the nonveridicality of modals next. Before we do that let us summarize below the typology of modal spaces (sets of worlds) that we just talked about:

\[
\text{(47) Veridical and nonveridical modal spaces and homogeneity (Giannakidou 2013)} \\
a. A modal space } M \text{ is veridical iff it is homogenous: } \forall w'(w' \in M \rightarrow p(w')), \text{ or } \forall w'(w' \in M \rightarrow \neg p(w'))
\]
CHAPTER 2. SEMANTIC FRAMEWORK FOR POSITIVE BIAS

b. A modal space $M$ is nonveridical iff it is non-homogenous: $\exists w', w'' \in M (w' \neq w'' \land (p(w') \land \neg p(w'')))$

A nonveridical state is epistemically weaker than the veridical state which supports the prejacent proposition ($p \lor \neg p$ if the prejacent is negated). The nonveridical $M$ conveys weakened commitment of $i$ to $p$:

(48) Weakened commitment to $p$
   i. A non-veridical modal space $M$ conveys weakened commitment of $i$ to $p$.
   ii. A non-veridical modal space $M$ is epistemically weaker than a veridical epistemic space $M$.

When $p$ is negated, we have commitment to $\neg p$, which is strong, homogenous e-commitment. When a speaker choses to embed $p$ under a subjectively nonveridical function, she does so because she can’t fully reject $p$, she still has some commitment to it.

When we think of informative content and individual anchor commitment, a homogenous veridical state corresponds to a move by $i$ to add the prejacent proposition, either to the common ground or to private grounds, as we will argue in chapter 4. Following Giannakidou (2013), we call this ‘full informativity’, and it is what we typically observe with positive bare and negated assertions. Positive and negative bare assertions are fully informative in that they allow addition of the prejacent to the common ground:

(49) Fact: Homogeneity and informativity
   Homogenous information states are fully informative.

Homogenous states contrast with nonveridical states which are partitioned ($p$ and $\neg p$) thus preventing addition of $p$ to the common ground.

We are now going to show that modal verbs as a natural class, no matter how ‘strong’ they might initially give the impression to be, are epistemically weaker than the unmodalized assertions because their epistemic modal bases are nonveridical states. By having such modal bases, modal operators do not entail knowledge or belief of $p$. When a speaker uses a modal, in other words, she does so because she wants to signal that she does not have knowledge or belief of $p$ and can therefore not be committed to it. The subjunctive, we argue, will be licensed in precisely this situation. It is, in other words, the mood of uncertainty and non-commitment.
2.3 Modal operators and the subjunctive: possibility

The foundation of any theory of linguistic modality is the Kratzer (1977, 1981, 1990) and Portner (2009) semantics, where modal verbs take modal bases and ordering sources. Following Giannakidou (1998, 1999, 2013b), Mari (2015a, 2017a,b) and Giannakidou and Mari (2012a,b, 2013, 2016c), we will add the ‘Nonveridicality Axiom’ that all modal bases are nonveridical, i.e. they are non-homogenous spaces containing \( p \) and \( \neg p \) worlds. Beaver and Frazee (2016) adopt nonveridicality as a defining property of modality too, and the Nonveridicality axiom appears in Condoravdi (2002) as a ‘diversity’ condition for modal bases. Modals are signals that the speaker does not know or Hintikka-believe that the pre-jacent is true, and are thus epistemically weaker than bare unmodalized assertions—which, as we showed, convey veridical epistemic states.

By ‘modals’, we intend to refer to expressions that denote the necessity or possibility operators of modal logic, regardless of grammatical category. Modals thus can be verbs, adverbs, adjectives, tenses, and particles:

(50) Flavio may/must/might. should be at home. (modal verbs)
(51) Flavio is probably/maybe/perhaps at home. (modal adverbs)
(52) It is possible/probable that Flavio is at home. (modal adjectives)
(53) O Janis tha erthi spiti. (modal future particle) the John FUT come.NONPAST.3sg home. ‘John will come home.
(54) Gianni arriverà domani. (modal tense) John arrive.3sg.FUT tomorrow. ‘John will arrive tomorrow.’

The future modal particle in Greek, and the future morphological tense in Italian are, in fact, epistemic necessity operators just like MUST we have argued in Giannakidou and Mari (2018b). In the discussion below, when we use MUST we refer to the future modal too, as will become clear. And the epistemic subjunctive used with questions in Greek and Italian, though particle and verbal morphology again, still behaves as a possibility modal in the semantics.

Modals come in different modal flavors, most prominently in epistemic and deontic variants. Portner talks about priority modality to include teleological, bouletic and ability modality. Below, we focus mainly on epistemic modals, but we will discuss the deontic too in the context of priority modality and ability in chapter 6.

Modal verbs as a class, it must be recalled, unlike knowledge/doxastic verbs,
require the subjunctive:

(55)  Prepi na/*oti vrehi.
      must that.SUBJ/IND rain.3sg.
      ‘It must be raining.’

(56)  Bori na/*oti vrehi.
      may that.SUBJ/IND rain.3sg.
      ‘It may be raining.’

(57)  Prepi na/*oti evrekse.
      must that.SUBJ/IND rain.PAST.3sg.
      ‘It must have rained.’

(58)  Bori na/*oti evrekse.
      may that.SUBJ/IND rain.PAST.3sg.
      ‘It may have rained.’

(The infinitive is also allowed in Italian, but is impossible in Greek). Greek has
two modal verbs— a possibility modal bori, and a necessity modal prepi. Staraki
(2013, 2017) offers recent extensive discussions on the Greek modals, includ-
ing further interactions with tenses (see also Giannakidou 2012, Giannakidou and
Mari 2016c, 2018b). As can be seen in the examples above, both modals require
the subjunctive. The type of modality also doesn’t seem to matter: the above
sentences are epistemic, but deontic modals also require subjunctive:

(59)  Prepi na/*oti fas olo to fagito sou! (Mother to child)
      must that.SUBJ/IND eat.2sg all the food yours.
      ‘You must eat all your food!’

(60)  Ja na perasis ston epomeno giro, prepi na/*oti
      for subj. pass.on.2sg to the next round, must that.SUBJ/IND
      apandisis tris erotisis.
      answer.2sg three questions.
      ‘In order to pass on to the next round (of the game), you must answer
      three questions.’

(61)  Boris na/*oti klisis tin porta.
      must that.SUBJ/IND close.2sg the door.
      ‘You may close the door.’

Deontic modality requires the subjunctive, as we see, even when used for rules,
definitions, etc. In Italian, subjunctive is also the pattern, along with infinitive.
Modal verbs never select the indicative.

Every modal has an epistemic modal base as its argument, which we will
designate as M(i). In terms of our framework, M(i) is the set of propositions
known by the speaker \( i \) at \( t_u \) (the utterance time). \( w_0 \) is the world of evaluation, by default the actual world:

\[
M(i) (t_u)(w_0) = \lambda w'(w' \text{ is compatible with what is known by the speaker \( i \) in } w_0 \text{ at } t_u)^5
\]

The epistemic modality is, therefore, by default ‘subjective’ (Lyons 1977), and knowledge changes with time. Epistemic modality is parametric to knowledge at \( t_u \), as is often acknowledged in the literature (see Portner 2009, Hacquard 2006,2010, Giannakidou and Mari 2016c).

Given what the speaker knows, the modal base of epistemic of MAY and MUST is nonveridical about the proposition \( p \) denoted by its prejacent, and contains both \( p \) and \( \neg p \) worlds. Following Giannakidou and Mari (2016c, 2018b), we formulate nonveridicality as a precondition on modalities in the form of the axiom below:

\[
\text{(63) Nonveridicality Axiom of modals}
\]

\[
\text{MODAL (M) (} p \text{) can be defined if and only if the modal base M is nonveridical, i.e. only if M contains } p \text{ and } \neg p \text{ worlds.}
\]

The nonveridicality axiom requires that the modal base \( M(i) \) be partitioned into worlds where \( p \) is true, and worlds where \( p \) is not true. Non-aleithic modal (possibility and necessity, epistemic, deontic, bouletic, etc) obey this principle, and therefore come with partitioned modal bases; consequently, epistemic modal do not entail \( p \) or knowledge of the speaker that \( p \), and express reduced commitment to \( p \).\(^6\) Unmodalized assertions express full commitment, and are therefore stronger than modalized sentences.

In agreement with the common analysis of epistemic possibility, we take it that epistemic possibility modals are existential quantifiers and that they lack ordering sources.\(^7\) The absence of ordering sources with epistemic possibility modals ren-

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\(^5\)Our notation \( M(i) \) corresponds to the Kratzerian notation using set intersection \( \cap f_{\text{epistemic}}(w_0, i, t_u) \), where this returns the set of worlds compatible with what it is known in \( w_0 \) by \( i \). It is also clear that modality, in our framework, is always subjective, allowing also for cases where \( i \) is a collective individual or group of people to capture what others would call objective modality.

\(^6\)There are two exceptions to the axiom, and both result in trivialization of modality. The first case is the actuality entailment of ability modals, where the modal is trivialized (see Mari 2017c), and our discussion in chapter 6. The second case is aleithic modality, as in \( 1 + 1 \text{ must equal } 2 \). Giannakidou and Mari (2016c) distinguish this aleithic \( \text{must} \) from the epistemic use — thus maintaining nonveridicality and so-called ‘weakness’ of epistemic MUST (Karttunen 1972). With both aleithic modality and actuality entailment, the distinction between modal and non modal statement is lost. We offer more discussion on this point in chapter 6.

\(^7\)Deontic possibility modals are claimed to use a circumstantial modal base and a deontic ordering source (Portner 2009).
ders $p$ and $\neg p$ equal possibilities revealing that the assessor is in a state of non-
veridical equilibrium which is true uncertainty (Giannakidou 2013, Giannakidou and Mari 2016c, 2018b):

(64) **Nonveridical equilibrium** (Giannakidou 2013)

a. An information state $M$ is in nonveridical equilibrium iff $M$ is parti-
tioned into $p$ and $\neg p$, and there is no bias towards $p$ or $\neg p$.

b. Sentences with nonveridical equilibrium are inquisitive prototypes.

We will refine this definition for equilibrium, but for now suffice it to see that it renders possibility modals truly weak with respect to the prejacent, akin to ‘in-
quisitive prototypes’. Unbiased polar questions (*Did Ariadne win the race?*) are such prototypes, according to Giannakidou, denoting states where both options are of equal preference to the speaker. Nonveridical equilibrium is a state of bal-
anced indecision, where both $p$ and its negation are equally plausible options and $i$ has no reason to prefer one over the other (see Kang and Yoon 2018 for some more discussion of the concept of equilibrium as it applies to certain question par-
ticles in Korean). Giannakidou (2013) argues that ‘inquisitive’ and ‘nonveridical’ describe the same state in the case of possibility and questions.

The bare truth condition of epistemic possibility is the following, considering also the explicit contribution of tense and focussing on the present and past cases:

(65) $\square \text{MIGHT (PRES (p))}^{M,i,S}$ is true iff $\exists w' \in M(i) : p(w', t_u)$

(66) $\square \text{MIGHT (PAST (p))}^{M,i,S}$ is true iff $\exists w' \in M(i) : \exists t' \prec t_u \land p(w', t')$

This truth condition will be enriched later, but it suffices as a basic truth condi-
tion. By choosing a possibility modal, the speaker $i$ conveys the weakest form of commitment to $p$: nonveridical equilibrium. We call this trivial commitment, and it comes with very low informativity about $p$ (comparable to that of questions, according to Giannakidou 2013).

Before we move on, it is worth noting that epistemic modals, questions, and the subjunctive are compatible with one another, as we mentioned earlier. Recall some of the examples from Giannakidou (2016) we discussed in chapter 1 under the label ‘epistemic subjunctive’:

(67) Na $\text{irthe i Ariadne?}$
That.SUBJ arrived.3sg the Ariadne.
‘Might Ariadne have arrived?’

(68) Pjos na $\text{pige sto party?}$
who that.SUBJ went.3sg to-the party.
‘Who might have gone to the party?’
2.4. **EPISTEMIC NECESSITY: NO INDIRECTNESS, POSITIVE BIAS**

Epistemic subjunctive has exactly the denotation of MIGHT designated above, and suffices to modalize the sentence, as we can see. In English, in fact, we do have the actual modal *might*. Crucially, epistemic MUST is ruled out in questions:

(69) #Prepi na irthe i Ariadne?  
    must that.SUBJ arrived.3sg the Ariadne.  
    ‘Must Ariadne have arrived?’

(70) #Pjos prepi na pige sto party?  
    who must that.SUBJ went.3sg to-the party.  
    ‘Who must have gone to the party?’

(For English data see Hacquard and Wellwood 2012). The incompatibility of MUST with a question has been a long standing mystery. It arises, in our theory, simply as lexical conflict: the question is in nonveridical equilibrium but MUST conveys positive bias, as we further develop this chapter.

Before moving on, it seems reasonable to formulate the following licensing condition of the subjunctive:

(71) Licensing dependency of subjunctive mood

An expression F licenses the subjunctive mood in its scope iff F is non-veridical.

The subjunctive requires to be in the scope of a nonveridical operator, and we propose this condition as a sufficiency condition (on the semantics of the licenser, i.e. the higher selecting verb. The possibility modal is nonveridical objectively and subjectively, it can therefore license the subjunctive mood.

2.4 **Epistemic necessity: no indirectness, positive bias**

We move on now to epistemic necessity modals. By using this label we mean to indicate, in the present work, modal verbs meaning ‘must, should’, as well as the future modal and morphemes (FUT). We refer to Giannakidou and Mari (2018a) for detailed arguments that FUT expressions are epistemic necessity modals, and we will use upper case MUST to refer to such expressions jointly, as we did in our previous work. Necessity modals obey the Nonveridicality Axiom, but now the modal base favors the worlds where \( p \) is true. We will call this ‘positive bias’ towards \( p \), and we will propose a theory of how exactly that happens based on some recent work (Giannakidou and Mari 2013, 2016c, 2018a,b).

In his seminal work, Kartunnen (1972) proposes an analysis of English *must* as ‘weak’. Recall that just like the possibility modal, Greek and Italian select the subjunctive, unlike the unmodalized sentences which select the indicative. They
are therefore, clearly, epistemically weaker than unmodalized sentences, and by
the licensing condition we just gave, Greek and Italian MUST are nonveridical
since they license the subjunctive. We have no reason to believe that English
MUST is otherwise. And do not forget that both epistemic MUST and MIGHT
are objectively nonveridical, i.e. they do not entail \( p \).

From the perspective of mood licensing thus, one could never be led to believe
that MUST is strong. In English, where there is no mood distinction, it is easy to
be misled. We proceed now to analyze the subjective nonveridicality of MUST.
We start by offering evidence that MUST expressions are not compatible with
knowledge of \( p \). In making this argument, we will refute Kartunnen’s thesis that
the weakness of ‘must’ has to do with a requirement that evidence be indirect. It
is not directness or indirectness that matter, but whether there is knowledge or not
of \( p \). If \( i \) knows \( p \), \( i \) is e-committed to \( p \), as we said, and in this case MUST can
simply not be used. After we establish this, we discuss the property of positive
bias.

2.4.1 Nonveridicality of MUST, not indirectness

Kartunnen (1972) held that the weakness of MUST is intimately related to the
weakness of the source of information: when the speaker has indirect evidence
that the prejacent is true, she uses MUST to signal that she is uncertain about
the truth of the prejacent. We (Giannakidou and Mari 2016c) argued that the
epistemic weakening is not due to the fact that knowledge is indirect, but to the
fact that knowledge is partial. In other words, the speaker \( i \) cannot be e-committed
to \( p \) with MUST. 8 When the speaker reasons with a universal modal, she is aware
that she does not have all the knowledge she needs to draw a valid conclusion in
all worlds in the modal base. When she has complete knowledge, she cannot use
the universal modal, as will show now.

Let us proceed to offer arguments for the epistemic weakness of MUST, and
against indirect evidence. Consider first the classical direct visual perception con-
texts.

(72) \h C x t e n t: \( i \) is standing in front of the window and sees the rain
a. #It must be raining.

8Von Fintel and Gillies (2010:361) also challenge Kartunnen: ‘Our point is simple: weakness
and indirectness are not two sides of a single coin at all. They are just different’. Their claim is
that the epistemic modal must presupposes indirect evidence, but it is nevertheless ‘strong’. We
have addressed von Fintel and Gillies in earlier work; here we will repeat our refutation only of
what appears to be their strongest argument, which concerns deductive contexts, and—as it turns
out—not epistemic but alethic MUST.
2.4. EPISTEMIC NECESSITY: NO INDIRECTNESS, POSITIVE BIAS

If I see the rain, I know that it is raining, and knowledge, as we said, is veridical: if I know \( p \), then all worlds compatible with my knowledge are \( p \) worlds, i.e. I am in a veridical state, e-committed to \( p \). MUST is incompatible with this state of homogenous e-commitment that comes form knowledge of \( p \). Hence, MUST is excluded not because the evidence needs to be indirect, but because evidence is a reliable path to knowledge. MUST, we must conclude, is incompatible with knowledge of \( p \).

In further support of this conclusion, Giannakidou and Mari (2016c) note that MUST statements can be continued by ‘but I am not entirely sure’. We illustrate below for Greek and Italian (as first noted in Bertinetto 1979; Mari 2009, Giannakidou and Mari 2012b):

(73) Deve essere a casa, ma non sono totalmente sicuro.

‘He must be home, but I am not entirely sure.’

In this respect, MUST differs from know and the bare positive assertion which are veridical thus expressing knowledge of \( p \), and do not accept such continuation:

(74) a. #He is at home but I am not entirely sure.

b. #I know he is at home but I am not entirely sure.

For English, Lassiter (2016) offers a plethora of attested examples where must is compatible with ‘I don’t know for sure’, and similar expressions challenging knowledge of \( p \):

(75) This is a very early, very correct Mustang that has been in a private collection for a long time. ... The speedo[meter] shows 38,000 miles and it must be 138,000, but I don’t know for sure.

(76) I don’t know for sure, sweetie, but she must have been very depressed. A person doesn’t do something like that lightly.
It must have been a Tuesday (but I don’t know for sure), I can’t remember.

I have an injected TB42 turbo and don’t like the current setup. There is an extra injected located in the piping from the throttle body... Must be an old DTS diesel setup but I’m not certain. Why would they have added this extra injector?

These examples support the conclusion that MUST does not entail knowledge of, thus full commitment to, $p$ by the speaker $i$. MUST, rather, allows inference to $p$ based on a number of premises and potential gaps (see also recent discussion in Goodhue 2018).

Giannakidou and Mari (2016c) offer some good arguments against indirectness, and in favor of lack of e-commitment with MUST. We summarize two arguments here and add two more. Consider the contrast between the veridical context we presented before where I see the rain, and the following case (79), where I only see a wet umbrella.

In this context, I see a wet umbrella, but I don’t see the rain, therefore I do not know that it is raining. The wet umbrella is an indication of rain, and can support ‘It is raining’ in part of my M by enabling the missing premise that the umbrella got wet because of the rain. But M can contain also worlds in which the umbrella got wet in some other way— and these worlds could be considered by me more likely, for instance in a context such that when I left the house this morning the weather was sunny and the forecast predicted no rain. Continuation with ‘I am not sure’ is allowed here, as we see.

Secondly, auditory perception is compatible with MUST, despite the fact that hearing is as direct as seeing:
2.4. **EPISTEMIC NECESSITY: NO INDIRECTNESS, POSITIVE BIAS**

(80) Context: I am in a room with no windows, but I hear sounds of rain on the roof.
   a. It must be raining.
   b. Tha vrexi.
      FUT rain.
   c. Pioverà.
      rain.FUT.3sg.
   d. Tha prepi na vrexi.
      FUT must that.SUBJ rain.

If I only hear something that sounds like rain, I do not know that ‘it is raining’, I only have the sound of something that could be rain. The stimulus is direct, but inadequate for knowledge. What I hear might be caused by something other than the rain (hence, I am also missing the premise: *if it sounds like rain it is rain*). Auditory perception is nonveridical (as we will discuss further in chapter 5), while visual perception is veridical (recall that the first discussions of veridicality in linguistic come from Montague’s (1969) analysis the verb *see* as veridical. Overall, perceptions can of course be deceiving, and just because something *looks like* it has the property P doesn’t mean that it does. Semblance verbs—as will be shown in chapter 4, can be construed as nonveridical.

Now consider the case where I see, but my vision is not clear. In this case, I can use MUST:

(81) Context: I am looking through the window, and it is foggy and dark. I don’t fully trust what I am seeing:
   It must be raining.

(82) Prepi na vrexi. (Greek MUST)
    must that.SUBJ rain.3sg.
    ‘It must be raining.’

(83) Tha vrexi. (Greek, epistemic future, equivalent to MUST)
    future rain.3sg.
    ‘It must be raining.’

The above shows that it’s not about direct perception or not, but about how reliable I take the sensory information to be in establishing knowledge. If my vision is unclear and it’s foggy, I do not trust my senses fully as a source for knowledge, I can therefore not be committed to ‘It is raining’. von Fintel and Gillies and Karttunen cannot predict the contrast between seeing clearly vs. not clearly, because both visions are direct.

As a fourth argument for nonveridicality of MUST and against indirectness,
consider the following case, reproducing an example from Smirnova (2013). Here we see a contrast between MUST and the Bulgarian indirect evidential which is fine in the reportative context.

(84) Reportative context: you and your sister were out of touch for a couple of years. Today she calls you on the phone to catch up. She tells you that her daughter Maria plays the piano. Later, you tell your husband:

a. Maria svirela na piano.
   Maria play.EV on piano Bulgarian evidential OK (Smirnova 2013:2)

b. #I Maria tha/prepi na pezi piano.
   #Maria must play the piano.

c. #Maria deve suonare il piano.
   #Maria must.3sg play the piano.

d. Mary must play the piano.

The reason why MUST is blocked in this context is that here the speaker has knowledge that $p$ provided by her sister’s utterance. Most of the knowledge we acquire, in fact, comes not from direct experience, but because we read or hear reports from sources that we trust. If the speaker trusts the source of the report Maria plays the piano, i.e. her sister, and has no reason to doubt her, then upon hearing the information that Maria plays the piano, the speaker knows that Maria plays the piano. This is a classical veridical exchange, and MUST is incompatible with it. This example, therefore, clearly shows that it is not indirectness that matters but knowledge. If one has knowledge of $p$, even if this knowledge is due to someone else having provided the information, one cannot use a modal, not even MUST.

In other words, the apparent evidential effect of universal epistemic modals is due to the fact that they are indicators of reasoning with some uncertainty, i.e., with a non veridical modal base. But the inadequacy of the indirectness approach is deeper than this. It is indeed possible to show that the same evidence can lead to two different types of statements – bare veridical assertion indicating knowledge, or universal modal statement – depending of the epistemic state of the speaker (see also Goodhue 2018).

Consider a context where I am preparing dinner, and ask my son to switch on the oven when the alarm rings. I know that what is in the oven is all we will eat. My son does not know it.

(85) Context: the oven alarm rings.
   Mom: The dinner is ready.
2.4. **EPISTEMIC NECESSITY: NO INDIRECTNESS, POSITIVE BIAS**

Son: The dinner must be ready.

Since my son does not know what his mom has in mind, it would be infelicitous for him to utter ‘The dinner is ready’. The bare assertion is instead felicitous when uttered by the mom, as she has the dinner plan in mind. Here, direct evidence, does not block MUST: the MUST sentence, uttered by the son, is felicitous because his knowledge state is that of only partial knowledge.

Reversely, as indicated in earlier reported conversation example, the indirectedness does not always trigger MUST either. We will use again an example modeled after Smirnova (2013). You and your sister were out of touch for a couple of years. Today you visit her for the first time. As she shows you around her apartment, you see that there is a piano. Later, you tell your husband:

(86) a. I Maria tha pezi/prepi na pezi piano.
    the Maria FUT play/must subjunctive play piano.

b. Maria deve suonare il piano.
   Maria must play the piano.

c. Maria must play the piano.

Here we have a piano, but we don’t actually see Maria playing it, and there is no report that she does. The speaker, knowing her sister and husband do not play the piano (and may in fact be entirely musically inept), inferences that their daughter Maria plays the piano. An inferential context with missing premises is therefore an excellent environment for MUST. Again, it is not a matter of indirectness, as we see the piano directly: it is simply reasoning with incomplete knowledge and some uncertainty, so that we can effectively partition the modal base into worlds that support the proposition and those that do not, as is required by epistemic weakening.

In Giannakidou and Mari (2016c), we summarized our conclusions in the following:

(87) **Evidential component of Universal Epistemic Modals (UEMs): partial knowledge**

a. UEMs can only effectively weaken a proposition \( p \), if the speaker’s knowledge that supports \( p \) is not complete.

b. Complete knowledge is knowledge of all the relevant facts for \( p \). More technically, it is a set of propositions that \( \text{entails} \ p \).

c. All other knowledge is partial.

The generalizations that we establish here for UEMs (aka MUST), are very relevant for the discussion of evidentiality, especially in languages that have indirect
evidential morphemes but do not mark direct perception (e.g. Native American languages such as Cheyenne, Murray to appear, and Turkish, Bulgarian, Smirmova 2013). The ‘direct’ evidential is typically an unmarked past or present, and the marked form is the so-called indirect evidential, which indicates that the source of information is not first-hand knowledge of the speaker. The indirect evidential—like MUST in English, Greek and Italian—is a nonveridical marker that marks the reduced commitment of the speaker to \( p \). Direct perception and reliable reports, on the other hand, as we discussed, entail full knowledge, veridicality, and e-commitment.

MUST, is therefore epistemically weaker than an unmodalized sentence. Before we move on to the technical part of how to capture this, we want to consider the argument for strength put forth by von Fintel and Gillies. The argument comes from deductive contexts, and it is the only substantial argument for strength. Consider:

\[(88)\] The ball is either in A, B or C. It is neither in A nor in B. It must be in C.

In this case, MUST indeed entails \( p \) and that the speaker knows \( p \). But does this show that MUST is strong, i.e., entailing \( p \) and knowledge of \( p \), as von Fintel Gillies would have it? Our response is no. Following our earlier discussion in Giannakidou and Mari (2016c), we will claim that MUST in this case is not epistemic but aleithic. Crucially, in the context above, the speaker has all the knowledge available, there are not gaps—unlike with epistemic MUST.

Aleithic MUST, we want to suggest, can be distinguished from epistemic MUST by means of focus. Aleithic MUST can bear focus, unlike epistemic MUST which cannot. Consider how odd MUST is in the inferential context to focus \textit{must}:

\[(89)\] Context: I see a wet umbrella.
\# It MUST be raining.
\# PREPI na vrexi.

\[(90)\] The ball is either in A, B or C.
\hspace{1em} a. The ball is neither in A nor in B. It MUST be in C.
\hspace{1em} b. Dhen ine sto A oute sto B, ara PREPI na ine sto C. (Greek)
\hspace{1em} c. La palla è in A o in B. Non è né in A, né in B. DEVE essere in C. (Italian)

We must therefore be cautious about the aleithic use of MUST which obeys veridicality, and not confuse it with epistemic MUST which obeys the nonveridicality axiom and relies on inference and partial knowledge (Giannakidou and Mari 2016c).
Let us now summarize the main points about modals compared to unmodalized assertions:

(91) (Non)veridicality as a formal criterion for strength
i. Veridical M = e-commitment, homogenous M (unembedded positive assertion with PAST, PRES)
ii. Nonveridical M with MUST = partitioned M, partial commitment in Ideal worlds (to be discussed further next).
ii. Nonveridical M with equilibrium = trivial commitment (MAY, questions)

We can order the states along a scale of epistemic commitment, where the unembedded assertion which implies knowledge or belief of \( p \) expresses the highest commitment, i.e. full, e-commitment of \( i \). Modal verbs produce epistemic weakening, which means that they express weaker commitment to \( p \). Weaker commitment means that the state M is nonveridical. MUST expresses partial commitment, and the possibility sentence expresses the weakest commitment of simply raising (or, not excluding) the possibility (called trivial below):

(92) Scale of epistemic commitment (Giannakidou and Mari 2016c)
\(<p, \text{MUST } p, \text{MIGHT } p>\); where \( p \) conveys full commitment of \( i \) to \( p \); MUST \( p \) conveys partial commitment, and MIGHT \( p \) conveys trivial commitment.

The criterion for epistemic commitment is (non)veridicality, i.e., \( p \), MUST \( p \), and MIGHT \( p \) are ranked based on veridicality: full commitment corresponds to a veridical M(\( i \)) which is the strongest state; reduced commitment (partial, as well as trivial) is weaker than full, e-commitment because M(\( i \)) is nonveridical. MUST \( p \) is stronger, however, than MIGHT \( p \) because it supports \( p \) in the Ideal worlds, as we shall see next.

The degree of commitment, finally, correlates also with how informative the sentence is. If, as we said earlier, a veridical state expresses maximal informativity, MUST \( p \) expresses medium informativity about \( p \), and MIGHT minimal informativity about \( p \). The negation of \( p \), as we said, indicates full informativity about \( \neg p \) which is also the ultimate weakening of commitment to \( p \).

Let proceed now to illustrate the semantics, and then the concept of bias.

2.4.2 MUST: Ideal and Non-Ideal worlds

Giannakidou and Mari (2016c,2018b) adopt the analysis of must by Kratzer 1991 (also Giorgi and Pianesi 1997, Portner 2009). MUST (and specifically Italian
dovere and Greek prepi), associates with an epistemic modal base $M(i)$ which is the set of propositions known by the speaker $i$ at $t_u$ (the utterance time). $w_0$ is the world of evaluation, by default the actual world:

$$(93) \quad M(i)(t_u)(w_0) = \lambda w' (w' \text{ is compatible with what is known by the speaker } i \text{ in } w_0 \text{ at } t_u)^9$$

The epistemic modality is, as we said, by default ‘subjective’, and knowledge changes with time. Epistemic modality is therefore parametric to knowledge at $t_u$, as is often acknowledged in the literature (see Portner 2009, Hacquard 2006, 2010, Giannakidou and Mari 2016c).

Given what the speaker knows, the modal base of epistemic MUST is non-veridical about the proposition $p$ denoted by its prejacent, and contains both $p$ and $\neg p$ worlds. To derive the truth conditions of MUST we assume with the literature (see e.g. Portner 2009) that MUST uses a set of propositions $S$ which describe shared stereotypical/normalcy conditions. Such conditions have most notably been discussed in relation to genericity (see Asher and Morreau 1995), progressives (Dowty 1979; Landman 1992; Portner 1998), but appear also as inertia (Dowty, ibid.), stereotypicality (Portner 2009), and reasonability (Landman ibid., Portner 1998; Mari 2014; see also discussion in Mari, Beyssade and Del Prete, 2012).

The Kratzer/Portner semantics posits an ordering source $\text{Best}$ which ranks worlds according to how close they are to the stereotypical ideal. Our account encodes that the modal base is partitioned into stereotypical and non-stereotypical worlds, but we dissociate stereotypicality from ranking. This allows us to capture possibility modals as undergoing the initial partition between stereotypical and non-stereotypical worlds without necessary ordering. Ranking in our system is expressed via a meta-evaluation which ranks the two sets of worlds produced by the initial partition. The adverb is the manifestation of the ranking, we will argue.

In the epistemic modal base $M(i)(t_u)(w_0)$, we define $\text{Ideal}_S$ as a function over $M(i)(t_u)(w_0)$, still in the spirit of Portner 2009. The output $\text{Ideal}_S$ is a subset of $M(i)(t_u)(w_0)$:

$$(94) \quad \text{Ideal}_S (M(i)(t_u)(w_0)) = \{ w' \in M(i)(t_u)(w_0) : \forall q \in S (w' \in q) \}$$

So defined, $\text{Ideal}_S$ delivers the worlds in the epistemic modal base, a subset of $M(i)$, in which all the propositions in $S$ are true. $S$ is a set of propositions that

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9It should be clear that our notation $M(i)$ corresponds to the Kratzerian notation using set intersection $\cap_f \text{epistemic}(w_0, i, t_u)$, where this returns the set of worlds compatible with what it is known in $w_0$ by $i$. It is also clear that modality, in our framework, is always subjective, allowing also for cases where $i$ is a collective individual or group of people to capture what others would call objective modality.
corresponds to common ground norms. The set Ideal$_S$ is also parametric to time. Unless otherwise stated, we consider that Ideal$_S$ is determined at the actual world and at the utterance time (this will be indeed always the case in the reminder of this book). As we can see, there is no ranking.

The overall modal structure looks like this:

(95) ModalP

Must M(i) S

TP

This structure has the following basic truth condition requiring that $p$ is true in the Ideal set of M(i). Tense comes from below (a semantic present or past; see Giannakidou and Mari (2018a) for discussion of tense); recall that $t_u$ is the utterance time. From now on, we assume that, by default, M(i) is projected at the time of utterance in the actual world. Given a set Ideal$_S$ and the utterance time $t_u$,

(96) (to be completed)

$[\text{prepi/devere/must (PAST ($p$))}]^{M,i,S}$ is defined only if M(i) is nonveridical and is partitioned into Ideal$_S$ and $\neg$Ideal$_S$ worlds. If defined, $[\text{prepi/devere/must (PAST ($p$))}]^{M,i,S} = 1$ iff $\forall w' \in \text{Ideal}_S : \exists t' < t_u \land p(w', t')$

(97) (to be completed)

$[\text{prepi/devere/must (PRES ($p$))}]^{M,i,S}$ is defined only if M(i) is nonveridical and is partitioned into Ideal$_S$ and $\neg$Ideal$_S$ worlds. If defined, $[\text{prepi/devere/must (PRES ($p$))}]^{M,i,S} = 1$ iff $\forall w' \in \text{Ideal}_S : p(w', t_u)$

Echoing Giannakidou and Mari (2016c) (and Knobe and Szabo 2013 before them), we can think of Ideal$_S$ as the ‘inner’ domain of MUST, and M(i) as the ‘outer’ domain. The outer domain is a nonveridical epistemic space that does not as a whole support $p$; but the Ideal$_S$ space is veridical: all worlds are $p$ worlds. In other words, MUST is nonveridical with respect to M, but veridical with respect to Ideal$_S$. This accounts for why we say that MUST expresses partial commitment: it expresses commitment to $p$ in the Ideal$_S$ subset of M(i). This makes it stronger than MIGHT, and grants MUST mixed veridicality status. Because of the nonveridical M(i), MUST satisfies the licensing condition for the subjunctive we posited, and this explains why the complement appear in the subjunctive.

The partition between Ideal and Non-Ideal worlds is not based on ranking of the worlds (as in Portner or Kratzer), but as we show next, the two sets are

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10 Since only those worlds are considered in which all the propositions in $S$ are true, the function Ideal$_S$ determines a cut-off point.
indeed ranked by a meta-evaluation function. This additional step produces, we will argue, positive bias.

### 2.4.3 Positive bias of necessity modals

We will now build a system for modality that creates positive bias. We will do this by following a recent analysis we proposed in Giannakidou and Mari (2018b).

As we just said, the partition between Ideal and Non-Ideal worlds is not based on ranking in our system, but we will now posit that the two sets themselves, i.e., $\text{Ideal}_S$ and $\neg\text{Ideal}_S$, are ranked according to an ordering source $O$. It is common to assume secondary ordering sources in recent literature (von Fintel and Iatridou, 2008; Rubinstein 2014, Portner and Rubinstein 2016); but given that our initial partitioning into $\text{Ideal}_S$ and non-$\text{Ideal}_S$ worlds does not depend on ranking, $O$ is not a secondary ordering. It is the primary ordering source, a ‘meta-evaluation’ that compares $\text{Ideal}_S$ to its complement in $M(i)$. Before we consider how ideality and stereotypicality specifically for epistemic modals, let us say more about the relation between ideality and metaevaluation.

In everyday life, we constantly evaluate whether the actual world follows stereotypical rules. What counts as normal or reasonable outcome depends on one’s knowledge and experience, and human agents make use of expectations relying on knowledge and experience when they reason. Normalcy and reasonability manifest themselves as domain restriction with quantifiers, or ignoring exceptions with generic statements, to mention just two well known examples. Of course, actual outcomes do not always conform to what is expected under normalcy conditions, and expectation of not conforming to what it is ‘normal’ determines often our uncertainty (besides not having complete knowledge). We propose the meta-evaluation $O$ as a way to capture the speaker’s confidence in normalcy effects. $O$ contains those propositions that allow $i$ to evaluate the relative ranking of stereotypical as better possibilities than non-stereotypical worlds.

Consider the case of John who is invited to a party. He is leaving from Place de la Sorbonne and needs to reach the Louvre. We know that he takes the metro. We also know that usually the metro works well in Paris. $\text{Ideal}_S$ creates a partition is $M(i)$ in which John arrives on time (these are worlds in which the metro worked well) and worlds in which he does not arrive on time (these are worlds in which the metro breaks down). Now, how likely are the worlds in which John arrives on time in comparison with those in which he does not? Usually, we believe, they are very likely, one of the propositions in $O$ being ‘I trust the metro system more than the car.’ Stated otherwise, stereotypicality triggers high confidence in (thus more commitment to) one’s conclusion, and this seems to be something basic about the way humans draw conclusions. One will have a tendency to rank the stereotypical worlds as more reliable than the non-stereotypical ones. In this case one would
probably utter something like (98-a) or even (98-b).

(98)  
   a. John must be at the Louvre.  
   b. John must definitely be at the Louvre.

Notice here the co-occurrence of MUST with definitely—an apparent ‘redundancy’, which we claim is not in section 6. Higher ranking of stereotypical worlds over non-stereotypical ones is a kind of natural inclination based on human reasoning and the fact that we usually domain restrict, therefore devalue or exclude non-stereotypical cases as perhaps non-relevant. Sometimes, however, one can evaluate the situation in a different manner. Based on one’s pessimistic personal inclinations, or convinced that public transportation is not as unreliable as expected, one can draw a different conclusion. \( \mathcal{O} \) will be different in this case, including ‘I do not trust the metro system.’ In this case, in a language like Italian, one would probably utter something like the following sentence, where the MUST combines with a possibility modal:

(99) Deve forse essere a la Louvre.  
    Must maybe be at the Louvre.

A few comments. First, there is a pragmatic dependency between stereotypicality and the ordering source \( \mathcal{O} \), revealing trust in the normalcy conditions. This dependency can be fragile because \( \mathcal{O} \) is subjective, and does not rely on shared rules like the initial \( \text{Ideal}_S \) partition. Cases like the above show that \( \mathcal{O} \) is a negotiable (Rubinstein, 2014, Portner and Rubinstein 2016) meta-evaluation of how confident \( i \) is about \( \text{Ideal}_S \) being a better possibility than \( \neg \text{Ideal}_S \). In this sense, \( \mathcal{O} \) can change as more arguments are added in the conversation.

Second, languages differ in the strength of the meta-evaluation. Languages like Greek maintain a dependence between stereotypicality and the metaevaluation and disallow occurrence of MUST with an possibility adverb.

(100) Prepei malon na ine giatros.  
    must probably that.SUBJ be.3sg doctor.  
    He must probably be a doctor.

(101) #Prepei isos na ine giatros.  
    must maybe that.SUBJ be.3sg doctor.  
    ‘He must perhaps be a doctor.’

Greek appears to be more rigid that Italian or English in this regard—though it is conceivable that rigidity might actually be more fragile. (A corpus study could actually shed light to this claim). Importantly, lexical items encode whether \( \mathcal{O} \) is empty or not, that it is to say, whether stereotypicality triggers ordering or not.
MUST, we claim, lexically encodes a default preference for a non-empty \( O \), but epistemic possibility tends to encode an empty one.

Let us now consider further how ideality and stereotypicality interact with epistemic modals specifically. In the semantics we gave, MUST quantifies universally over the \( \text{Ideal}_S \) worlds. In the specific case of the positive assertion, all \( \text{Ideal}_S \) worlds are \( p \) worlds. \( O \), in addition, reveals \( i \) confidence towards the prejacent; it does so indirectly by determining an ordering between the \( \text{Ideal}_S \) worlds where the prejacent is true and \( \neg \text{Ideal}_S \) worlds. With universal epistemic modals, \( O \) ranks \( \text{Ideal}_S \) worlds as better possibilities than \( \neg \text{Ideal}_S \) worlds. We encode this below as *positive bias*:

\[
(102) \quad \text{Positive bias of epistemic necessity modals.} \\
\text{Ideal}_S \text{ is a better possibility than } \neg \text{Ideal}_S, \text{ relative to } M(i) \text{ and } O.
\]

According to (102), there is no \( \neg \text{Ideal}_S \) world in \( M(i) \) which is not outranked by an \( \text{Ideal}_S \) world. And since, by the truth condition of MUST, all ideal worlds are worlds in which the prejacent is true, \( O \) is responsible not just for positive bias towards \( \text{Ideal}_S \), but also towards the prejacent itself.

Also, note that (102) states that worlds that are compatible with what the speaker knows in the actual world \( w_0 \) (recall that \( M(i) \) is projected from the actual world) are ideal and thus better ranked. Hence, according to the speaker, the actual world is more likely be a world where the prejacent is true.

We can now build on the connection between weak necessity and better possibility (see Portner 2009:70), we restate (102) as in (103).

\[
(103) \quad \text{Positive bias of epistemic necessity modals (final).} \\
\text{Ideal}_S \text{ is weak necessity with respect to } \neg \text{Ideal}_S, \text{ relative to } M(i) \text{ and } O.
\]

As we noted earlier, authors have generally acknowledged a need to ‘discriminate’ between the two options in the modal base with necessity modals (e.g. Rubinstein 2014, Portner and Rubinstein 2016). Our own implementation proceeds in two steps, determining a partition based on stereotypicality and then evaluating the relative ranking of the two subsets. And recall again that the preference for \( \text{Ideal}_S \) relies on a (potentially fragile) connection between stereotypicality and confidence of \( i \) that the actual world behaves in a stereotypical way.

Existential modals are generally taken to not have ordering sources (although there is variation across types of existential modals, see discussion in Portner 2009). We will assume following most of the literature that epistemic possibility modals come with an empty \( O \), and we will call this, following our earlier work, *nonveridical equilibrium* Section 5 offers more discussion, and in Section 6.2, we see that the default preference for non-empty ordering sources can be overwritten.

As noted already, since \( \text{Ideal}_S \) is the set of worlds in which the prejacent is
true, in ranking the Ideal$_S$ worlds as higher as the ¬Ideal$_S$, $\mathcal{O}$ reveals $i$’s confidence that the prejacent is true. Recall that MUST does not convey full commitment: its modal base is nonveridical. However, it conveys partial commitment, and the set Ideal$_S$ in which the prejacent is true is ranked as higher by $\mathcal{O}$. In order to successfully convey partial commitment towards the prejacent, the Ideal$_S$ set must be homogeneous and contain only those worlds in which the prejacent is true. Indeed, if the Ideal$_S$ set were not homogeneous, the sentence would convey that the speaker is equally committed towards the prejacent and its negation and the sentence would become uninformative about the speaker’s stance towards the prejacent.

This leads us to formulate the following:

\[(104) \text{ Homogeneity constraint on Ideal}_S. \]

$\mathcal{O}$ requires that Ideal$_S$ be homogeneous as far as the prejacent of MUST is concerned.

So, $\mathcal{O}$ requires that, by the time it is computed, all Ideal$_S$ worlds are $p$ worlds or that all Ideal$_S$ are ¬$p$ worlds. This constraint is not merely a stipulation. As just said, if the Ideal$_S$ set contains both $p$ and ¬$p$ worlds, this would reveal partial commitment towards both the prejacent and its negation. This situation of triviality is to be avoided, and, as the reader can foresee (and shown further in Section 6), it also proves instrumental when we consider the effect of negation.

It is important to note that when $\mathcal{S}$ is non-empty, the bias will be necessarily positive, and the reader can already anticipate, that, in virtue of using $\mathcal{O}$, the necessity modal will not be able to express negative bias.

In sum, we presented in section 4 a detailed novel analysis of the epistemic modal structure of MUST involving four ingredients: (i) a nonveridical modal base $M(i)$, (ii) a partition of $M(i)$ into Ideal$_S$ and a ¬Ideal$_S$ subsets, relying on stereotypical assumptions, (iii) a meta-evaluation $\mathcal{O}$ triggered by stereotypicality that ranks the Ideal$_S$ worlds as better possibilities than ¬Ideal$_S$ worlds in $M(i)$ (positive bias). The result of $\mathcal{O}$ and bias is that Ideal$_S$ is homogenous, i.e. veridical, supporting $p$. This explains why MUST gives off the impression of strength (support of $p$ in the better worlds in Ideal$_S$), while MUST remains weak (nonveridical modal base).

An additional important lesson that we learned is that the lexical entries of modal expressions can be complex and contain layers of meaning. In MUST, we have a nonveridical and a veridical layer. We will find this structure to be, in fact,

\[\text{The preference for higher ranking of Ideal}_S \text{ is lexically specified, and MUST and MIGHT differ in their lexical preferences (both use } \mathcal{S}, \text{ but higher ranking of Ideal}_S \text{ is only a feature of MUST).}\]
quite common with propositional attitudes. The presence of a nonveridical M will be sufficient to trigger the subjunctive, under the licensing condition we defined.

We want to move on with the discussion of modalization by considering modal adverbs and the fact that the MUST modal is a positive polarity item. Modal adverbs may also appear with the subjunctive in Greek. Modal adverbs, we will argue, are overt realizations of the meta-evaluation $O$, and are responsible for the positive polarity property of MUST. The discussion of modal adverbs concludes the basic formal framework that we will be using, and which illustrated the multiple layers needed for modality.

### 2.5 More layers in modality: modal adverbs, positive polarity

We propose that the modal adverb is the realization of the meta-evaluation function $O$. Given what we said so far, the modal structure now is follows:

\[
(105) \quad \text{AdverbP} \quad \text{Modal Adverb} \quad \text{ModalP} \quad \text{Must} \quad M(i) \quad S \quad TP
\]

We propose that, by default, there is a covert adverb meaning ‘probably’:

\[
(106) \quad [\emptyset]^O,M,i,S = \lambda q. \text{Ideal}_S \text{ is a weak necessity with respect to } \neg \text{Ideal}_S \text{ relative to } M(i) \text{ and } O \land q
\]

The complete lexical entry for MUST is thus the following:

\[
(107) \quad [\emptyset \text{ MUST (PRES } (p)) ]^{O,M,i,S} = 1 \text{ iff: Ideal}_S \text{ is a weak necessity with respect to } \neg \text{Ideal}_S \text{ relative to } M(i) \text{ and } O \land \forall w' \in \text{Ideal}_S : p(w', t_u)
\]

Why do we posit the existence of an adverb layer? For two reasons: first, because modal verbs and adverbs often co-occur. In Giannakidou and Mari (2018) we called this phenomenon modal spread. Second, because the adverb, along with Ideal, create positive polarity behavior.
2.5.1 Modal Spread

Consider some typical examples of modal spread:

(108)  
   a. John must probably/certainly be sleeping.
   b. John may possibly be a doctor.

Here we see *must* and *may* co-occurring with *probably/certainly* and *possibly*, respectively. Lyons 1977 talks about ‘harmony’ in these cases— the idea being that there is a concord running through the clause which results in the double realization of a single modality (Lyons 1977: 808; see also Willer 2013), on a par with other cases of concord such as negative concord, person or gender agreement. This observation, namely that there is one modality in these cases, is stable in most of the analyses of the phenomenon (Geurts and Huitink 2006, Huitink 2012,2014, Grosz 2010, *a contrario* Anand and Brasoveanu 2010). Syntactically, if we admit one modality in these cases, we are saying that there is no embedding of one modal operator to the other, and the two work together to produce a single modal structure. This situation is distinct from true embeddings:

(109)   It may turn out that Ariadne must give her speech this afternoon.

This is a genuine case of *must* embedded under *may*; notice also the clause boundary (*that*). (Embedding can also happen within one clause, of course, as in *Ariadne may have to give her speech this afternoon*).

If the modal verb is the modal operator, the puzzle has been: what is the semantic contribution of the adverb in modal spread? In more philosophical works it has been claimed that "iterating epistemic possibility operators adds no value in the semantics" (Yalcin 2007:994), or "embedding an epistemic modal under another epistemic modal does not in general have any interesting semantic effects" (Willer 2013:12). Though these statements were mostly made mostly for embeddings, they reveal a concord perspective where some of multiple exponents of modality are semantically vacuous (just like, e.g., multiple exponents of negation in negative concord). Huitink (2012) and Moss (2015), on the other hand, argue that the multiple exponents of modality have a semantic role, and Huitink in particular argues that the adverb lexicalizes the ordering source of the modal. Our analysis is different, but it agrees with the perspective that in modal spread the adverb has as semantic role, and we are not dealing with mere ‘concord’.

In understanding modal spread, it must also be acknowledged that we are not always dealing with concord, and this fact by itself serves as an argument that the use of the adverb is contentful. Modal verbs and adverbs with apparently opposing forces can co-occur with a single modality reading, as (110) shows for
Italian *dovere* co-occurring with *forse* 'maybe'.

(110) Le luci sono accese. Gianni deve forse essere a casa.
The lights are switch-on. Gianni must maybe be at home.
(non-harmonic use)

‘The lights are on. John must (#maybe) be at home.’

Below is an attested example (see also Cui 2015 for a corpus study of modal concord). The discussion is about an archeological reconstruction of the town Castel Nuovo, near Naples.

(111) Il vaso, che costituisce uno dei premi guadagnati dagli atleti negli agoni panatenaici di Atene, deve forse fare parte del corredo di una sepoltura ubicata non lontano dall’area di Castel Nuovo.
‘The jar, which constitutes one of the prizes earned by the athletes in the pan-athenians olympics of Athens, must maybe belong to the kid of a burial located not far from the area of Castel Nuovo.’

Sentences like these have, to our knowledge, rarely been discussed in the literature (see Moss 2015), and every theory of modal concord would claim that they do not have a single modality reading. We will argue here, however, that they do, and this is why we use the neutral term ‘modal spread’ instead of ‘concord’ (or ‘harmony’).

Huitink (2012) states that conditions on the adverbs ”really can only be decided on a case to case basis” (Huitink 2012:30), but we aspire to show that there are some general principles that delimit the set of possible interactions.

Apparent harmonic uses seem to be pervasive in Greek and Italian:

(112) a. Prepì malon/oposhipote na efije noris.
    Must probably/definitely that.SUBJ left.3sg early.
    ‘He must probably/definitely be a doctor.’

b. Deve probabilmente/sicuramente essere un dottore.
    Must.PRES.3sg probably/certainly be a doctor.
    ‘He must probably/definitely be a doctor.’

(113) a. Prepì malon/oposhipote na efije noris.
    must probably/definitely that.SUBJ left.3sg early.

Although very marginally, we also find some attested examples of the combination of epistemic *must* with *maybe* in English (see discussion in Lassiter 2014).

(i) So there must maybe be some glitch somewhere along the line or something that makes this happen. I am sure is a cache or technical glitch

Source: http://www.comune.napoli.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/1425/UT/systemPrint
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b. Deve probabilmente/sicuramente essere partito presto.
   Must.PRES.3sg probably/certainly be left early.
   ‘He must have probably/definitely left early.’

We see here the modal adverbs malon/probabilmente (probably), oposdhopote/certamente (definitely), etc. co-occur with the necessity modals prepildovere/must. In Greek and Italian, modal spread is very common and unmarked. We offered combinations with present and past tenses, to illustrate that the phenomenon is tense independent. We find the co-occurrence also with the future, see (114) (Bertinetto 1979, Mari 2009, Giannakidou 2012, Giannakidou and Mari 2012a, 2013):

   Arrive.FUT.3sg certainly/probably at 4.
   ‘John will definitely/probably arrive at 4.’

   the John FUT come.3sg certainly/probably at 4 pm.
   ‘John will definitely/probably arrive at 4.’

In Greek strong adverbs cannot co-occur with possibility bori/may/might (115-a)-(152). In Italian and English, on the other hand, weak modals can co-occur with strong adverbs (115-b)-(116-b)-(151), just as strong modals can co-occur with weak adverbs.\(^{15}\)

(115) a. *Bori malon/oposdhipote na efije noris.
   May probably/definitely that.SUBJ be.3sg early.

b. Può probabilmente essere partito presto.
   ‘He may have probably/definitely left early.’

(116) a. *Bori malon na ine giatros.
   May probably that.SUBJ be.3sg doctor.

b. Può probabilmente essere un dottore.
   ‘He may probably be a doctor.’

In Italian, the co-occurrence of existential modality with a strong adverb is not rare. In (117), we can be certain that the existential modal is epistemic insofar as it embeds a stative which cannot be coerced into an eventive giving rise to

\(^{15}\)An anonymous reviewer suggests that *probably* is an existential adverb. We disagree, and here is why. First, the data here indicate that *probably* combines with universal modals. Secondly, consider that the adverb *necessarily*, which would be the uncontested universal, tends to not be used epistemically in languages. Its closest equivalent, *obligatorily*, has deontic flavor. This leaves *probably* in the context of epistemic MUST and *should* as the universal adverb, and we are not aware of any analysis that argues otherwise.
the abilitative or circumstantial interpretation of potere (might). We also see in the second sentence (‘no matter how the facts were settled’) that the truth is not established and that the first sentence is described as expressing a conjecture. In this attested example, potere combines with probabilmente (probably). Notice a similar combination in English:

(117) ... e a questa circostanza può probabilmente essere dovuto il fatto che egli fosse arrivato al nono compleanno. Comunque stessero le cose, in ogni modo, era il suo nono compleanno.
‘and the fact that he reached his ninth birthday might probably be due to these circumstances. No matter how the facts where settled, in any case, it was his ninth birthday.’\(^\text{16}\)

(118) In some cases, however, the psychosis might definitely be due to anxieties and conflicts associated with the pregnancy.\(^\text{17}\)

On the other hand, the possibility adverb is grammatical only with possibility modals in Greek, Italian and English.

(119) a. Bori isos na efije noris.
may maybe that.SUBJ left.3SG early.
b. Può forse essere partito presto.
Can.3sg.pres maybe be left early.
‘He may have possibly left early.’

(120) a. Bori isos na ine giatros.
may maybe that.SUBJ be.3SG doctor
b. Può forse essere un dottore.
Can.3sg.pres maybe be a doctor.
‘He may possibly be a doctor.’

We can summarize the facts above in the following three generalizations:

1. Modal matching appears to be the general case, attested in all three languages (Greek, Italian, English), as well as Dutch (Geurts and Huitink 2006, Huitink 2012, 2014), and German (Grosz 2012).

2. Modal spread also allows non-matching. It appears to be a more restricted option, a fact that needs to be explained.

\(^\text{16}\)Source: https://books.google.fr/books?isbn=8804536829
\(^\text{17}\)Source: https://books.google.com/books?id=c6JPyfOBZYIC&pg=PA74&lpg=PA74&dq=%22might+definitely%22&source=bl&ots=LXLgsQVXTj&sig=S5u9MCjN4HwRHnfYTs_yQOSbL9Y&hl=fr&sa=X&ved=0ahUKEwjp-4Xm36XVAhUJh1QKHWFPCVA4ChDoAQg5MAQ#v=onepage&q=%22might%20definitely%22&f=false
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3. Languages are subject to variation with respect to whether they allow non-matching (Italian does, but Greek doesn’t; English shows some of the flexibility of Italian).

We are now ready to address the PPI-hood property of universal epistemic modal MUST.

2.5.2 Negation, MUST, and the adverb

MUST stays "positive", and, prima facie, it seems to resist partitioning of the modal base by negation. In recent studies, interest in the interaction of modal verbs with negation has been rekindled (e.g., Iatridou and Zeijlstra 2013, Rubinstein, 2014, Homer 2015, Zeijlstra to appear), and a core observation is that necessity modals such as must scope above negation, but possibility modals scope below:

(121) Ariadne must not be a doctor. (= It must be the case that Ariadne is not a doctor).
(122) Ariadne must not eat meat. (Ariadne is a vegetarian).
(123) a. Ariadne cannot be a doctor.
    b. Ariadne cannot talk to Dean.
(124) a. Ariadne doesn’t have to be a doctor (to apply for this job).
    b. Ariadne doesn’t need to spend a lot of money (for Jason’s birthday gift).

The English modal must, in both epistemic and deontic use, is interpreted with scope above negation. Can, on the other hand, takes scope inside negation, on a par with modals such as have to, need. These scope constraints are reminiscent of polarity, and van der Wouden (1994) proposed indeed that need is a negative polarity item (NPI), identifying similar NPI modals in Dutch (hoeven) and German (brauchen). If the necessity need is an NPI, then its counterpart must must be a positive polarity item (PPI), since it escapes the scope of negation.

This basic polarity contrast of English has been reproduced in a number of languages, and though the data are not always exactly parallel (in part depending on what the actual modal verb system is in each language), the general tendency is that a necessity modal which is not an NPI will tend to scope above negation. Below are the relevant data from Greek and Italian:

(125) a. Gianni deve essere malato.
    John must be ill.
    ‘John must be ill.’
b. Gianni non deve essere malato. MUST > NEG
   ‘John must not be ill.’

(126) a. I Ariadne dhen prepi na einai eggyos. MUST > NEG
   the Ariadne not must. that.SUBJ be pregnant.
   ‘Ariadne must not be pregnant (based on what I know).’

b. I Ariadne dhen xreiazete na ine eggyos. NEG > MUST
   the Ariadne not need.3sg that.SUBJ be ill.
   ‘Ariadne need not be pregnant (to be eligible for this leave).’

The question is how we can explain this behavior. Does it follow form the semantics we gave thus far for MUST and the adverb? Our answer is yes, it does. Observe below the truth conditions for MUST (we only consider here the PRES option for simplicity), which contains the default adverbs PROBABLY:

[(PROBABLY MUST (PRES (p)))\textsuperscript{O,M,i,S}] is defined only if the modal base \(M(i)\) is nonveridical and it is partitioned into \(\text{Ideal}_S\) and \(\neg\text{Ideal}_S\) worlds. If defined,

\[(PROBABLY MUST (PRES (p)))\textsuperscript{O,M,i,S} = 1 \iff \text{Ideal}_S \text{ is a weak necessity with respect to } \neg\text{Ideal}_S \text{ relative to } M(i) \text{ and } O \land \forall w' \in \text{Ideal}_S: p(w', t_u)\]

MUST presupposes a nonveridical modal base and a non-empty \(O\); it universally quantifies over the \(\text{Ideal}_S\) worlds. When we add negation, we have the truth conditions below:

(128) a. Malon dhen prepi na ine giatros.
   Probably not must that.SUBJ be.pres a doctor.
   ‘He must not be a doctor.’

b. Probabilmente non deve essere un dottore.
   Probably not must be a doctor.

(129) [(PROBABLY MUST NOT (PRES (p)))\textsuperscript{O,M,i,S}] is defined only if the modal base \(M(i)\) is nonveridical and it is partitioned into \(\text{Ideal}_S\) and \(\neg\text{Ideal}_S\) worlds. If defined,

\[(PROBABLY MUST NOT (PRES (p)))\textsuperscript{O,M,i,S} = 1 \iff \text{Ideal}_S \text{ is a weak necessity with respect to } \neg\text{Ideal}_S \text{ relative to } M(i) \text{ and } O \land \forall w' \in \text{Ideal}_S: \neg p(w', t_u)\]

The adverb ranking, which remains intact along with the nonveridicality presupposition, will again rank as higher the \(\text{Ideal}_S\) worlds than the \(\neg\text{Ideal}_S\) ones. Only now the Ideal worlds will be \(\neg p\) worlds.
In Greek and Italian negation is preverbal, and appears directly preceding the modal verb (Zanuttini 1992, Giannakidou 1998):

(130) AdverbP
     /   \  
    Modal Adverb  NegP
     /   \       /   \  
    Neg  ModalP  TP
     /  \  /  \  
    Must M(i) S

The adverb appears above negation and can never intervene between negation and the modal:

(131) a. *Dhen malon prepi.
       Not probably must.

b. *Non probabilmente deve.
   Not probably must.

We observe the same distributions for the existential.

(132) a. Isos dhen bori.
       Maybe not can.

b. Forse non può.
   Maybe not can.

(133) a. *Dhen isos bori.
       Not maybe can.

b. *Non forse può.
   Not maybe can.

Hence the adverb must be above the negation syntactically. Crucially, the adverb can never appear lower than negation, even in English, as we noted in Section 1, repeated here:

(134) #Ariadne must not probably/definitely be at home.

Only a metalinguistic negation reading is acceptable here, which is irrelevant. In other words, scoping of modal adverbs under negation seems to be generally prohibited in languages. In English, must precedes negation (must not) anyway, and the constraint on the adverb not scoping low also holds, (134).
Now, what would it mean for the structure to be interpreted with negation scoping between the adverb and the modal verb as given in the apparent surface structure of (130)? The corresponding truth conditions would be as in (135):

\[
[\text{PROBABLY NOT MUST (PRES} (p))][O,M,i,S] \text{ is defined only if the modal base } M(i) \text{ is nonveridical and it is partitioned into Ideal}_S \text{ and } \neg\text{Ideal}_S \text{ worlds. If defined,}
\]

\[
[\text{PROBABLY NOT MUST (PRES} (p))][O,M,i,S] = 1 \text{ iff: Ideal}_S \text{ is a weak necessity with respect to } \neg\text{Ideal}_S \text{ relative to } M(i) \text{ and } O \& \neg\forall w' \in \text{Ideal}_S: p(w', t_u)
\]

The default adverb retains the content that Ideal$_S$ is a weak necessity relative to $O$, but Ideal$_S$ now is targeted by negation and can be non-homogenous. This means that the homogeneity constraint on Ideal$_S$ is not satisfied (recall the constraint in (104)), and this leads to infelicity. To repair the infelicity the negation is interpreted below the modal.

Recall our discussion. We said there that the ranking of the Ideal$_S$ worlds with respect to $\neg$Ideal$_S$, $O$ is intended to capture $i$’s confidence in the truthfulness of the prejacent. In order to successfully establish this comparison between Ideal$_S$ and $\neg$Ideal$_S$ worlds and express confidence towards the prejacent, Ideal$_S$ needs to be homogeneous insofar as the prejacent is concerned. $O$ cannot produce a well-formed ranking if the Ideal$_S$ set is itself partitioned, as this would reveal confidence in both $p$ and $\neg p$ worlds and the sentence would become uninformative about the speaker’s stance towards $p$.

In other words, the positive polarity property of MUST is derived as a result of its semantics that includes the ranking of Ideal$_S$ worlds as better possibilities than $\neg$Ideal$_S$ worlds, which itself forces homogeneity on the Ideal$_S$ set. As we saw at the beginning of this section, with negation scoping low, the modal delivers a homogeneous Ideal$_S$ set, and $O$ can now apply successfully, with the bias being towards $\neg p$ worlds.

As regards NPI-universals like need, hoeven, xreiazete (which are typically deontic), we propose that the higher (adverb) content is neutralized. Making this precise in the context of our theory so far is to say that NPI necessity modals have an empty $O$. That would be a lexical feature of them that, in contrast to epistemic PPI universals, renders them compatible with higher negation. The two necessity modals would thus differ by lexical properties.

### 2.5.3 Existential epistemic modality: nonveridical equilibrium

In agreement with our analysis of epistemic possibility, we take it that epistemic possibility modals are existential quantifiers and that they lack ordering sources.
The absence of ordering sources with epistemic possibility modals renders \( p \) and \( \neg p \) equal possibilities revealing that the assessor is in a state of hesitation and true uncertainty, as we said earlier. Following our earlier work (Giannakidou 2013, Giannakidou and Mari 2016c, 2018b), we call this nonveridical equilibrium. We now define nonveridical equilibrium as the absence of bias in the following way:

(136) Nonveridical equilibrium
A partitioned space \( M(i) \) is in nonveridical equilibrium if the ordering \( O \) is empty.

Nonveridical equilibrium implies that \( \text{Ideal}_S \) and \( \neg \text{Ideal}_S \) are not compared to one another; \( p \) and \( \neg p \) are equal possibilities, none is privileged over the other. Recall that, in addition to possibility modals, information questions are also in nonveridical equilibrium. We take equilibrium to be the default for epistemic possibility—though this may be subject to variation.

We assume, as before, that a silent adverb MAYBE hosts the default preference for equilibrium of \( \text{bori/potere/might} \):

(137) \[
[\emptyset \text{MIGHT (PRES (} p \text{))}]^{O,M,i,S}_{O,M,i,S} = 1 \text{ iff } O \text{ is empty } \& \exists w' \in M(i)p(w', t_u)
\]

(138) \[
[\emptyset \text{MIGHT (PAST (} p \text{))}]^{O,M,i,S}_{O,M,i,S} = 1 \text{ iff } O \text{ is empty } \& \exists w' \in M(i)\exists t' \prec t_u \land p(w', t')
\]

The covert adverb adds the presupposition that \( O \) is empty. The existential quantifier operates on the entire modal base \( M(i) \) and not on one of the subsets created by \( S \) (and \( \text{Ideal}_S \) in particular). This amounts to stating that the quantifier is blind to stereotypicality conditions in spite of the fact that these are always operational in the cognitive system of the anchors (note also that there might be \( p \) worlds which are not in the set \( \text{Ideal}_S \)). Stereotypicality conditions, however, as we will show, can also trigger a non-empty \( O \) for MIGHT in some languages.

Just as the presence of stereotypicality conditions with universal modals triggers positive bias (i.e. higher ranking of the \( \text{Ideal}_S \) over non-\( \text{Ideal}_S \)), the absence of stereotypicality conditions with existential modal does not produce any ranking.

In virtue of this, the most straightforward combination which we find in all languages is MAYBE + MIGHT.

(139) a. Bori isos na eijke noris.
may maybe that.SUBJ left.3sg early
When we add MAYBE (possibly, maybe, perhaps, and their crosslinguistic equivalents) we obtain (142)-(141). The combination maintains the default, which now is nonveridical equilibrium. With possibility modals, MAYBE has no effect on the equilibrium, since it does not provide ranking. For any proposition \( p \) and the utterance time \( t_u \),

\[
(MAYBE \text{ MIGHT (PRES (} p \text{)})[O,M,i,S] = 1 \text{ iff } O \text{ is empty } \& \exists w' \in M(i)p(w', t_u)
\]

Possibility modals are not forced to scope above negation; nonveridical equilibrium is compatible with both scopes. Empirically, possibility modals tend to scope below negation crosslinguistically. In John cannot be at home, the possibility is denied that John is at home.

The reason for this preference, we want to suggest, seems to be that low scope with negation appears to be the general case with all kinds of existentials: Ariadne didn’t see any student/ a student/ one student all scope below negation. If this is a general tendency of existential quantifiers, possibility modals simply follow this systemic pattern. (There do appear to be PPI existentials like some—Ariadne didn’t see SOME student—but note that this use is marked; Giannakidou 2011). It is an open question whether PPI possibility modals can be found in languages. Our analysis predicts, in any case, both scopes.

### 2.5.4 Manipulations of \( O \) by the adverbs

We have up to here built our theory on the assumption that the adverbs are in harmony with the modal verbs. Researchers indeed talk about ‘harmony’ or ‘modal concord’—the idea being that there is a concord running through the clause which
2.5. MORE LAYERS IN MODALITY: MODAL ADVERBS, POSITIVE POLARITY

results in the double realization of a single modality (Lyons 1977: 808; Geurts and Huitink 2006, Huitink 2012, 2014, Grosz 2010; see also Willer 2013), on a par with other cases of concord such as negative concord, person or gender agreement. This observation, namely that there is one modality in these cases, is stable in most of the analyses of the phenomenon.\(^\text{18}\)

Syntactically, if we admit one modality in these cases, we are saying that there is no embedding of one modal operator to the other, and the two work together to produce a single modal structure. This situation is distinct from true embeddings:

(143) It may turn out that Ariadne must give her speech this afternoon.

This is a genuine case of must embedded under may; notice also the clause boundary (that). (Embedding can also happen within one clause, of course, as in Ariadne may have to give her speech this afternoon).

Yet languages differ as to whether they allow adverb / verb combinations of opposing forces. We did note earlier that Italian and English are more flexible than Greek, and here we will consider some more cases. Let us begin with MUST. All languages allow strengthening of the bias from ‘probably’ to ‘definitely’. In this case, the bias of weak necessity is strengthen to necessity.

All languages accept strengthening:

\[(144) \begin{align*}
\text{a. Prepi malon/oposdhipote na ine giatros.} & \quad \text{must probably/definitely that.SUBJ be.3sg doctor.} \\
& \quad \text{‘He must probably/definitely be a doctor.’} \\
\text{b. Deve probabilmente/sicuramente essere un dottore.} & \quad \text{must probably/certainly be a doctor.} \\
& \quad \text{‘He must probably/definitely be a doctor.’}
\end{align*}\]

\[(145) \begin{align*}
\text{[DEFINITELY MUST (PRES ($p$))]}^{O,M,i,S} & \text{ is defined only if the modal base } M(i) \text{ is nonveridical and it is partitioned into } \text{Ideal}_S \text{ and } \neg \text{Ideal}_S \\
& \text{ worlds. If defined,} \\
\text{[DEFINITELY MUST (PRES ($p$))]}^{O,M,i,S} & = 1 \text{ iff: } \text{Ideal}_S \text{ is a necessity with respect to } \neg \text{Ideal}_S \text{ relative to } M(i) \text{ and } O \& \forall w' \in \text{Ideal}_S : p(w', t_u)
\end{align*}\]

This combination reveals that the speaker is very highly e-committed to the truthfulness of $p$. Note, however, that, no matter how subjectively strong this e-commitment is, it remains a subjective commitment, that it is to say a commitment within a subset in the modal base. $p$ is not true in the entire modal base, and it is not objectively veridical.

\(^{18}\)On a different analysis of the adverbs as contributing at a non-at-issue level, see Mayol and Castroviejo, 2013 and Giannakidou and Mari 2017. See Giannakidou and Mari 2018a for a criticism.
Some languages accept opposing forces for the adverb and the modal verb, among which Italian and English. Here below, we see the combination of MUST and a weak adverb.

(146) Il vaso, che costituisce uno dei premi guadagnati dagli atleti negli agoni panatenaici di Atene, deve forse fare parte del corredo di una sepoltura ubicata non lontano dall’area di Castel Nuovo.

‘The jar, which constitutes one of the prizes earned by the athletes in the pan-athenians olympics of Athens, must maybe belong to the kid of a burial located not far from the area of Castel Nuovo.

(147) So there must maybe be some glitch somewhere along the line or something that makes this happen. I am sure is a cache or technical glitchup.

Recall that opposing forces are impossible in Greek.

(148) #Prepi isos na ine giatros.

must maybe that.SUBJ be.3SG doctor.

‘He must probably/definitely be a doctor.’

In Italian and English, then, the adverb can be used to weaken the default bias of PROBABLY. We get the following interpretations:

(149) \[
\text{[MAYBE MUST (PAST (p))]}^{O,M,i,S} \text{ is defined only if } M(i) \text{ is nonveridi-}
\text{cal and is partitioned into } \text{Ideal}_{S} \text{ and } \neg \text{Ideal}_{S} \text{ worlds. If defined, }
\text{[MAYBE MUST (PAST (p))]}^{O,M,i,S} = 1 \text{ iff } O \text{ is empty } & \forall w' \in \text{Ideal}_{S} :
\exists t' < t_u \land p(w', t')
\]

The manipulation is that now, because O is empty, there is no ranking of the Ideal_{S} worlds over the ¬Ideal_{S} ones. This is, then, a weaker MUST than the one with PROBABLY, and the effect is sue entirely to the manipulation by the adverb.

When a weak adverb combines with a strong modal, the e-commitment of the modal is weakened: quantification happens in the stereotypical set, but it is not ranked as higher.

Conversely, Italian and English allow strengthening the default with existential epistemic modals.

(150) ... e a questa circostanza può probabilmente essere dovuto il fatto che egli fosse arrivato al nono compleanno. Comunque stessero le cose, in ogni modo, era il suo nono compleanno.

‘and the fact that he reached his ninth birthday might probably be due to these circumstances. No matter how the facts where settled, in any
2.6. SUMMARY OF OUR ANALYSIS OF MODALIZATION

case, it was his ninth birthday.\textsuperscript{19}

(151) In some cases, however, the psychosis \textbf{might definitely} be due to anxieties and conflicts associated with the pregnancy.\textsuperscript{20}

Once again, Greek is a strict language that forbids this combination.

(152) #Bori malon na ine giatros. may probably that.SUBJ be.3SG doctor.

(153) [\textit{PROBABLY MIGHT (PAST (p))}]^{O,M,i,S} is defined only if M(i) is non-veridical and is partitioned into Ideal\textsubscript{S} and \textit{¬}Ideal\textsubscript{S} worlds. If defined, [\textit{PROBABLY MIGHT (PAST (p))}]^{O,M,i,S} = 1 iff Ideal\textsubscript{S} is a weak necessity with respect to \textit{¬}Ideal\textsubscript{S} relative to M(i) and \(O \& \exists w' \in M(i) \exists t' < t_u \land p(w', t')\)

The adverb PROBABLY ranks now the Ideal\textsubscript{S} set over the \textit{¬}Ideal\textsubscript{S} set, but quantification is over M(i). This creates a strengthened MIGHT, combining the expected hesitation of the speaker about the truthfulness of \(p\) (given that a possibility modal is used), with an ordering of the \(p\) possibility as better. This is a strengthening that violates, or overrides, the equilibrium. For this reason, such uses are generally discouraged, but as we see are not impossible. As a general tendency, the combinations of different forces will be dispreferred because they go against the natural inclinations of the modals and the adverbs. But as we showed, manipulations are possible— a fact that supports our idea that ranking is independent of the modal verb itself.

Note, finally, that the partition between \(p\) and \textit{¬}\(p\) worlds in the modal base and the partition between Ideal\textsubscript{S} and \textit{¬}Ideal\textsubscript{S} worlds are orthogonal. The \textit{¬}Ideal\textsubscript{S} sets are ranked as higher, however, it is not guaranteed that quantification happens over the worlds in the Ideal\textsubscript{S} set.

2.6 Summary of our analysis of modalization

In this chapter, we developed a theory where the logical properties of veridicality and nonveridicality serve as the foundation for modeling the commitment of individual anchors to the truth of a proposition. We made the following central distinctions:

\textsuperscript{19}Source: https://books.google.fr/books?isbn=8804536829

\textsuperscript{20}Source: https://books.google.com/books?id=c6JPyfOBZYIC&pg=PA74&lpg=PA74&dq=%22might%20definitely%22&source=bl&ots=LXLgsQVXTj&sig=S5u9MCjN4HwRHnfYTsa_yQOSbL9Y&hl=fr&sa=X&ved=0ahUKEwjp-4Xm36XVAhUJh1QKHWPFCVA4ChDoAQg5MAQ#v=onepage&q=%22might%20definitely%22&f=false
1. Veridicality and non-veridicality characterize information states of individual anchors that are homogenous (veridical) or non-homogenous (non-veridical).

2. Epistemic modals of necessity and possibility obey the Nonveridicality Axiom, i.e., a presupposition on their model bases that they be non-homogenous containing both $p$ and $\neg p$ worlds. Nonveridicality imbues the modal base with uncertainty. The use of subjunctive with modal verbs therefore follows from our licensing condition that says that the subjunctive is sensitive to the nonveridicality of the presupposition.

3. The nonveridical state is epistemically weaker than the epistemic state of knowledge which is veridical. Modal verbs are signals of anti-knowledge, i.e. that the speaker does not have enough evidence to know $p$.

4. Possibility modals express nonveridical equilibrium: $p$ and $\neg p$ are equal options in the modal base, and the speaker has no reason to prefer one over the other. Questions are also in nonveridical equilibrium, and this is why possibility modals, but not necessity ones, are good in questions.

5. The illusion of strength of MUST comes from its non-empty $\mathcal{O}$ and the resulting positive bias, which as we showed, can be manipulated.

6. As can be seen, modals have various layers of meaning, including multiple modal bases.

7. The existence of a nonveridical modal base is the prerequisite for the licensing of the subjunctive mood and the reason why all modals in Greek and Italian select the subjunctive.

The difference between veridicality (e-commitment) and epistemic weakening (nonveridicality) also has implications, we argued, for informativity: full e-commitment conveys maximum informativity, i.e., $p$ is added to the common ground. But epistemically weaker sentences are less informative about $p$, and do not add $p$ to the common ground. In chapter 4, we propose that mood particles are explicit realizations of anchoring updates. In chapter 6, we will discuss ability modals and some deontic uses.
Chapter 3

Mood and tense in complement clauses

Our goal in this chapter is to offer the reader a thorough description and analysis of the interaction between mood and tense in complement clauses. We want to familiarize the reader with the basic patterns of correlation between mood and embedded tense that need to be explained. The tense of future orientation, we will argue, is the NONPAST (Giannakidou 2009, Giannakidou and Mari 2016c, 2018a), and it is the dependent tense that we find with future oriented subjunctive clauses. This is also the tense of the bare infinitive in English, we will argue. Our claim will be that in languages lacking productive morphological mood, the verbal correlate of mood is tense. The apparent finiteness distinction in English and other Germanic languages disguises this correlation. In uncovering the role of tense, we revisit some of the patterns we observed in chapter 1.

3.1 Some syntax: Mood and complementizers

Mood is a morphological category. Typologically, we find morphological distinctions such as indicative, subjunctive, optative, imperative, conditional mood; of these, only the former two appear in complement clauses— which are the focus of our work. Greek, recall, has an optative particle as which only appears in main clauses, something that na can also do:

(1) As fiji/ efevge o Janis!
OPT leave.NONPAST.3sg/ left.IMPRF.3sg the John.
‘Let John leave!’ ‘I wish John had left!’

(2) Na/ As fiji/efevge o Janis.
That.SUBJ/ SUBJ leave.PERF.NONPAST.3sg/PAST.3sg the John.
'John may go./ Let John go.'

In main clauses, the subjunctive *na* appears equivalent to *as* in having directive, imperative-like illocutionary force producing requests, commands or wishes. We will assume, just as in the case of the imperatives or assertions, that there is an illocutionary force operator in C in main clauses. It can then be assumed that the subjunctive particle *na* moves to this position, as the imperative morpheme has been argued to do (Rivero and Terzi 1994, Giannakidou 1997, 1998). One can also hypothesize that the subjunctive remains in Mood phrase under C, and there is a null illocutionary force operator in C. This position receives support from the fact that *na* itself appears with other illocutionary forces, e.g. in questions, as we have mentioned:

(3)  Pjos na kerdise (araje)?
    who that.SUBJ win.PERF.PAST.3sg question particle.
    'Who might have won?'

Here we have a question, and the presence of the subjunctive particle does not turn the question into a command or a wish. It must then be understood that *na* does not have illocutionary force itself. C hosts the interrogative function which turns a proposition into a question, and *na*, as we said earlier, contributes an epistemic modal. The particle *araje* (used only in questions) may be seen as the question operator (Giannakidou 2009) Given that the we have the question particle *araje*, *na* cannot be the Q operator. In other words, *na* is compatible in main clauses with both directive (imperative-like) and interrogative force, and it would be unreasonable to conclude that *na* itself contributes the force operator.

We schematize this discussion below:

(4)  CP
    C: DIRECTIVE FORCE Op MoodP
        na

The directive force is, of course, non-veridical, as questions and imperatives are; Giannakidou and Staraki (2017) call the main clause subjunctives ‘hybrid’ imperatives. Giannakidou (1997) elaborates that speech act operators other than assertion, which are not defined on truth conditions, are trivially nonveridical since they do not entail the truth of the prejacent at the utterance time. Theories of imperative such as Kaufmann (2012), and Portner (2007) posit likewise presuppositions for the felicitous use of an imperative that the prejacent *p* not be true at the time of the
3.1. SOME SYNTAX: MOOD AND COMPLEMENTIZERS

assertion. The use of main subjunctive, then, and its non-assertive force, follows from the licensing conditions we have given:

(5) Licensing dependency of indicative mood
An expression $F$ licenses the indicative mood in its scope iff $F$ is (at least) subjectively veridical.

(6) Licensing dependency of subjunctive mood
An expression $F$ licenses the subjunctive mood in its scope iff $F$ is at least non-veridical.

The subjunctive requires to be in the scope of a nonveridical operator. The directive force operator is nonveridical objectively and subjectively, it can therefore license the subjunctive mood in main clauses. The assertion operator, on the other hand, is veridical— recall that subjective veridicality is a precondition on assertion— and this explains why the subjunctive cannot be triggered is main assertions:

(7) *Na that.SUBJ leave.PAST.3sg the John.

The subjunctive, however, can be triggered in an assertion under a modal:

(8) Isos na that.SUBJ leave.PAST.3sg the John.
   ‘Maybe John left.’

Giannakidou (2012) treats this case as genuine case of modal concord, with the subjunctive na being licensed and agreeing in modality with the modal adverb of possibility. Crucially, a necessity modal is at odds with na because the modality needs to be matched: if na is an possibility modal (as can be seen in questions), then it can only be compatible with possibility modals. Recall from our discussion of Giannakidou and Mari (2018a) that the modal forces must be matched in Greek but not in Italian.

(9) Mallon (*na) that.SUBJ leave.PAST.3sg the John.
   ‘Probably John left.’

Being in the scope of a modal adverb thus satisfies the subjunctive licensing condition: na is found in the scope of a nonveridical operator. The lexical constraints on the co-occurrence of modal verbs and adverbs were discussed in chapter 2.

The syntactic characterization of the Greek mood particles has been the subject of study in many works since the early 90s. The main question has been: are
the Greek particles Mood exponents or complementizers? In one approach, \textit{na} is taken to be the inflectional realization of Mood (heading MoodP; Philippaki-Warburton 1994, 1998, Philippaki-Warburton and Veloudis 1984, Tsimpli 1990, Giannakidou 1998, 2009). Another approach claims that \textit{na} is a complementizer C (Agouraki 1991, Tsoulas 1993, and Roussou 2000, who uses an extended C-domain in the spirit of Rizzi 1997). Giannakidou (2009) offers detailed discussion of both approaches, and concludes that \textit{na} is a Mood head that moves to C in embedded clauses because it is also a subordinator, hence the tree looks as follows:

(10)

\[
\begin{array}{c}
\text{CP} \\
\text{C: na/ot/po/pu} & \text{MoodP} \\
\text{V+Mood morpheme}
\end{array}
\]

Here we will take the above structure as the point of departure for both Greek and Italian, and assume that mood particles are MoodP elements that move to C. Another option is to say that the subjunctive C is occupied by a null subordinator, hence the mood morpheme remains in Mood— an option considered in Giannakidou (2009), and motivated by cases where \textit{na} appears under an actual subordinator, e.g. in relative clauses mentioned in chapter 1, where \textit{na} appears after the subordinator \textit{pu} ‘that’, with temporal connectives (\textit{prin na, xoris na} ‘before’, ‘without’), and in purpose clauses:

(11) I Ariadne irthe gia na mas di.
    the Ariadne came.3sg for that.SUBJ us see.3sg.
    ‘Ariadne came in order to see us.’

Given that the worlds that \textit{na} appears under can be plausibly analyzed as complementizers, it seems preferable to treat \textit{na} as remaining in the mood position. For Italian, we can adopt Bauanaz’s (2015) and Todorovich’s (2012) position that, despite the fact that we have no lexically distinct complementizers, there are nevertheless different \textit{ques}: a subjunctive one that appears with nonpast, and an indicative one that appears with present and past. In these analyses, the subjunctive correlates with tense, in a way that we will make precise below.

What becomes immediately clear by looking at the morphological exponents of mood in Greek and Romance languages is that mood affects three positions in the embedded clause: the verb (Latin, Romance languages, Ancient Greek), the subordinator C (Modern Greek, Balkan languages, including Romanian which is a Romance language), and the embedded tense. Following Giannakidou (2009, 2016), we will show that in Greek there is a strong correlation between the tense
on the embedded verb: the subjunctive combines often with a nonpast and has future orientation (consistent with the required higher nonveridicality of the verb, as we will show), whereas the indicative combines with veridical tense, i.e., past and present, or with future. The nonpast is incompatible with the indicative in Greek and Italian.

Let us proceed now to examine in more detail the correlation between mood and tense. In doing so, we will revisit some of the selection pattern and identify the main propositional attitude classes that are relevant for mood choice.

### 3.2 Morphological and semantic tenses

In order to understand the role of tense, we give first some necessary background on tense and aspect in Greek, which will serve as the foundation for our analysis. Tense and aspect are always reflected morphologically on the Greek verb. The grammars (Holton et al. 2007) describe the morphological opposition between past and non-past, and the aspectual distinction is perfective vs. imperfective. The morphological combinations create three semantic tenses (Giannakidou 2009 2014): a present (PRES), a PAST, and a NON-PAST, which is the tense used for prediction and future orientation. In our discussion in this book, the uppercase names of tenses will refer to the semantic tenses, and the lower case to the morphological forms.

We start with the morphological non-pasts. Consider first the imperfective nonpast.

(12) graf-o. (Greek imperfective nonpast: creates write.IMPFV NONPAST.1sg. PRES)

‘I am writing (right now).’

‘Write’ (generally).

The morphological imperfective nonpast is semantically the present tense (PRES) in Greek (Giannakidou 2014), comparable to English progressive. The form also has a generic, habitual reading because of imperfective aspect, also observed in English. The combination of these two readings is very common with imperfective forms crosslinguistically.

The perfective nonpast is a dependent form, ungrammatical by itself as indicated. It does not occur on its own:

(13) *grap-s-o (Greek perfective nonpast: *on its own)

write- PERF NONPAST.1sg.
CHAPTER 3. MOOD AND TENSE

The perfective nonpast has no English equivalent, and it is in fact quite rare to find grammatical perfective non-pasts in languages (Giorgi and Pianesi 1997). Romance languages certainly do not exhibit a morphological perfective non-past, and retain the aspectual distinction only in the past paradigm. Holton et al. (1997) and Giannakidou (2009) call this form the verbal dependent. This is the form used for prediction and future orientation, in combination with modal particles including the future (FUT), the subjunctive and optative:

(14) Tha/As/Na grapsi to gra ma avrio.
    FUT/OPT/SUBJ write.PRF NONPAST.3sg the letter tomorrow.
    ‘She will write the letter tomorrow.’
    ‘Let her write the letter tomorrow.’

We analyze this form as a semantic NONPAST in the next subsection. NONPAST is also the tense of the infinitive, as we illustrate with Italian. We also claim that this is the tense of the infinitive in English.

The past is marked typically in Greek with the presence of the augment e-, and we have again two options, perfective and imperfective. The imperfective past is the equivalent of preterite in Romance languages. The preterite is a combination of a semantic past plus habitual or progressive aspect, both typical reading with this morphological form:

(15) e- graf- a. (Greek imperfective past)
    PAST write.IMPVF 1sg.
    ‘I used to write.’
    ‘I was writing.’

The perfective past, on the other hand, is called the aorist and denotes a single (usually completed) event in the past. It is interpreted as a default simple past in English:

(16) e- grap- s- a. (Greek perfective past (aorist))
    PAST write- PERF 1sg.
    I wrote.

This form is a simple semantic PAST. Giannakidou (2004) offers discussion of why this form is not telic, but tends to be—as a form of implicature, perhaps, since the perfective past instead of the imperfective is used.

For future, Greek has the modal particle tha that we are by now familiar with. Italian has a future tense. They both combine with all of the above tenses. Notice first the combinations of FUT with the PRES (imperfective nonpast in Greek, gerund plus stative in Italian):
3.2. MORPHOLOGICAL AND SEMANTIC TENSES

(17) a. I Ariadne tha ΤΟΙΩΣ tora. (Greek)
    the Ariadne FUT eat.IMPF.NONPAST.3sg now.
    ‘Ariadne must be eating now.’
    b. Giacomo ora starà mangiando. (Italian)
    Giacomo now be.FUT.3sg eat.GERUND.
    ‘Giacomo must be eating now.’

As shown above, FUT plus PRES does not have a predictive reading, and is equivalent to an epistemic MUST modal statement. In Italian, as we discussed in Giannakidou and Mari (2018a), Aktionsart plays the role that aspect plays in Greek. (The role of Aktionsart in connection with modal interpretation has been studied across languages and categories, see Condoravdi 2002; Laca 2008; Copley 2009; Mari 2015a,b). Combinations of FUT with a lower PAST (an aorist in Greek), also receive epistemic non-predictive readings:

(18) a. I Ariadne tha itan αρροστί xthes (ji’afto dhen
    the Ariadne FUT be.PAST.3sg ill yesterday (for-this not
    came.PERF.PAST.3sg.
    ‘Ariadne must/#will have been ill yesterday (that’s why she didn’t
    come).’
    b. Giovanni sarà stato malato ieri (per questo non è
    Giovanni be.FUT.3sg been ill yesterday (for this not has
    come).
    ‘Giovanni must/#will have been ill yesterday (that why he didn’t
    come).’

(19) a. I Ariadne tha εφηγε xthes. (Greek)
    the Ariadne FUT leave.PERF.PAST.3sg yesterday.
    ‘Ariadne must have left yesterday.’
    b. Gianni avrà parlato ieri. (Italian)
    Gianni have.FUT.3sg spoken yesterday.
    ‘Gianni must/ #will have spoken yesterday.’

Pietrandrea (2005), Mari (2009) and Giannakidou and Mari (2018a) call these ‘epistemic futures’. (Note that English will does not combine with the past; for differences between Greek/Italian FUT and will see Mari, 2015b,2018; Giannakidou and Mari 2018b; French future is similar to will Mari, 2015b,2018).\(^1\) These uses, crucially, are quite common and do not feel in any way marked or excep-

\(^1\)See Tasmowski and Dendale, 1998; Dendale, 2001; de Saussure et Morency, 2011 on the differences between French MUST and FUT.
The readings are equivalent to the combinations of MUST with the exactly the same tense combinations:

(20) a. I Ariadne prepei na itan arrosti xthes the Ariadne must that.SUBJ be.PAST.3sg ill yesterday (ji’aito dhen irt hé).
Ariadne must have been ill yesterday (that’s why she didn’t come).

b. Giovanni deve essere stato malato ieri (per questo Giovanni be.FUT.3sg be been ill yesterday (for this non é venuto).
Giovanni must/#will have been ill yesterday (that why he didn’t come).

(21) a. I Ariadne prepi na efige xthes. the Ariadne must that.SUBJ leave.PERF.PAST.3sg yesterday.
‘Ariadne must have left yesterday.’

b. Gianni avrà parlato ieri.
Gianni have.FUT.3sg spoken yesterday.
‘Gianni must/ #will have spoken yesterday.’

For the sake of completeness, consider that with PAST, we do not obtain a future of a past reading in either language (Giannakidou and Mari 2018a). To obtain a future of a past, Italian uses the conditional (Mari, 2015d), and Greek the imperfective past (Giannakidou 2012:21):

(22) Gianni sarebbe arrivato più tardi.
Gianni be.COND.3sg arrived more late.
‘Gianni would arrive later.’

(23) I Ariadne tha efevge argotera. the Ariadne FUT leave.IMPF.PAST.3sg later.
‘Ariadne would leave later.’

Tha plus imperfective past is argued to be the Greek equivalent to conditional mood (Iatridou 2000, Giannakidou 2012), a position that we adopt here.

Before we move on, let us remind the reader that the perfective nonpast is the form used in embedded subjunctive clauses too for future orientation:

(24) Thelo na ftasi noris o Janis. I-want that.SUBJ arrive.PERF.NONPAST.3sg early the John.
‘I want John to arrive early.’
3.2. MORPHOLOGICAL AND SEMANTIC TENSES

(25) Bori na ftasi noris o Janis.
maybe that.SUBJ arrive.PERF.NONPAST.3sg early the John.
‘John might arrive early.’

The perfective nonpast never occurs with indicative oti:

(26) *Pistevo/ksero oti ftasi noris o Janis.
I-believe/know that.IND arrive.PERF.NONPAST.3sg early the John.
‘I believe John to arrive early’/ ‘I know John to arrive early.’

(27) *Pistevo/ksero oti ftani noris o Janis.
I-believe/know that.IND arrive.PERF.NONPAST.3sg early the John.
‘I believe John to arrive early’/ I know that John arrives early.’

Hence, we have a robust so correlation between the non-past and the subjunctive, on the one hand, and the indicative and past, present on the other. The correlation is harder to see in English, but very easy to see in Greek.

As in our earlier work, we will assume that the morphological tense and aspect combinations map onto semantic tenses PRES (imperfective nonpast), PAST (perfective past) and NON-PAST (perfective non-past), designated with upper case. The imperfective past is a compositional combination of PAST and PROGRESSIVE or GEN (Giannakidou 2009). The syntax we adopt for Mood and Tense, following Giannakidou (2009), is the following:

(28) Modal Particle P
     Modal Particle P
     Future tha TP
     Subjunctive na nonpast / past
     Optative as

The modal and temporal information are dissociated in the Greek clause. The tensed verb appears in T. Modal particles are heads above TP in what we can call Modal particle P, or MoodP, as we have been calling this position so far. We assume that the differentiation of tense and modality is true also for Italian, and holds perhaps even universally. In any case, the transparency of modality and tense in the Greek clause allows us to see the clear contribution of each component, and the interaction between mood/modal particle and tense. ²

² Similar overt dissociations as in Greek are found in typologically unrelated languages such as Gitksan with prospective aspect under their modal (Matthewson 2012), and Hindi (Kush 2011), where the modality (mood or particle) is also dissociated from tense.
3.3 The semantic NONPAST: future orientation

In Greek, the modal particle is separated from the tense system as we saw, and appears above the tensed verb (TP). The first key observation is that the indicative particles are incompatible with perfective nonpast. Recall:

(29) Thelo na kerdisi o Janis. 
    want.1sg that.SUBJ win.NONPAST.3sg the John. 
    ‘I want John to win.’

(30) *O Pavlos kseri oti kerdisi i Roxani. 
    the Paul knows-3sg that.IND win.NONPAST.3sg the Roxani. 
    ‘Paul knows that Roxanne left.’

(31) *O Pavlos lipate pu kerdisi i Roxani. 
    the Paul is-sad-3sg that.IND win.NONPAST.3sg the Roxani. 
    ‘Paul regrets that Roxanne left.’

The incompatibility of the perfective nonpast with the indicative mood particles suggests a correlation between mood and embedded tense— and both correlating with (non)veridicality. The past and present tenses, as we said in chapter 2, are veridical, but the future is nonveridical (objectively, i.e., metaphysically, as well as epistemically; Giannakidou and Mari 2018a). This correlation maps directly onto the mood distinction, and appears also in non-complement clauses, as shown below with the temporal connective BEFORE prin:

(32) O Nicholas irthe prin (na) figi 
    the Nicholas came.3sg before (that.SUBJ) leave.PERF.NONPAST.3sg 
    o Janis. (Greek) 
    the John. 
    ‘Nicholas came before John left.’

(33) *O Nicholas irthe prin efige o Janis. (Greek) 
    the Nicholas came.3sg before leave.PERF.PAST.3sg the John. 
    ‘Nicholas came before John left.’

Giannakidou and Zwarts (1999) discuss this basic property of Greek BEFORE in selecting the perfective nonpast as well as, optionally, the subjunctive (see also Xherija 2015 for more recent discussion and corroborating data from Albanian). Given that the prin ‘before’ clause is nonveridical (Sanchez-Vanencia et al. 1993) and denotes a relative future with respect to the main clause, the use of nonpast generalizes as a nonveridical tense. The perfective nonpast is also used with the conditional an and the temporal otan ‘when’, always producing for future orientation (see Giannakidou 2009 for details):
(34) An _if_ leave.PERF.NONPAST.3sg o Janis, tha leave.PERF.NONPAST.1pl and we. ‘If John leaves, we will leave too.’

(35) Otan _when_ leave.PERF.NONPAST.3sg o Janis, tha leave.PERF.NONPAST.1pl and we. ‘When John leaves, we will leave too.’

(36) Otan _when_ left.3sg o Janis, left.1pl and we. ‘When John left, we left too.’

The perfective nonpast is responsible for the prospective orientation consistently in all cases. Giannakidou 2009 derives this property by arguing that the morphological perfective nonpast denotes a semantic NONPAST:

(37) Morphological perfective nonpast in Greek denotes NON-PAST (Giannakidou 2009):

\[
[\text{NON-PAST}] = \lambda P \lambda t \lambda w (P(t, \infty)(w))
\]

(Following standard practice, we use "(" in the left interval to show that \(t\) is excluded from the interval, hence \(P\) will be true at a time later than \(t\)). NON-PAST introduces a prospective interval, like Abusch’s 2004 WOLL, a work Giannakidou draws on; but unlike WOLL and other morphological non-pasts that can forward shift by default, the left boundary \(t\) of the Greek NON-PAST is dependent variable, like the variable many NPIs have, i.e., in need of binding. This means, Giannakidou argues, that the NON-PAST is a temporal polarity item, and needs to be licensed. Licensing here means that \(t\) must be identified with \(t_u\). Hence \(n\) needs to be introduced in the syntax. The modal particles occupy the higher structure, and because they all have \(t_u\) as a parameter of evaluation (as we saw modal operators do in chapter 2), they satisfy the licensing requirement and supply \(t_u\).

Licensing of NONPAST requires anchoring to \(t_u\), and following Giannakidou and Mari (2018a), we will call it Now-anchoring. How is Now-anchoring done? There are two possible implementations. One way is to say that the modal particle actually adds \(t_u\) in the syntax. This is essentially the view pursued by Giannakidou

\(^3\)Giannakidou (2009) claims that the particles denote \(t_u\), thus rendering them temporal operators. In Giannakidou and Mari (2018a), we modified that analysis, and argued that \(t_u\) is introduced syntactically in Greek in the higher structure by default, without being temporal itself. It is this formulation that we rely on here.
(2009). If we take that view, then we must concede that \( t_u \) is added also by the other particles that appear in MOD, namely the subjunctive and the optative, as well as IF, BEFORE, WHEN what we mentioned earlier. But if we say that, we end up saying that the modal particles and the connectives as a class all denote \( t_u \). Such a claim is not adequately justified. Consider also that, when combining with PAST, \( t_u \) would be redundant, and we would have to somehow cancel it (which is what Giannakidou 2009 does).

The other way of understanding Now anchoring would be to treat it as a substitution rule for free variables. (This was the spirit of Abusch’s rule for WOLL: "In the substitution operator, \( t \) is a bound variable that corresponds to the tense argument of WILL. For a top-level occurrence of WILL, the effect is to substitute \((n, \infty)\) for \( n \)." (Abusch 2004: 39)). We can thus posit the following rule:

\[
\text{(38) Now-anchoring rule, triggered at MOD} \\
\text{Substitute any free variables } t \text{ in TP with } t_u \\
\]

This rule will be triggered only if there are free variables in TP, and it will not apply to lower PAST, for instance, as we will show soon. The rule will enable the free variable \( t \) of NON-PAST to be identified with \( t_u \). As a result, the interval provided by NON-PAST will then be anchored to \( t_u \), which is what we want. The advantage of having this rule is that it allows us to keep the semantics of modality clear of time— and it avoids the undesirable position that all modal particles introduce \( t_u \), and that \( t_u \) is dually present both as a parameter of evaluation and an argument of FUT. Introducing \( t_u \) appears to be a property of the higher structure, therefore positing the Now-anchoring rule seems to be the better option. The analysis for the future sentence (39) is provided below (following Giannakidou and Mari 2018a)

\[
\text{(39) O Janis tha kerdisi.} \\
\text{the John FUT win.PERF.NONPAST.3sg} \\
\text{‘John will win.’} \\
\]

\[
\text{(40)} \\
\]
Meaning is represented explicitly at LF, and semantic composition is limited to function application, variable binding, and type raising. Starting from the bottom, perfective aspect applies yielding a statement that there is a winning event. Following Giannakidou (2009), PERF and NON-PAST are modifiers: their input is a property \( P \) and give back the same property with the addition of the event argument, and replacement of \( t \) by \((t, \infty)\). PERF introduces the event argument and existentially closes it (as in Giannakidou 2002, also Hacquard 2009). This event has to be located at \( t \), which itself must be placed within the interval provided by NON-PAST. At TP, the \( t \) variable remains unbound. At FUT, the Now-anchoring rule applies, resulting in identifying the \( t \) provided by NON-PAST with \( t_u \). The interval at FUTP is set to \((t_u, \infty)\). The modal meaning can be thus properly computed.

Our analysis of nonpast embedded under FUT is very similar to the idea of a prospective marker under FUT, found in recent literature in Kush (2011), and Matthewson (2012) for Gitksan which actually has overt prospective aspect marker \textit{dim}, see (41).

\begin{equation}
\text{(41) da’akxw[-i]-’y dim ayee=hl bax-’y (Gitksan)}
\end{equation}
circ.pos[-tra]-1sg.II PROSP go.fast=CN run-1sg.II.
‘I can run fast’. 
We want to make clear that Greek does not have a prospective aspect, but a morphological and semantic NON-PAST form. Kush (2011), further, \textit{(ibid.)} studies the Hindi modal particle \textit{gaa}, which, like FUT, shows a flexibility between epistemic and predictive readings. The future reading arises with the bare verb (no tense or aspect) (42), and the epistemic with perfective (past) (43-a) or progressive aspect (43-b) (examples and glosses from Kush, \textit{ibid.}, ex. (5)-(6a)-(6b)):

(42) \begin{align*}
\text{ve} & \quad \text{bacce} & \quad \text{do} & \quad \text{din} = \text{mē} & \quad \text{aa} & \quad \text{ē}-\text{gee}. \\
\text{dem.3pl} & \quad \text{child.m.pl} & \quad \text{two} & \quad \text{day} = \text{in} & \quad \text{come-SUBJ.PL.MOD.m.pl.}\end{align*} \\
\hspace{1cm} \text{‘Those children will come in two days.’}

(43) a. \begin{align*}
\text{ve} & \quad \text{log} & \quad \text{ab}^\text{i} = \text{tak} & \quad \text{pahūc}^\text{h}-\text{ee} \\
\text{dem.3pl} & \quad \text{people} & \quad \text{now} = \text{by} & \quad \text{arrive-PFV.PL} \\
\text{hō-∅}-\text{gee}. & \quad \text{AUX.SUBJ.PL.MOD.m.pl} & \quad \text{They must have arrived by now.’}
\end{align*} \\
b. \begin{align*}
\text{ve} & \quad \text{log} & \quad \text{ab}^\text{i} \text{naac} & \quad \text{rah-ee} \\
\text{dem.3pl} & \quad \text{people} & \quad \text{now} & \quad \text{dance.PROG.m.pl aux-SUBJ.MOD.m.pl} \\
\text{hō-∅}-\text{gee}. & \quad \text{AUX.SUBJ.PL.MOD.m.pl} & \quad \text{They must be dancing now.’}
\end{align*}

Kush analyzes \textit{gaa} as a modal operator, but posits metaphysical modality for the future reading. Future/metaphysical modal base arises with no tense in Kush’s account, and the epistemic reading relies on as aspect: "from the ungrammaticality of auxiliaries in Future constructions we can conclude that Tense is absent." (Kush 2011: 417).

Given the Greek system we outlined above, we cannot say that tense is absent with non-past. Morphologically, nonpast is a tense in Greek. So, when FUT selects a perfective non-past, it selects a tense/aspect combination, which is assigned the denotation of NON-PAST. At the same time, the non-predictive epistemic reading in Greek and Italian rely on PAST and PRES, and this creates a parallel with Hindi; but, unlike Kush (2011) and Giannakidou and Mari (2013), we do not claim that there is a shift in modal base, as FUT uniformly quantifies over epistemic alternatives in our account. Overall, and this is worth emphasizing, looking at Kush, Matthewson (2012), and the analysis we propose here, we find systems where modality and tense/aspect are dissociated, and the modal particle scopes above tense/aspect. Therefore the data from Greek, Italian, Gitksan, and Hindi jointly suggest that future modals at least in these languages are not mixed modal/temporal operators \textit{(pace} Condoravdi (2002)).
3.4 The subjunctive and NONPAST

The derivation with the subjunctive will proceed in similar steps. Consider first the main subjunctive. Here is the derivation from Giannakidou (2009:63):

\[(44)\]
\[
\text{CP} \quad \lambda p_!p \quad \exists e \left[ \text{win}(j, e) \land e \subseteq (n, \infty) \right]
\]
\[
\text{C: } \emptyset \quad \text{MoodP} \quad \exists e \left[ \text{win}(j, e) \land e \subseteq (n, \infty) \right]
\]
\[
\text{Mood} \quad \text{TP} \quad \lambda t \exists e \left[ \text{win}(j, e) \land e \subseteq (t, \infty) \right]
\]
\[
\text{kerdisi o Janis} \quad \text{`John wins'}
\]

Here \(t_u\) is introduced by the Mood head which hosts \(na\). At C we have the operator that gives the illocutionary force of a request or a command: \(!p\). This function is also performed by the imperative morpheme. (Giannakidou 2009: 1901).

In our current terms, the Now anchoring rule will be triggered at Mood, just like with FUT in the case of the future particle.

When it comes to complement clauses, it is important to remember that there is no directive illocutionary force. This is consistent with the fact that the imperative force is not embeddable (Portner and Zanuttini 2003). In embedded clauses, embedding under the higher verb will now identify the left \(t\) of the NON-PAST with the time of the higher verb, which can be present or past (or even future). If the attitude verb is in the present tense, \(t\) of the NONPAST will be identified with \(t_u\), as in the unembedded clauses. If we have a past tense attitude verb, the complement now will denote an event to be located at the time \(t\) through infinity, but now \(t\) is in the past, just as the attitude verb:

\[(45)\]
\[
\text{Ithela na kerdisi o Janis.} \quad \text{wanted.1sg that.SUBJ win.PERF.NONPAST.3sg the John. `I wanted John to win.'}
\]

\[(46)\]
\[
\text{Volevo che Gianni vincesse.} \quad \text{Want.IMPF.1sg that John win.IMPF.SUBJ.3sg. `I wanted John to win.'}
\]

A common observation for the embedded subjunctive tense (going back to Kempsicky 1981) is that it is anaphoric. Anaphoric means dependent on the atti-
tude tense. With the past tense *ithela/volevo* ‘wanted’, the top T contributes a time $t$ prior to now, a past. We get a reading where I wanted in the past that there be an event of John’s winning that is not in the past, but in the interval that starts at my wanting time and looks forward, to times possible after $t_u$:

(47)

$$
\text{TP:} \quad \text{want}(j, t_{2 < u}, \lambda n \exists e [\text{win}(j, e) \land e \subseteq (n, \infty)])
$$

$$
\text{T:} \quad \text{wanted}^\prime\text{ithela'}
$$

$$
{t_2 < n}
$$

$$
\text{CP:} \quad \exists e [\text{win}(j, e) \land e \subseteq (n, \infty)]
$$

$$
\text{C:} \quad \emptyset
$$

$$
\lambda p!p \quad \exists e [\text{win}(j, e) \land e \subseteq (n, \infty)]
$$

$$
\text{Mood:} \quad \lambda t \exists e [\text{win}(j, e) \land e \subseteq (t, \infty)]
$$

$$
\text{MoodP:} \quad \lambda t \exists e [\text{win}(j, e) \land e \subseteq (n, \infty)]
$$

$$
\text{T^0: nonpast:} \quad \text{kerdisi}
$$

$$
\lambda p \lambda t P((t, \infty)) \quad \lambda t \exists e [\text{win}(j, e) \land e \subseteq (n, \infty)]
$$

$$
\text{AspectP:} \quad \emptyset
$$

My desire in this reading is expressed in the following paraphrase: the time $t_2$ of my wanting is located in the past, and the time $t$ of John’s winning is located in the future interval that starts at $t_2$. That interval, then, would be the one that starts at the internal now of the attitude (which can be identified with $t_2$ ) and moves forward to include the actual utterance time and times after that. Hence, when embedded, the lambda bound $n$ of *na* cannot refer to the utterance time, but to the relative $n$ of the attitude. If the attitude, on the other hand, is anchored to the present, the interval will be $[t_u, \infty)$, thus identical to the main occurrence of subjunctive.

(48)  $$\text{want}(j, t_u, \lambda n \exists e [\text{win}(j, e) \land e \subseteq (t_u, \infty)])$$

Hence, the embedded interpretation of nonpast with *na* is follows compositionally from the meaning of NON-PAST and Now anchoring. The tense anaphoricity is thus a temporal dependency between the time of the higher attitude and the
3.4. THE SUBJUNCTIVE AND NONPAST

time of the complement, and is enabled by the NONPAST, which can be identified with $t_a$ or a time prior to it, depending on the time of the attitude.

We may ask now: does the subjunctive have a modal force, like the FUT? Recall the use with modal adverbs and in questions we discussed earlier:

(49) O Janis isos na kerdisi.
    the John maybe that.SUBJ win.PERF.NONPAST.3sg.
    ‘John might win.’

(50) Pjos na kerdise (araje)?
    who that.SUBJ win.PERF.PAST.3sg question particle.
    ‘Who might have won?’

(51) O Janis mallon tha/*na na kerdisi.
    the John probably FUT/SUBJ win.PERF.NONPAST.3SG.
    John probably will win.

Notice, crucially, that the modality comes from the modal. Without it, the subjunctive is impossible:

(52) *O Janis na kerdisi.
    the John that.SUBJ win.PERF.NONPAST.3sg.
    ‘#John might win.’

Hence subjunctive does not seem to have the inherent modal force in assertion that THA has. $Na$ instead, seems to contribute a modality parasitically on an already present possibility modal (or equivalent operator such as the question). Notice that in both cases, $na$ is ‘agreeing’ with the nonveridical operator; recall that questions and modals both express possibilities in nonveridical equilibrium.
To sum up: the modal position where *na* is found serves exclusively the function to introduce the Now anchoring rule in embedded clause. The temporal information comes from nonpast just like with the FUT. The inherent modality on *na* surfaces only in main clauses, and indeed parasitically on an existing epistemic modal.

### 3.5 Subjunctive with a lower PAST

Let us now provide the analysis for modal particle with PAST. We illustrate first with FUT as the simple case without embedding. We distinguish a morphological perfective and a past layer.

(54) O Janis tha kerdise.  
    the John FUT win.PERF.NONPAST.3sg
3.5. SUBJUNCTIVE WITH A LOWER PAST

‘John must have won.’

Here, the embedded time is a PAST which is deictic, therefore it denotes the anteriority relation wrt \( t_u \): \( t' < t_u \). The Now anchoring rule does not apply since there are no free variables.

(55)

FUT thus does not provide tense. With a lower NON-PAST we get future orientation and a prediction, but with a lower PAST, the FUT sentence is equivalent to a MUST sentence with embedded PAST. The temporal information, in both cases, comes form the tense below FUT. Incidentally, PAST is also posisble under the Dutch and German futures:

(56) Hij zal wel slecht geslapen hebben! (Dutch)
   ‘He must have slept really bad!’ (Giannakidou and Mari 2018a)

(57) Ich habe meinem Freund letzte Woche einen Brief geschrieben; er wird ihn sicher schon bekommen haben. (German)
   ‘I wrote a letter to my friend last week; he must surely have already received it.’ (Lederer 1969, p.98, ex. 584).
Morphologically, a present perfect appears in Dutch and German, just as in English *must have slept*, and not a simple past *must slept*. The simple past is thus excluded in the infinitival with must. This can be taken to suggest, in agreement with what we said earlier, that the default tense of the infinitive is NONPAST. This, as Giannakidou and Mari (2018a) suggest, necessitates the use of a NONPAST auxiliary resulting in the apparent present perfect.\(^4\) Greek, on the other hand, lacks infinitives and the modal embeds a tensed clause which can be a simple past or a nonpast. The sentences above, in any case, show that a future morpheme can combine with lower PAST, and when this happens the predictive reading disappears. The future reading requires a lower NONPAST.

(58) O Janis isos na kerdise.
    the John maybe that.SUBJ win.PERF.PAST.3sg.
    ‘John must have won.’

\(^4\)McCawley 1988 notes that in nonfinite contexts, past tense and the perfect are equivalent; for recent discussion see Arregi and Klecha 2015).
3.6 Syntax-semantics of tense and mood of Italian

We now extend this analysis to Italian, by using the modal future to maintain the parallelism.

3.6.1 From Greek to Italian

In Italian, *futuro* appears on the verb (60-b), like present (60-a) and simple past (60-c).

(60)  
| a. Arriv- a.  | (Italian)  
| Arrive PRES.3sg.  |
| ‘He arrive any moment soon.’  |
| b. Arriv- erà.  | (Italian)  
| Arrive FUT.3sg.  |
| ‘He will arrive.’  |
| c. Arriv- ò.  | (Italian)  
| Arrive SIMPLE,PAST.3sg.  |
| ‘He arrived.’  |

We propose that abstractly the structure is similar to Greek, with FUT being expressed higher than TP. The order of application of the semantic functions is the same as in Greek - and it is merely a morphological fact that future is a Tense, and must therefore stay within the V-form in Italian. In Greek, FUT is a particle and stays outside the V. In other words, in Italian there is a mismatch between the function of *futuro* (modal) and its status as a verbal category. The same, by the way, holds for subjunctive, which in Italian, unlike Greek, also appears on V.

The main difference between Italian and Greek, is that, in Italian, Aktionsart determines the aspectual information - since in Italian there is no grammatical aspectual distinction. We note with previous literature (and most notably Bertinetto 1979), that, in Italian, the eventive/stative distinction plays a role, just as in a variety of other languages (see Cipria and Roberts 2000; Condoravdi 2002; Copley 2002; Laca 2008; Mari, 2015a,b). With eventive predicates embedded under present (61-b) or future (62-b), the time of evaluation of the prejacent is forward-shifted—unlike with stative predicates (61-a)-(62-a). Such data can be replicated for English, and extend beyond present and future (e.g. see Copley 2009).

(61)  
| a. Gianni è malato.  | ((Italian) stative, present reading)  
| Gianni be,PRES.3sg ill.  |
| ‘John is ill.’  |
| b. Gianni arriva.  | (eventive, future reading)  
| Gianni arrive,PRES.3sg.  |
| ‘John will arrive immediately.’  |

(62)  
| a. Gianni sarà malato.  | ((Italian) stative, present epistemic reading)  
| Gianni be,FUT.3sg ill.  |
| ‘John must be ill.’  |
| b. Gianni arriverà.  | (eventive, predictive reading)  
| Gianni arrive,FUT.3sg.  |
Gianni will arrive.

Condoravdi (ibid.) notes the same pattern for modals (see (63)) and proposes an account that relies on aspectual differences between statives and eventives, from which it follows that the time of evaluation of the prejacent is forward-shifted only with eventive ones.5

(63) a. John might be ill (stative, present orientation)
    b. John might become ill (eventive, future orientation)

According to Condoravdi (ibid.) the modal itself bears the temporal information and provides a forward-shifting interval. We cannot adopt this view here, since forward-shifting with eventives is independent of modal embedding, see (61-b). Our proposal builds on a parallelism between grammatical and lexical aspect, according to which lexical statives are standardly imperfective, whereas eventives are perfective unless they are marked by a progressive verb form (see Smith 1991; Boogaart and Trnavac 2011). In this line of thought, lexical eventives provide aspectual information – perfectivity – and perfectivity, in absence of PAST, triggers futurity (NON-PAST, \(\lambda P\lambda t\lambda w(P(t, \infty)(w))\)). Aspect is thus contributed in the VP.

Note that, just as in Greek morphological perfectivity combines with either nonpast or past to produce PERF, NON-PAST and PERF PAST, in Italian lexical perfectivity is also compatible with PAST or NON-PAST leading to PERF PAST and PERF NON-PAST, as is the case here to produce the predictive reading.6

Above the VP, the derivation in Italian is parallel to the one in Greek. We see that, by being parametric to the time of utterance, FUT provides Now-anchoring in Italian as well.7 Consider (64).

(64) Flavio vincerà.
    Flavio win,FUT.3sg.
    ‘Flavio will win.’

(65)

---

5When the prejacent is stative (and the time of evaluation is not forward-shifted), the modal has an epistemic interpretation. According to Condoravdi (2002) the modal has a metaphysical interpretation in (63-a).

6As often noted, forward-shifting is observed with statives too, e.g. as in ‘Domani sarà malato’ (Tomorrow he will be ill), see Giannakidou and Mari (2018a) for details.

7Why in nonpast environments the perfective triggers futurity has been the object of much study—but there is no final answer (Copley 2009, Mari 2015a, Boogaart and Trnavac 2011). Here we tend to align with Boogaart and Trnavac (ibid.) who espouse the classical view from Comrie (1976): “a perfective verb form instead presents a situation, ‘from the outside’, as a completed whole, thus including both its starting point and endpoint.” Perfectivity thus establishes a distance between the boundaries of the event and the perspectival point, which in the case of future is \(t_u\). For this reason perfectivity can combine with past or non-past, but does not provide PRES.
3.6. SYNTAX-SEMANTICS OF TENSE AND MOOD OF ITALIAN

As for the so called ‘anterior future’ in Italian we observe what follows.

(66) Gianni sarà andato al cinema ieri.  
Gianni be.FUT.3sg gone to-the theatre yesterday.  
Gianni must have gone to the theatre, yesterday.  

Recall that the corresponding sentence is a a simple past, i.e. past perfective, in Greek. In Italian, FUT is in complementary distribution with a variety of auxiliaries bearing different tenses (67), thus entering apparent Perfect constructions (see de Swart, 2007).

(67) è, fu, sarà andato.  
be.PRES, SIMPLE-PAST, FUT gone.  

We decompose the perfect component as a combination of PAST and PERF, as in Greek. PERF provides the temporal boundaries of the eventuality; the PAST expresses anteriority. But given the possibility of combining with a variety of tenses, we must concede that the PAST we are positing is not deictic as in Greek but relative (Verkuyl, 2011, Broekhuis and Verkuyl 2014): it does not express anteriority with respect to $t_u$ but wrt a time $t$ which is a free variable TP. This triggers the Now-anchoring rule. The derivation of (68) follows in (69).
We can thus generalize that, regardless of whether the embedded PAST under FUT is a simple past or a perfect, the anteriority relation is expressed—only in the case of the simple past (Greek) it makes reference to $t_u$, but in the case of the perfect (Italian, English, Dutch, German) we have relative anteriority and reliance on the Now-anchoring rule. What is important is that the anteriority relation is in the scope of FUT. This analysis of Italian can be extended to cover Dutch, German and English apparent perfects under FUT and MUST.

### 3.6.2 Mood and T in complement clauses

As we illustrated with Greek, this very same analysis can be extended to mood, which can be decomposed into a Mood head and a NON-PAST/PAST. The main difference with FUT is that Mood itself is not a modal, and it does not provide the modal base and the ordering source as future does. These come from the upper main predicate. However, like future, mood anchors the tense, and the
effects, as we shall see in the next chapter of embedded NON-PAST and PAST are parallel with modals and attitudes. Another major difference with future (which has a tense component, via the Now anchoring) is that Mood does not provide anchoring to \( t_u \), rather, and this is an important difference, it is anaphoric to the tense introduced by the attitude. Note, in fact that in (71) we have a future of a past, where the future component is provided by the imperfective embedded under belief and the past relative to which the futurity is calculated is provided by the time on the main verb, to which mood is anaphoric (the counterfactuality is also provided by the imperfect, see Ippolito, 2005).

(70)  
a. Crede che Flavio vinca.  
Believes that Flavio win.PRES.SUBJ.3sg  
‘He believes that Flavio will win.’

b. Crede che Flavio abbia vinto.  
Believes that Flavio have.PRES.SUBJ.3sg won.  
He believes that Flavio has won.

(71)  
Credeva che vincessse.  
Believe.3sg.IMPF that win.IMPF.SUBJ.3sg  
He believed that he would win.
As we see, all modal particles introduce a perspectival time. Mood is no exception to this. When embedded, it functions as a mirror of the tense of the attitudes upon which it is dependent, i.e. it becomes anaphoric, and the left boundary \( t \) will now be the time of the attitude, as mentioned in the discussion of Greek.

Having clarified the tense and mood interaction, let us revisit now some core patterns illustrating how attitude verbs restrict the temporal orientation of the complement.

### 3.7 Temporal constraints imposed by the selecting verb

#### 3.7.1 Verbs selecting the indicative

Recall the relevant attitude classes, starting with the indicative in Greek:

<table>
<thead>
<tr>
<th>Verbs selecting the indicative</th>
<th>Verbs selecting the indicative</th>
<th>Verbs selecting the indicative</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. epistemic factives: ( \text{ksero, gnorizo} ) (know)</td>
<td>b. emotive factives: ( \text{xerome} ) (be glad), ( \text{metaniono} ) (regret)</td>
<td>c. doxastic (non-factive): ( \text{pistevo} ) (believe), ( \text{nomizo} ) (think), ( \text{theoro} ) (consider), ( \text{vrisko} ) (find)</td>
</tr>
</tbody>
</table>

(73) Indicative verbs in Greek \((\text{oti/pos, pu})\)

\begin{itemize}
  \item a. epistemic factives: \( \text{ksero, gnorizo} \) (know)
  \item b. emotive factives: \( \text{xerome} \) (be glad), \( \text{metaniono} \) (regret)
  \item c. doxastic (non-factive): \( \text{pistevo} \) (believe), \( \text{nomizo} \) (think), \( \text{theoro} \) (consider), \( \text{vrisko} \) (find)
\end{itemize}
3.7. TEMPORAL CONSTRAINTS IMPOSED BY THE SELECTING VERB

d. certainty: ime sigouros (be certain), ime pepismenos (be convinced)

e. consciousness: exo epignosi (be aware)

f. pure assertives: leo (say), dhiafazo (read), isxirizome (claim), dilono (declare, assert)

g. verbs of denial: arnoume (deny), ksexno (forget)

h. fiction verbs: onirevome (dream), fandazome (imagine)

i. memory verbs: thimame (remember)

j. perception verbs: vlepo (see), akouo (hear)

These attitudes, specifically doxastic, epistemic, certainty, memory, and dream fiction verbs select indicative across a number of languages including French (as we saw earlier: Baunaz 2015, Puskas 2017), Spanish, Catalan (Quer 1998, 2001, Villalta 1998), Portuguese (Marques 2010, 2014), Serbian (Todorovich 2012), and Romanian (Farkas 1992), among others. They pose no restrictions on the tense of the complement, and appear with present and past. Here are some examples from Greek:

(74) O Nicholas kseri oti/pos/*na efi je i Ariadne.
    the Nicholas knows.3sg that.IND/*/SUBJ left. 3sg the Ariadne.
    ‘Nicholas knows that Ariadne left.’

(75) O Nicholas ine sigouros oti/*na efi je i Ariadne.
    the Nicholas s.3sg certain that.IND/*/SUBJ left.3sg the Ariadne.
    ‘Nicholas is certain that Ariadne left.’

(76) O Nicholas ine pepismenos oti/*na efi je i Ariadne.
    the Nicholas is.3sg convinces that.IND/*/SUBJ left.3sg the Ariadne.
    ‘Nicholas believes that Ariadne left.’

(77) O Nicholas pistevi oti/*na efi je i Ariadne.
    the Nicholas believe.3sg that.IND/*/SUBJ left.3sg the Ariadne.
    ‘Nicholas believes that Ariadne left.’

(78) O Nicholas exi epignosi oti/*na i Ariadne ton
    the Nicholas has awareness.3sg that.IND/*/SUBJ the Ariadne him
    vouthise.
    helped.3sg
    ‘Nicholas is aware that Ariadne helped him.’

(79) O Nicholas onireftike oti/*na efi je i Ariadne.
    the Nicholas dreamt.3sg that.IND/*/SUBJ left.3sg the Ariadne.
    ‘Nicholas dreamt that Ariadne left.’

(80) O Nicholas theor i oti/*na i Ariadne ine omorfi.
    the Nicholas consider.3sg that.IND/*/SUBJ the Ariadne is beautiful
    ‘Nicholas considers Ariadne to be beautiful.’
CHAPTER 3. MOOD AND TENSE

(81) O Nicholas vriskei oti/*na thē Ariadne ine omorfi.
the Nicholas find.3sg that.IND/*SUBJ the Ariadne is beautiful
‘Nicholas considers Ariadne to be beautiful.’

Since the indicative is an indicator of commitment and veridicality, its use after verbs of knowledge, belief, and certainty is expected—given the premises of our theory in chapter 2. Doxastic attitudes involve an individual anchor’s, in this case, the main clause subject’s cognitive mental state which relies on knowledge, belief, awareness, memory, perception, or imagination. In the doxastic attitude we include verbs like vrisko ‘find’ and theoro ‘consider’, which in Greek take finite complements only.

Here are examples from other languages illustrating the stability of the pattern of indicative with knowledge, belief, certain, and imagination:

(82) Jean croit/est certain/imagine que Marie est partie.
John believes/is certain/imagines that Mary is left.
‘John believes/is certain/imagines that Mary left.’

These verbs, as we mentioned already do not combine with non-past, but they do allow future reference with FUT in their complements:

(83) O Nicholas ine sigouros oti/*na tha fiji i Ariadne.
the Nicholas be.3sg certain that.IND/*SUBJ FUT leave.nonpast3sg i the Ariadne.
‘Nicholas is certain that Ariadne will leave.’

(84) O Nicholas ine pepismenos oti/*na tha fiji i Ariadne.
the Nicholas is.3sg convinces that.IND/*SUBJ FUT leave.non.3sg the Ariadne.
‘Nicholas believes that Ariadne will leave.’

In other words, future orientation is not excluded from the doxastic complement, but it is blocked by the use of indicative which is incompatible with the NONPAST and therefore necessitates the use of future.

Purely assertive verbs select the oti-indicative in Greek, and behave like epistemics and doxastics:

(85) O Nicholas anakinose oti/*na efije i Ariadne.
the Nicholas announced.3sg that.IND/*SUBJ left.3sg the Ariadne.
‘Nicholas announced that Ariadne left.’
3.7. TEMPORAL CONSTRAINTS IMPOSED BY THE SELECTING VERB

Verbs like anakinose ‘announce’ are purely assertive and do not alternate with na.

Finally, verbs of negative assertion (mentioned in chapters 1 and 2) also select the indicative:

(86) O Nicholas arinthike oti/*na i Ariadne ton voithise.  
the Nicholas denied.3sg that.IND/*SUBJ the Ariadne him helped.3sg.  
‘Nicholas denied that Ariadne helped him.’

At first, the indicative appears striking given that DENY \( p \) does not entail \( p \). But—as we said in chapter 2— if we view these verbs as subjectively veridical, e-commited to \( \neg p \), it makes sense that they select indicative:

(87) [Nicholas denied that \( p \)] is true in the world of the utterance context \( w \) iff:  
\[ \forall w' [w' \in M(Nicholas, w) \rightarrow \neg p(w')] \]

In other words, if \( i \) denies that \( p \) and \( i \) is truthful, then \( i \) knows \( \neg p \) to be true. The condition might be weakened to \( i \) believes \( \neg p \) to be true. Regardless of which version we chose, the point here is that subjective veridicality explains why we get indicative with even negative assertives. The tense, again, is variable and there are no particular constraints.

Let us move on now to the subjunctive verbs.

3.7.2 Subjunctive verbs

In Greek, the following verbs select subjunctive:

(88) Subjunctive verbs in Greek
a. volitionals: thelo (want), skopevo (plan)
b. directives: dhiatazo (order), simvulevo (advise), protino (suggest),
c. modal verbs: prepi (must), bori (may)
d. effort verbs: prospatho (try)
e. permissives: epitrepo (allow); apagorevo (forbid)
f. implicatives: katorthono (manage), anagazo (force)

The very same classes select subjunctive in Italian too:

(89) Subjunctive verbs in Italian
a. volitionals: volere (want),
b. directives: ordinare (order)
c. modal verbs: \( \acute{e} \) necessario (it is necessary),\( \acute{e} \) possibile (it is possible), bisogna (it is needed).
d. permissives: *impedire* (forbid)

Here are some examples with volitional verbs in Greek and Italian (90).

(90) a. Θέλω *na/*oτι* κέρδισε ο Τάνις.
    want.1sg that.SUBJ/*IND win.NONPAST.3sg the John.

    *I want John to win.*

b. Voglio che Gianni vinci/*IND.
    Want.1sg.SUBJ that John win.3sg.SUBJ.

    ‘I want John to win.’

Volitional verbs are future oriented and select the NONPAST, as mentioned earlier:

(91) Μάς προτίναν *na/*oτι* μιλίσουμε με τον Τάνις.
    suggested.3pl that.SUBJ/*IND talk.NONPAST-1PL with the John

    ‘They suggested to us that we talk with John.’

(92) Μάς συμβουλέψαν *na/*oτι* μιλίσουμε με τον Τάνις.
    advised.3pl that.SUBJ/*IND talk.NONPAST-1PL with the John

    ‘They advised us to talk with John.’

(93) Σκοπεύουμε *na/*oτι* μιλίσουμε με τον Τάνις.
    plan.3pl that.SUBJ/*IND talk.NONPAST-3PL with the John

    ‘They suggested to us that we talk with John.’

    We observe here again the correlation of *na* plus lower nonpast and future orientation. Notice the parallel with the to-infinitival or the subjunctive in English (which is, as we said, a bare infinitive). Epistemic modal verbs are independent in their lower tense:

(94) a. Βορί/Πρέπει *na/*oτι* κέρδισε ο Τάνις.
    Can/Must that.SUBJ win.PAST.3sg the John.

    ‘It is possible that he has won.’

b. È possibile che abbia vinto.
    Be.3sg possible that have.SUBJ.sg won.

    ‘It is possible that he has won.’

(95) a. Ινε *pίθανο* *na/*oτι* κέρδισε.
    is.3sg possible subj win.nonpast.3sg.

    ‘He may win.’

b. È possibile che vinci.
    Be.3sg.IND possible that win.3sg.SUBJ.

    ‘He may win.’
As we saw in chapter 2 and in earlier discussions (Giannakidou and Mari 2016a, 2018), epistemic modals appear with all three tenses. The constrain for NON-PAST concerns more narrowly the volitional class, which we discuss further in chapter 5.

It is also important to note verbs of effort like TRY, and implicatives like MANAGE patterns with volitional verbs and require NONPAST:

\[(96)\] O Flavio prospathise na/*/oti milisi me ton the Flavio tried.3sg that.SUBJ/*IND talk.NONPAST-3sg with the Jani.
the Flavio tried.3sg that.SUBJ/*IND talk.NONPAST-3sg with the John.
‘Flavio tired to talk with John.’

\[(97)\] O Flavio katafere na/*/oti milisi me ton Jani.
the Flavio tried.3sg that.SUBJ/*IND talk.NONPAST-3sg with the John.
‘Flavio tired to talk with John.’

\[(98)\] *O Flavio prospathise na/*/oti milisi me ton Jani.
the Flavio tried.3sg that.SUBJ/*IND talk.PAST-3sg with the John.

\[(99)\] *O Flavio katafere na/*/oti milisi me ton Jani.
the Flavio tried.3sg that.SUBJ/*IND talk.PAST-3sg with the John.

We will discuss what the temporal constraints with this class of verbs mean in chapter 7. For now, we note the fact that verbs of effort and implicatives require nonpasts.

### 3.8 Flexible mood patterns in Italian

Apparent flexible mood within a language has been challenging for almost all analyses of mood, as we noted several times already. To deal with the flexibility, most accounts would have to say, in some way or other, that the verb meaning changes depending on the mood chosen. Our guiding assumption in this book is that the mood and lower tense play a key role in bringing about dimensions in the meaning of the propositional attitude that are responsible for the flexibility.

The Italian data have only been treated in sections addressing open questions in the literature and, in spite of the pioneering work of Giorgi and Pianesi (1996) little progress has been made in the last 20 years to explain the flexibility in mood choice that this language allows. Generally speaking, and in contrast to Greek, Italian is a language that favors the subjunctive. Compared to the strict indicative selectors of Greek, Italian features mood shift for most of the indicative Greek classes (see Mari, 2016).
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(100) Mood shift in Italian
   a. emotive factives: essere contento, sorpreso (be happy, be surprised) mostly subjunctive, allow indicative. (101)
   b. doxastic (non-factive): credere, pensare, trovare (believe, think, find) mostly subjunctive, allow indicative. (102)
   c. certainty: essere certo (be certain) mostly indicative, allow subjunctive; essere convinto (be convinced) subjunctive, allows indicative (103)
   d. consciousness: essere cosciente (be aware) (104)
   e. pure assertives: dire (say) mostly indicative, allow subjunctive (105)
   f. verbs of denial: negare (deny) (106)
   g. fiction verbs: immaginare (imagine) sognare (dream) (107)
   h. memory verbs: ricordare/ricordarsi (remember) (108)

(101) Sono contenta che sia/è venuto.
   I am happy that he be.SUBJ.3sg/IND.3sg come.
   ‘I am happy that he has come.’

(102) Credo che sia/è bella.
   Belive.1sg that be.SUBJ/IND cute.
   ‘I believe that she is cute.’

(103) Sono sicura che sia/è bella.
   Am certain that be.SUBJ/IND cute.
   ‘I am certain that she is cute.’

(104) Sono cosciente che sia/è bella.
   Am aware that be.SUBJ/IND cute.
   ‘I am aware that she is cute.’

(105) Le gente dice che sia/è bella.
   The people say that be.SUBJ/IND cute.
   ‘People say that she is cute.’

(106) Maria nega che Laura sia/è bella.
   Mary denies that Laura be.SUBJ/IND cute.
   ‘Mary denies that Laura is cute.’

(107) Maria immagina che Laura sia/è bella.
   Mary imagines that Laura be.SUBJ/IND cute.
   ‘Mary imagines that Laura is cute.’

(108) Maria ricorda che Laura sia/è bella.
   Mary remembers that Laura be.SUBJ/IND cute.
   ‘Mary remembers that Laura is cute.’
This overwhelming flexibility is still in need of a principled and unified explanation. Most notably, Italian is an exception to the generalization supported by Greek and the other European languages that we mentioned, namely that belief verbs are indicative selectors. Mood with doxastic verbs is flexible in Italian, with a normative pressure for subjunctive.\(^8\)

The Italian doxastic class will give us the key to understand mood flexibility and to generalize it cross-classes and cross-linguistically, thus allowing us to stabilize a unified theory of mood shift. Such principled explanation will have to explain the possible meaning variations that can arise with the choice of either one of the two moods.

(109) Credo/Penso che Maria sia./è incinta.
Believe/Think.PRES.1sg that Mary is.SUBJ/IND.3sg pregnant.
‘I believe that Mary is pregnant.’

Indicative is also allowed with non-epistemic factives, but the subjunctive tends to be the norm. Interestingly, as we have just mentioned even verbs of certainty can select subjunctive in Italian, and, as previously never observed (see Mari, 2016) also fiction verbs can.

(110) Sono sicura che Maria sia./è incinta.
Am certain.PRES.1sg that Mary is.SUBJ/IND.3sg pregnant.
‘I am certain that Mary is pregnant.’

(111) Sono convinta che Maria sia./è incinta.
Am convinced.PRES.1sg that Mary is.SUBJ/IND.3sg pregnant.
‘I am convinced that Mary is pregnant.’

(112) Immagino che Maria sia./è incinta.
Imagine.PRES.1sg that Mary is.SUBJ/IND.3sg pregnant.
‘I imagine that Mary is pregnant.’

The pattern is thus in striking contrast to the Greek doxastics which rigidly selected indicative. Crucially, the doxastics differ from ‘know’ sapere, which strictly selects indicative as all other languages that we are aware of.

(113) So che Maria è. incinta.
Know that Mary is.SUBJ/IND.3sg pregnant.
‘I know that Mary is pregnant.’

The epistemic vs. doxastic choice thus matters in Italian when it comes down to

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\(^8\)German and Icelandic are sometimes cited as allowing occasionally subjunctive with doxastic verbs, but these languages lack systematic mood selection (like English), and the choice seems to depend on other factors such as expressive meaning (Potts 2007).
mood selection. If the indicative is non-negotiable with the knowledge verb, and since the knowledge verb is veridical, the generalization seems to be, as in Greek, that the indicative is the mood of veridicality and e-commitment. Belief verbs, when construed in the indicative, they do so because they are subjectively veridical, as we argued the classical belief is — and the indicative licensing requirement is satisfied.

But what about the subjunctive? Does the verb meaning change in this case? The Italian belief verbs present a prime example of the puzzle of flexible mood choice and how the lower mood can be used as a diagnostic for a richer meaning of the higher attitude verb. Following the proposal in Mari (2016), we will argue in chapter 4 that the subjunctive is enabled because the doxastic verb can be construed as containing a nonveridical knowledge component ‘not know’. We will call this suppositional belief, and argue that suppositional construals are available for all doxastics that shift to the subjunctive.

We want to close with a note on fiction verbs. Mari (2016) notes that in Italian that fiction verbs can license the subjunctive (114). Here ‘imagine’ has a conjectural meaning, and the speaker is making an hypothesis about Gianni’s job. Scenario: Gianni, who is 35 years old, used to sing very well when he was a child. A friend of his mother, who has known Gianni since he was born, utters:

(114) Immagino che Gianni sia/*è una pop star oramai.
    Imagine.1sg that John be.SUBJ/*IND.3sg a pop star by-now.
    ‘I imagine that Gianni is a pop star by now.’

In a different scenario where Gianni is not a popstar, and this is not a possibility given the facts, ‘imagine’ cannot convey conjecture and the subjunctive is out.

(115) Immagino che Gianni è/*sia una pop star.
    Immagino che Gianni be.IND/*SUBJ.3sg a pop star.
    ‘I imagine that Gianni is a pop star.’

In line with Mari (2016), in chapter 4, we will propose that there are two possible realizations intra and cross-linguistically of the attitude IMAGINE.

3.9 Summary

Our main findings in this chapter were three. First, the choice of mood correlates not with finiteness, but with a choice of embedded tense: the indicative complement, specifically, is incompatible with NONPAST, but the subjunctive of volitional and directive verbs requires it. NONPAST, and not the subjunctive or fu-
3.9. SUMMARY

ture, is responsible for future orientation. We articulated explicit syntax-semantics compositions to illustrate how the anaphoric (NONPAST), or independent (past, present) tense of the embedded tense are derived in Greek and Italian.

Second, in the subjunctive class, there are further restrictions: some verbs strictly require NONPAST (volitionals), but other are flexible (modals). We will discuss the temporal properties of each class in our specific discussions in the chapters that follow.

Third, mood flexibility is rampant in Italian— but is also observed, though not with doxastics, in Greek, as can be recalled from chapter 1. The subjunctive, specifically, being sensitive to the presence of a higher nonveridical licensor, is a diagnostic that the attitude contains a nonveridical epistemic ‘do not know’ component— which, as we will argue next, is a presupposition that characterizes all subjunctive taking verbs and renders them nonveridical.
Chapter 4

Mood choice with doxastic verbs: solipsistic and suppositional belief

4.1 The main points of this chapter

In this chapter, we discuss the indicative versus subjunctive choice with doxastic propositional attitude verbs in Greek and Italian. As it became clear in the preceding discussion, there are two main patterns: (a) doxastic verbs strictly select the indicative, which is the pattern observed in Greek and most other Romance languages, and (b) doxastic verbs can flexibly allow both moods, such as in Italian and to some extent Portuguese, with repercussions in meaning.

We will argue the following.

1. Doxastic verbs that select the indicative have what we call ‘solipsistic’ Hintikka belief-style truth conditions that render them subjectively veridicality. The express the attitude holder’s i d(oxastic)-commitment to the complement proposition.

2. Greek doxastic verbs express d-commitment and select the indicative. Italian verbs can be construed solipsistically too, and in this case they follow the Greek pattern and select indicative (Giannakidou, 1999,2009).

3. The subjunctive is triggered when the doxastic verb is construed suppositionally. Suppositional belief is of mixed veridicality and means ‘believe but not know’ (Mari, 2016). In this case, the doxastic predicate takes a non-veridical epistemic modal base M as an additional argument, just like the modal verbs, and obeys the Nonveridicality Axiom. When this happens, subjunctive will be selected, as is the case in Italian.
4. There are, therefore, two ways of conceptualizing doxastic attitudes: (a) as veridical, solipsistic attitudes that do not address the actual world or knowledge, and lack any presuppositions, or (b) as nonveridical *suppositional* states that have two layers of meaning, and engage with knowledge in the presupposition (like MUST). Italian verbs are underspecified lexically, and can be construed either way. This explains why they are compatible with both indicative and subjunctive. Greek doxastic verbs, on the other hand, are lexically specified as veridical Hintikka beliefs and select only the indicative. A partitioned epistemic state is sensitive to the unsettledness of $p$ in the epistemic space of the attitude holder. By carefully distinguishing knowledge and doxa, we will argue that, just as Greek, Italian belief is strong doxa-wise but it is weak epistemic-wise.

5. The flexibility in mood choice does not necessitate imposing ambiguity in the lexical entries of propositional attitude verbs. It rather shows that doxastic propositional attitudes exhibit the variability that we see typically with modals in being able to pick different modal bases, and in some cases, they take two. Our account therefore offers a new way of understanding mood shift by acknowledging the similarity between attitudes and modals.

6. Negation in Greek triggers the subjunctive with doxastic verbs because it eliminates d-commitment and creates a nonveridical $Dox$.

7. The embedded mood has a pragmatic function: it anchors the complement proposition to the local attitude holder’s $M(i)$. We define an assertive indicative *oti* which adds $p$ to $M(i)$, and the presuppositional indicative $(pu)$ which requires that $p$ already be present in $M$ or the common ground. The subjunctive introduces nonveridical update and does not add the complement proposition to $M(i)$ or the common ground.

### 4.2 Veridical belief and commitment

In the discussion that follows, we will use the label ‘doxastic’ to refer to verbs that express attitudes of belief, thought, consciousness, consideration, dream, imagination, fiction, perception, and memory. These attitudes are also sometimes referred to as ‘cognitive’. We will not be able to discuss all these attitudes here, and continue the discussion in chapter 5, especially of those attitudes in Greek with which we observe mood flexibility.

Let us start by recalling that the epistemic and doxastic classes select indicative:
4.2. VERIDICAL BELIEF AND COMMITMENT

(1) Indicative verbs in Greek (oti/pos, pu)
   a. epistemic factives: ksero, gnorizo (know)
   b. emotive factives: xerome (be glad), metaniono (regret)
   c. doxastic (non-factive): pistevo (believe), nomizo (think), theoro (consider), vrisko (find)
   d. certainty: ime sigouros (be certain), ime pepismenos (be convinced)
   e. consciousness: exo epignosi (be aware)
   f. pure assertives: leo (say), dhiavazo (read), isxirizome (claim), dilono (declare, assert)
   g. verbs of denial: arnoume (deny), ksexno (forget)
   h. fiction verbs: onirevome (dream), fandazome (imagine)
   i. memory verbs: thimame (remember)
   j. perception verbs: vlepo (see), akouo (hear)

The latter three classes can alternate with the subjunctive, with repercussions in meaning. Let us focus first on ‘pure’ doxastics, i.e., verbs that indicate belief, certainty, conviction, and dream/fiction. Here are some core examples repeated from earlier discussion:

(2) O the Nicholas kseri oti/pos/*na efije i Ariadne.
   the Nicholas knows.3sg that.IND/*SUBJ left.3sg the Ariadne
   ‘Nicholas knows that Ariadne left.’

(3) O Nicholas ine sigouros oti/*na efije i Ariadne.
   the Nicholas s.3sg certain that.IND/*SUBJ left.3sg the Ariadne.
   ‘Nicholas is certain that Ariadne left.’

(4) O Nicholas ine pepismenos oti/*na efije i Ariadne.
   the Nicholas s.3sg convinces that.IND/*SUBJ left.3sg the Ariadne.
   ‘Nicholas believes that Ariadne left.’

(5) O Nicholas pistevi oti/*na efije i Ariadne.
   the Nicholas believe.3sg that.IND/*SUBJ left.3sg the Ariadne.
   ‘Nicholas believes that Ariadne left.’

(6) O Nicholas exi epignosi oti/*na i Ariadne ton
   the Nicholas has awareness.3sg that.IND/*SUBJ the Ariadne him
   helped.3sg.
   ‘Nicholas is aware that Ariadne helped him.’

(7) O Nicholas onireftike oti/*na efije i Ariadne.
   the Nicholas dreamt.3sg that.IND/*SUBJ left.3sg the Ariadne.
   ‘Nicholas dreamt that Ariadne left.’
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(8) O Nicholas theori oti/*na i Ariadne ine omorfi.
the Nicholas consider.3sg that.IND/*SUBJ the Ariadne is beautiful.
‘Nicholas considers Ariadne to be beautiful.’

(9) O Nicholas vriskei oti/*na i Ariadne ine omorfi.
the Nicholas find.3sg that.IND the Ariadne is beautiful.
‘Nicholas considers Ariadne to be beautiful.’

Echoing our initial question: what do all these verbs have in common that renders them indicative selectors like knowledge verbs? If indicative is an indicator of subjective veridicality in the higher verb, as we have been arguing, its use after verbs of certainty and belief is perhaps expected. But what about awareness, memory, dream, fiction, imagination and similar cognitive states? Unlike knowledge, some of these attitudes are purely subjective, i.e., they are about what the bearer of the attitude imagines, dreams of, etc., and lack completely a factual dimension. Imagining or dreaming do not care about what is the case in the actual world; they nevertheless select the indicative, just like knowledge verbs. And even verbs like those meaning ‘find’, which typically convey disputable beliefs, are indicative selectors in Greek.

Recall our discussion of the indicative as the mood of veridicality objectively and subjectively, also as a precondition on assertion: Crucially, the subjunctive na is excluded from an unembedded assertion:

(10) (*Na) Efije i Ariadne.
(*That.SUBJ) left. 3sg the Ariadne
‘Ariadne left.’

(11) Efije i Ariadne is assertable by speaker i if and only if
\[ \forall w'[w' \in M(i) \rightarrow left(Ariadne)(w')] \]

We said that for the co-operative speaker to utter the sentence \( p \), she must be commitment to \( p \), which means that she is in a state of subjective veridicality, i.e. she knows or believes \( p \) to be true. Recall:

(12) Subjective veridicality
i. A function \( F \) that takes a proposition \( p \) as its argument is subjectively veridical with respect to an individual anchor \( i \) and an information state \( M(i) \) iff \( M(i) \) entails \( p \).
ii. \( M(i) \) entails \( p \) iff \( \forall w[w' \in M(i) \rightarrow w \in \{ w' \mid p(w') \}] \).

Subjective veridicality implies \( p \)-homogeneity of the entire \( M(i) \). When all worlds in \( M(i) \) are \( p \) worlds, \( p \) is entailed in \( M(i) \). This is a state of full commitment to \( p \), and following Gricean quality (Be truthful) it is a precondition on assertion. If \( p \) is negated, in a parallel manner, the sentence expresses the speaker’s
commitment to \( \neg p \):

\[ \text{(13) } O \text{ Giacomo dhen ine giatros/ Giacomo is not a doctor is assertable by speaker } i \text{ if and only if } \forall w'[w' \in M(i) \rightarrow \neg \text{doctor}(\text{Giacomo})(w')]. \]

Again we have a universal condition, this time that all worlds in \( M(i) \) be \( \neg p \) worlds. We can therefore say that unmodalized unembedded assertions, positive or negative, express full commitment of the speaker to \( p \) or \( \neg p \).

Commitment, as we said, is a gradable property:

\[ \text{(14) Scale of epistemic commitment (Giannakidou and Mari 2016c)} \]

\( p \gg \text{MUST} p \gg \text{MIGHT} p; \) where \( \gg \) means: epistemically more committed

Assertion of \( p \) conveys full commitment to \( p \) in the veridical space \( M \), which means that all worlds in \( M \) are \( p \)-worlds. Modalization, as can be recalled, produces weakened commitment: \( \text{MUST } p \) conveys partial commitment in that only the ideal worlds in \( M \) are \( p \)-worlds; and \( \text{MIGHT } p \) conveys trivial (i.e. the weakest) commitment in that some world in \( M \) is a \( p \)-world. In our discussion of epistemic commitment, we remained neutral with respect to whether \( M \) contains knowledge or beliefs. But right now, when we look at doxastic verbs, it is necessary to differentiate between two kinds of commitment: \( e \)-commitment and \( d(oxastic) \)-commitment (Mari 2016).

Doxastic commitment is subjective veridicality in an individual’s doxastic space. Depending on the propositional attitude, we will identify several doxastic spaces in our discussion below, namely belief, imagination, thought, memory, and consciousness states. These states are anchored to the subject of the propositional attitude, for obvious reasons, i.e. since it is her or his attitude that the sentence reports. The system we will develop in the next few chapter follows the earlier typology of propositional attitudes and models proposed in Giannakidou (1997, 1998, 1999, 2009), as well as some more recent work on Italian doxastics by Mari (2016, 2017a,b). Here we here will aim for a comprehensive, integrated system that will address in more detail the semantics of all the attitudes we identify as doxastic.

Recall the case of knowledge verbs. The truth condition for knowledge is the following:

\[ \text{(15) } [\text{Nicholas kseri /know } p] \text{ will be defined iff the actual world } w \text{ is a } p \text{ world. If defined,} \]
\[ [\text{Nicholas kseri oti } p] \text{ is true in } w \text{ with respect to } M(\text{Nicholas}) \iff \forall w'[w' \in M(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}] \]

\( \text{KNOW} \) thus combines an objective veridicality presupposition with a subjec-
tively veridical assertion: the information state of the subject, M(Nicholas), is 

dominous, i.e., all worlds are p worlds.¹ Factivity is the objective veridical 

cition that w is a p world.

(16) Factivity as a presupposition of objective veridicality

A propositional function F is factive iff Fp presupposes that p is true.

In other words, an objectively veridical F can simply entail p, or presuppose it, in 

which case F is factive.

Veridical functions, however, need not be factive like the epistemic one. Subjective veridicality simply requires that the individual anchor is in a state M that 
supports p, regardless of whether p is actually (i.e. objectively) true. For instance, 
Nicholas believes that Ariadne is a doctor reflects a veridical epistemic state (with 
respect to Nicholas = i and Nicholas’s belief state = M(i), but the sentence Ariadne 
is a doctor can be objectively false, i.e., Nicholas might have a false belief:

(17) [Nicholas believes that p] is true in the world of the utterance context w 

iff:

\[ \forall w'[w' \in \text{Dox}(Nicholas, w) \rightarrow p(w')] \]

Here we are using Dox to refer specifically to a doxastic state, and separate it form 
the epistemic space of knowledge.

(18) Belief state of an individual anchor i

A belief state Dox(i) is a set of worlds associated with an individual i 
representing worlds compatible with what i believes.

The truth condition of believe does not entail actual truth. However, (18) 
renders believe subjectively veridical, because the whole M(Nicholas) entails p. 
We will generalize here that other verbs denoting private doxastic spaces such as 
dream, imagine and the like are subjectively veridical because they denote variants 
of Dox that entail p without entailing actual truth.

Subjective veridicality (thus also: commitment and homogeneity), we will 
argue, is the prerequisite property for the licensing of the indicative mood. This is 
why verbs of belief and knowledge both select the indicative. Our thesis, recall, 
is the following:

(19) Licensing condition: indicative mood and veridicality

The indicative will be licensed in the complement of a propositional attitude 
that is veridical (objectively or subjectively), and lacks a nonveridi-

ical presupposition.

¹For these reasons, Giannakidou (1998, 1999) called knowledge verbs strongly veridical.
Let us think of the belief state a little bit more. Looking at languages following the Greek pattern, we must say that belief verbs lack the objective layer of meaning, and make no connection to the actual world. Following Hintikka’s classical analysis, a belief verb has subjective veridicality anchored to the subject in the truth condition — but it lacks the factive presupposition, and it does not imply that \( p \) is actually true. The truth condition of belief simply asserts that the belief space is a veridical. Dox indicates that the modal base of belief is doxastic, not epistemic. The truth condition is purely subjective and does not require the actual world to be a member of Dox.

For the evaluation of an embedded \( i \) believes that \( p \), the speaker may also have an opinion. The speaker, in fact, may have an opinion in every sentence. The doxastic spaces of speaker and subject need not coincide: the speaker need not believe that \( p \) is true for instance; the speaker might actually know that \( p \) is false:

(20) O Nicholas theorí/pisteví oti i ji ine epipedi the Nicholas consider/believe.3sg that.IND the earth is flat.
‘Nicholas considers earth is flat.’

People can believe highly implausible, or even crazy and flat our false things. However, the speaker’s knowledge or beliefs, or what is generally known in the common ground, are irrelevant for the truth condition of belief and for the choice of indicative mood. The only ‘realis’ that matters for indicative is the subjective, private ‘realis’ of the believer. For the sentence ‘\( i \) believes that \( p \)’ to be true, the truth condition requires that the believer cannot have any \( \neg p \) worlds in her belief space. Dox(subject) is the space of subjective veridical and d(oxastic)-commitment with doxastic attitudes.

The use of indicative is therefore a sign that a doxastic attitude is solipsistic, i.e., anchored to Dox(subject) and ignoring Dox(speaker), the actual world, and the common ground. The classical Hintikka semantics of belief lies at the basis of a solipsistic attitude. The other doxastic verbs that select the indicative, we will propose here, can be analyzed as manifestations of this kind of belief. We develop a system that details the various types of doxastic models needed, and addresses the specific nuance of each attitude class.

But we will also show that doxastic verbs can have weaker construals too, where doxastic commitment to the complement is compared to knowledge of it. In Italian, there are systematic construals of belief verbs with the nonveridical presupposition of modals, namely that the believer does not know \( p \). In this construal, the belief verb entails \( p \) in the doxastic space, but does not entail \( p \) in the epistemic space. We will call this construal of belief suppositional, and we will show that it expectedly triggers the subjunctive.
We start with Greek, where belief is pure doxa and lacks connection to knowledge. We then turn to Italian, where belief is a composite attitude with the veridical assertion of doxa and the nonveridical presupposition of not knowing.

### 4.3 Veridical doxastic attitudes: the indicative

In this section, we zoom in on the various doxastic classes, and show how they can be construed solipsistically as denoting veridical, d-commitment states. This analysis is necessary in order to account for the fact that solipsistic doxastics select indicative in Greek and in a significant number of other languages. In section 4 we illustrate that Italian allows also a non-solipsistic construal of these verbs.

#### 4.3.1 Attitudes of certainty, awareness, and memory

Consider first attitudes of certainty:

(21) O Nicholas ine sigouros oti/*na efije i Ariadne.  
the Nicholas us.3sg certain that.IND/*SUBJ left.3sg the Ariadne.  
‘Nicholas is certain that Ariadne left.’

(22) O Nicholas ine pepismenos oti/*na efije i Ariadne.  
the Nicholas is.3sg convinced that.IND/*SUBJ left.3sg the Ariadne.  
‘Nicholas is convinced that Ariadne left.’

The cognitive states of certainty and of being convinced can be thought of as variants of belief. Dox therefore is the relevant model here too. The attitude subject is d-commitment to the truth of the complement, i.e., Dox entails $p$:

(23) $\lbrack\text{Nicholas ine sigouros (certain) oti } p\rbrack$ is true in w iff $\forall w' [w' \in \text{Dox}(Nicholas) \rightarrow w' \in \{w'' \mid p(w'')\}]$

(24) $\lbrack\text{Nicholas ine pepismenos (convinced) oti } p\rbrack$ is true in w iff $\forall w' [w' \in \text{Dox}(Nicholas) \rightarrow w' \in \{w'' \mid p(w'')\}]$

(25) $D$\textnormal{(oxastic) commitment} of $i$

i. An individual anchor $i$ is d-committed to a proposition $p$ ff Dox($i$) entails $p$.

ii. An individual anchor $i$ is d-committed to a proposition $\neg p$ iff Dox($i$) entails $\neg p$.

(26) $D$\textnormal{(oxastic) commitment} and entailment

i. For an individual anchor $i$, Dox($i$) entails $p$ iff all the words in Dox($i$) are $p$-worlds.
ii. For an individual anchor \( i \), \( \text{Dox}(i) \) entails \( \neg p \) iff all the words in \( \text{Dox}(i) \) are \( \neg p \) worlds.

Notice that doxastic commitment is not specifically tied to the subject of an attitude. In a main sentence, if the speaker reasons purely with Dox—i.e., based solely on what he believes but not on what he knows— it is d-commitment, and not e-commitment, that is the prerequisite for assertability, i.e., the veridicality condition will be understood in relation to Dox. In most cases, however, the speaker reasons with a mix of knowledge and belief and veridicality is taken to hold for that mixed space—which we will continue to call epistemic. When we have embedding under attitudes, knowledge and doxa get separated.

In the complements of the sentences above, ‘Ariadne left’ is anchored to the subject’s \( \text{Dox}(\text{Nicholas}) \). The truth condition requires that \( \text{Dox}(\text{Nicholas}) \) be a d-commitment \( p \)-state. There are no non-\( p \) worlds in \( \text{Dox}(\text{Nicholas}) \). Both ‘be certain’ and ‘be convinced’ denote doxastic states, but they differ from BELIEVE in that they might allow inference to previous states of non-belief. E.g., we may hypothesize that to be convinced of something means that you came to be believe it from a previous state of not believing it. Likewise, if you are certain of \( p \), this means that you have considered, and rejected, the possibility of not \( p \). This adversarial component, however, is not part of the truth condition, and it is most likely an implicature:

\[
\begin{align*}
(27) & \quad \text{O Nicholas ine pepismenos oti i Ariadne ton agapai, ke the Nicholas is.3sg convinced that.IND the Ariadne him love.3sg, and pote dhen skeftike oti afto bori na min ine alithia.} \\
& \quad \text{never not thought that this might that.subj not be.3sg true.} \\
& \quad \text{Nicholas is convinced that Ariadne loves him, and he never thought that this might not be true.}
\end{align*}
\]

\[
\begin{align*}
(28) & \quad \text{O Nicholas ine sigouros oti i Ariadne ton agapai, ke the Nicholas is.3sg certain that.IND the Ariadne him love.3sg, and pote dhen skeftike oti afto bori na min ine alithia.} \\
& \quad \text{never not thought that this might that.subj not be.3sg true.} \\
& \quad \text{Nicholas is certain that Ariadne loves him, and he never thought that this might not be true.}
\end{align*}
\]

Consciousness attitudes such as those meaning \textit{be aware} differ from belief in more substantial ways. Without entering into unnecessary (for the purposes of mood)
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debates, we assume, with the linguistics literature on the matter, that the set of worlds representing consciousness is a subset of worlds of the belief space (eg. Franke and Jäger 2011). It is generally assumed that one can hold beliefs without being conscious about them. We thus define a function $\text{Con}$ that returns those worlds of $\text{Dox}(\text{subject})$ that are the worlds compatible with the attitude holder’s conscious beliefs. $\text{Con}(\text{Dox}(\text{subject}))$, as a result, is a veridical d-commitment state. In addition, awareness attitudes are factive, as we see:

\begin{align*}
(29) & \text{Consciousness state of an individual anchor } i \\
& \text{A consciousness state } \text{Con}(\text{Dox}(i)) \text{ is a set of worlds associated with an individual } i \text{ representing worlds compatible with what } i \text{ is conscious about.}
\end{align*}

\begin{align*}
(30) & [\[i \text{ is aware that } p]\]_{w, M, i, \text{Con, Dox}} \text{ is defined iff } w \in p. \\
& \text{If defined } [\[i \text{ is aware that } p]\]_{w, M, i} = 1 \text{ iff:} \\
& \forall w'' \in \text{Con}(\text{Dox}(i)(p(w'')) \text{, and } \exists w' \in \text{Dox}(i) : \neg p(w')
\end{align*}

Attitudes with this meaning be aware will select the indicative in Greek. But they allow both subjunctive and indicative in Italian.

\begin{align*}
(31) & \text{O Nicholas exei epignosi oti/*na i Ariadne tou leei the Nicholas has awareness that.IND/*SUBJ the Ariadne him says lies.} \\
& \text{Nicholas is aware that Ariadne is lying to him.}
\end{align*}

\begin{align*}
(32) & \text{Sono conosciente che Anna è/sia a casa. Be.1sg.PRES.IND aware that Anna be.3sg.IND.SUBJ at home.} \\
& \text{‘I am aware that Ann is home.’}
\end{align*}

We will discuss the reasons behind this variability later, and again in chapter 7. As a preview, consider that while $\text{Con}(\text{Dox(}\text{subject}))$ is a d-commitment veridical state, $\text{Dox}$ itself isn’t since, as indicated, $\text{Dox}$ contains worlds where the subject is not aware of $p$.

Finally, with verbs such as thimame ‘remember’, we are looking at $\text{M}_{\text{Memory}}(\text{subject})$, that it to say, the set of propositions that are remembered by the attitude holder:

\begin{align*}
(33) & \text{Memory state of an individual anchor } i \\
& \text{A state of memory } \text{M}_{\text{Memory}}(i) \text{ is a set of worlds associated with an individual } i \text{ representing worlds compatible with what } i \text{ remembers.}
\end{align*}

\begin{align*}
(34) & [\[i \text{ remember } p]\]_{w, \text{M}_{\text{Memory}}(i)} \text{ is } = 1 \text{ iff} \\
& \forall w'' \in \text{M}_{\text{Memory}}(i)(p(w'')).
\end{align*}
4.3. VERIDICAL DOXASTIC ATTITUDES: THE INDICATIVE

Memory is therefore a variant of belief, and is difference from awareness or knowledge. It does not have factivity component. One can have memories that do not correspond to true episodes in the world, one may embellish or dramatize reality in building memories, as is well known from psychological work on memory. Children and adults often correct memories or have false recalls in experimental tasks. Memory is therefore highly doxastic and even, it can understood imaginative. Memory, however, can also be construed factively, as remembering a fact, and this will result in allowing the factive complementizer $pu$. We will revisit memory verbs in section 4 and then again chapter 5, when we discuss flexible mood patterns.

To sum up, with attitudes of certainty and awareness are dealing with variant of Dox(subject), in the case of awareness a subset or Dox(subject) that contains conscious beliefs. With memory predicates, the relevant state of veridicality and commitment in the state of memory. Certainty, awareness, and memory states are solipsistic in that they all have subjective veridicality in their truth condition and lack presuppositions or engagement with the common ground, both of which could result in weakening commitment.

4.3.2 Attitudes of thought and personal taste

Consider now the attitudes of thought and personal taste:

(35) O Nicholas nomizi oti/\*na efije i Ariadne.
the Nicholas thinks.3sg that.IND/\*SUBJ left.3sg the Ariadne.
‘Nicholas thinks that Ariadne left.’

(36) O Nicholas theorin oti/\*na i Ariadne ine omorfi.
the Nicholas believe.3sg that.IND/\*SUBJ the Ariadne is beautiful.
‘Nicholas considers Ariadne to be beautiful.’

(37) O Nicholas vriskei oti/\*na i Ariadne ine omorfi.
the Nicholas believe.3sg that.IND/\*SUBJ the Ariadne is beautiful.
‘Nicholas finds Ariadne to be beautiful.’

Nomizo ‘think’, theoro ‘consider’ and vrisko ‘find’ are all doxastic verbs, and in Greek, theoro ‘consider’ and vrisko ‘find’ take finite oti complements. The English verbs have been discussed extensively, and are known to favor predicates of personal taste which create faultless disagreement. They are therefore impossible to combine with ‘objective’ predicates such as wooden:

(38) O Nicholas nomizi oti/\*na to trapezi ine xylino.
the Nicholas thinks.3sg that.IND/\*SUBJ the table is wooden.
‘Nicholas thinks that the table is wooden.’

(39) #O Nicholas theori oti to trapezi ine xylino.
the Nicholas considers.3sg that.IND the table is wooden.
‘Nicholas considers that the table is wooden.’

(40) #O Nicholas vriski oti i Ariadne ine eksipni.
the Nicholas believe.3sg that.IND the Ariadne be smart
‘Nicholas believes that Ariadne is smart.’

The problem here is that theori, vriski, consider, find require complements that contain debatable properties, and predicates of personal taste (PPT) such as those meaning BEAUTIFUL are indeed debatable, while predicates like WOODEN aren’t. The expanding literature on predicates on PPTs such as tasty, modern, and fun is divided broadly into contextualists (Stephenson 2005, 2006, 2007, Glanzberg 2007, Stojanovic 2008, Saebø 2009, Kennedy and Willer 2016), and relativists (Lasersohn 2005, 2015, Egan 2007, MacFarlane 2007, 2014). Both sides posit a categorical distinction in adjectives between evaluative/subjective and non-evaluative/objective type: the former have, and the latter lack, a judge argument or parameter. The English verb find, consequently, has been argued to combine only with judge-taking adjectives (Saebø 2009), and this is built as a presupposition, most prominently in Kennedy and Willer’s ‘(radical) counterstance’ presupposition. FIND and CONSIDER are argued to differ from BELIEVE in having the (radical) counterstance presupposition, which says that the property they embed must be debatable. We can think of countr-stance as as the adversarial inference we mentioned earlier, or the negative inference we get with emotive verbs (chapter 7).

Crucially, when it comes to mood choice, for the Greek counterparts of FIND and CONSIDER engagement with the possibility of not p doesn’t seem to matter. For Greek, specifically, it becomes clear the vrisko FIND and theoro CONSIDER complements behave like belief complements in selecting indicative. Their truth condition is identical to that of pistevo ‘believe’:

(41) \[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

\[\text{Nicholas vriski/theori (finds, considers) oti } p \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff: } \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]\]

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4.3. VERIDICAL DOXASTIC ATTITUDES: THE INDICATIVE

Greek *theoro* ‘consider’ and *vrisko* ‘find’ are thus classical Hintikka beliefs when it comes to mood choice, and although the verbs differ from *pistevo* in that the subject is indeed aware that there may be opposing views, the verbs remain nevertheless solipsistic. The lexical entry contains no presupposition, perhaps an implicature, as mentioned earlier with BE CONVINCED— but certainly not strong enough such as a presupposition, which could trigger shift to subjunctive. Mood choice is not affected.

The verb think is similarly construed as a belief verb:

\[
\begin{align*}
\text{[Nicholas nomizi (thinks) oti } p] & \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \\
\forall w' [w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w'' | p(w'')\}]
\end{align*}
\]

Hence, it seems to be a robust generalization that, in Greek, attitudes of thought and personal taste pattern solipsistically and select indicative.

4.3.3 Dream and fiction attitudes

The last class we consider is dream and fiction verbs such as *dream* and *imagine*. In this case, we do not have a doxastic model, but we understand M to be the set of worlds compatible with the subject’s dream which we designate as \(M_{\text{dream}}\):

\[
\begin{align*}
\text{Dream state of an individual anchor } i \text{ (Giannakidou 1999: (45))} \\
\text{A dream state } M_{\text{dream}}(i) \text{ is a set of worlds associated with an individual } i \text{ representing worlds compatible with what } i \text{ dreams.}
\end{align*}
\]

\[
\begin{align*}
\text{Imagination state of an individual anchor } i \text{ (Giannakidou 1999: (45))} \\
\text{An imagination state } M_{\text{imagination}}(i) \text{ is a set of worlds associated with an individual } i \text{ representing worlds compatible with what } i \text{ imagines.}
\end{align*}
\]

(45) a. O Nicholas onireftike oti/*na efi je i Ariadne. the Nicholas dreamt.3sg that.IND/*SUBJ left.3sg the Ariadne.
b. Nicholas ha sognato che Ariadne è andata via. Nicholas has dreamt that Ariadne be.3sg.PRES.IND gone away. ‘Nicholas dreamt that Ariadne left.’

(46) O Nicholas fandastike oti/*na efi je i Ariadne. the Nicholas imagined.3sg that.IND/*SUBJ left.3sg the Ariadne. ‘Nicholas imagined that Ariadne left.’

(47) \[
\begin{align*}
\text{[Nicholas dreamt that } p]_{w,M_{\text{dream}}(\text{Nicholas})} \text{ is } 1 \text{ iff:} \\
\forall w' [w' \in M_{\text{dream}}(\text{Nicholas}) \rightarrow w' \in \lambda w'' \{w'' | p(w'')\}]
\end{align*}
\]

(48) \[
\begin{align*}
\text{[Nicholas imagined that } p]_{w,M_{\text{imagination}}(\text{Nicholas})} \text{ is } 1 \text{ iff:} \\
\forall w' [w' \in M_{\text{imagination}}(\text{Nicholas}) \rightarrow w' \in \lambda w'' \{w'' | p(w'')\}]
\end{align*}
\]
When someone dreams or imagines something, the relevant private space is the set of dream or imagination worlds. $M_{\text{dream}}$ is, according to Giorgi and Pianesi 1996, a prototypical private space. What one dreams entails nothing about the real world. This is something expressed also in Farkas (1985, 1992): fictional reality replaces the actual one. A dream or imagination state, as can be seen, fully supports $p$, it is therefore veridical. $Oti$ anchors $p$ to $M_{\text{dream}}$ (subject), we will say, and adds the embedded proposition to it.

Hallucinations are similar:

(49) O Nicholas ixe tin paraisthisi $\text{oti}/^\#\text{na}$ efije i the Nicholas has the hallucination that.IND/that.SUBJ left.3sg the Ariadne.

Ariadne.

‘Nicholas hallucinated that Ariadne left.’

(50) Hallucination state of an individual anchor $i$ (Giannakidou 1999: (45))

A hallucination state $M_{\text{hallucination}}(i)$ is a set of worlds associated with an individual $i$ representing worlds compatible with what $i$ hallucinates about.

(51) $\left[\text{Nicholas hallucinated that } p\right]^{w,M_{\text{hallucination}}(\text{Nicholas})}$ is 1 iff:

$\forall w' [w' \in M_{\text{hallucination}}(\text{Nicholas}) \rightarrow w' \in \lambda w'' \{ w'' | p(w'') \}]$

The fiction, dream, and hallucination models are entirely dissociated from the actual world, and are therefore private in the strictest sense. We can use $Fic$ to refer jointly to the fictional states, as an alternative to $Dox$. $Fic$, unlike $Dox$ does not contain beliefs about the world, and sets up an entirely fictional reality. The prerequisite for indicative is veridicality in $Fic$, and not factivity. The concept of objective realis is totally irrelevant, as it turns out, for indicative.

As d-commitment states, veridical doxastic verbs select indicative complements, and we can view this, syntactically as a form of L(exical) selection:

(52) Generalization: Strict selection of indicative in Greek

Veridical verbs L(exically) select CPs headed by $\text{oti}$ and $\text{pu}$ in Greek.

(53) Greek doxastic verbs

Veridical Doxastic $V: [\text{CAT: } [V]; \text{SEL: } [\text{INDICATIVE: } \text{oti, pu}]]$

Lexicalizations: pistevo, nomizo, onirevome, and the rest of the verbs discussed here that strictly select indicative.

The Greek doxastic verbs are therefore lexically specified as selecting complements marked indicative by $\text{oti}$ and $\text{pu}$. Mood selection is therefore in this case like case selection, e.g. accusative or dative, for the direct object of the verb in a
4.4. SUPPOSITIONAL BELIEF AND THE SUBJUNCTIVE

language that assigns case. And just like with case, mood alternations are not possible. Case marking, thus, in strict selection, has no semantic effect as correctly pointed out in Giannakidou (2016) and Ambar (2016), unlike in optional cases e.g., epistemic subjunctive in questions and relative clauses.

Generalizing, Veridical Doxastic V will select INDICATIVE also in Romance languages:

(54) Veridical doxastic verbs
Veridical Doxastic V : [CAT: [V]; SEL: [INDICATIVE] ]
Lexicalizations: Penso, creer, penser, croire, and the rest of the verbs in Romance that strictly select IND.

Veridical doxastic solipsistic verbs are thus purely subjective, and this is reflected in the grammatical choice of indicative. Let us move on to Italian now which exhibits a more flexible mood pattern with doxastics, and therefore allows us to establish a non-solipsistic belief with a nonveridical presupposition. Non-veridical belief contrasts with solipsistic belief in conveying an awareness that the complement is believed but not known.

4.4 Suppositional belief and the subjunctive

Italian, contrary to what seems to be the general pattern in European languages (which we took Greek to exemplify), allows belief and other doxastic verbs to select indicative as well as subjunctive:

(55) Credo/Penso che Maria sia/è incinta. – ‘I believe that Mary is pregnant.’

Indicative is also allowed with non-epistemic factives, but the subjunctive is the preferred form. Subjunctive might be taken to indicate some form of weakness, e.g., partitioning in the doxastic space (as is argued, e.g., by Homer 2008). The major argument against this explanation of the difference between the indicative / subjunctive alternation with belief in Italian is provided by verbs of certainty (Mari 2016). Even verbs of certainty can select subjunctive in Italian, which is the preferred mood with ‘be convinced’. When one is certain or convinced one is d-committed to the truth of \( p \), i.e., there can be no \( \neg p \) worlds in Dox.

(56) Sono sicura che Maria sia/è incinta. \( \text{Am certain.PRES.1sg that Mary be.SUBJ/IND.3sg pregnant.} \) ‘I am certain that Mary is pregnant.’
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(57) Sono convinta che Maria sia/è incinta.
Am convinced.PRES.1sg that Mary be.SUBJ/IND.3sg pregnant.
‘I am convinced that Mary is pregnant.’

Moreover, as pointed in Mari (2016), also dream verbs, which prototypically select indicative in Greek, can license subjunctive in Italian.

(58) Immagina che Maria sia./è incinta.
Imagine.PRES.3sg that Mary be.SUBJ/IND.3sg pregnant.
‘S/he imagines that Mary is pregnant.’

It is very important to note here (see Mari 2016, 2017b,c) the intuition that subjunctive with fictional predicates convey a ‘do not know’ component. The sentence means that the attitude holder does not know whether Mary is pregnant, but to her best imagination s/he imagines that she is.

Crucially, the subjunctive is not an option for Italian ‘know’, sapere, which selects indicative, as all other languages that we are aware of. With ‘know’ the veridicality of epistemic space is settled. With subjunctive ‘belief’ and ‘imagining’ there is no epistemic certainty, but this does not mean that there is hesitation in the doxastic space or in the imagination space. Informally, the distinction between knowledge and belief, in a language like Italian can be represented as in (60).

(59) Sa che Maria è incinta.
Knows that Mary is pregnant.
‘S/he knows that Mary is pregnant.’

(60) a. Knowledge: \( p \) is presupposed; M is veridical (e-commitment)
b. Belief: that \( p \) is known is not presupposed; Dox is veridical (d-commitment)

The above facts indicate clearly that (a) the difference between epistemic versus doxastic modal spaces in Italian, and (b) the Italian doxastic verbs are not lexically specified to select IND — as we concluded Greek and other Romance doxastics are.

4.4.1 Two kinds of belief: Italian

An obvious take on subjunctive belief is that in Italian, belief is weak, and that it reveals uncertainty (Homer 2008). However, as we said, this cannot be correct, because even the predicate meaning be certain licenses the subjunctive. To make our way into the semantics of Italian doxastics, a better way to start is by assuming that, in the subjunctive version, the verbs are construed as ‘believe but not know’.
This ‘do not know’ component is the nonveridical presupposition of modals, and is always present, we will argue, in the interpretation of doxastic statements in Italian. It plays the key role in triggering the subjunctive.

Mari (2016) proposes that the Italian doxastic verbs are underspecified lexically, and can be interpreted either as Hintikka beliefs (thus in the Greek style, veridical with respect to Dox(subject), and selecting the indicative); or they can be interpreted conjecturally. The ‘do not know’ presupposition adds, just like with modals, uncertainty to the lexical entry and the doxastic verb acquires mixed veridity. We will call such construals of doxastic attitudes suppositional doxastics. The two meanings of doxastics are, of course, closely related. The ‘believe but don’t know’ meaning can be understood under Gricean assumptions to be the more basic meaning of a doxastic. If the speaker choses to report ‘i believes that p’ rather than ‘i knows that p’, then the speaker probably doesn’t have sufficient evidence to say the latter. But ‘i believes that p’ can always be strengthened to ‘i knows that p’:

(61) Roberto believes that Carla had an offer from Harvard. In fact, he knows that she did.
(62) I know you think otherwise, but I believe he is lying. I truly do.

In these examples, belief is construed quite strongly as equivalent to knowledge, or contrasting another’s disbelief. Such uses of belief verbs are quite common, and rely of course on the context, as all strengthenings do. The Greek style Hintikka doxastic verbs can be understood as conventionalizations of strengthened belief, but Italian doxastics, apparently, can retain ‘believe but don’t know’. When construed this way, Italian doxastics obey the Nonveridicality axiom of modals and combine a veridical assertion with a nonveridical epistemic presupposition. It is then no surprise that they select the subjunctive, just as modals do.

4.4.2 Nonveridical epistemic space with suppositional belief

Our specific proposal for suppositional doxastics in Italian will implement the system we employed for MUST, and we will present an analysis building on the earlier discussion of Mari (2016) (which is responsible also for revealing the empirical richness of the phenomenon). Suppositional belief statements and assertions differ in some important respects which are reminiscent of the difference between bare assertion and modal MUST which we have discussed in chapter 2. Note that this is not peculiar to Italian. English also allows spelling out a series of differences between belief statements and bare assertions, which highlight the ‘lack of knowledge’ component of belief. The most important test is parallel to the one that we used in chapter 3 to show that MUST features lack of knowledge.
(63) Context: I look through the window and it is raining.
   a. It is raining.
   b. #I believe that it is raining.
   c. #It must be raining.

In the context where knowledge of \( p \) is established, a mere belief statement is weak, just like a MUST statement is. This contrastive context encourages, as expected, the suppositional reading of belief.

Belief statements and assertion have different effects on the common ground. The bare assertion is a proposal to update the common ground with \( p \), while a belief statement cannot eliminate \( \neg p \) worlds. Denials are a good test to capture the difference.

(64) Context. I believe that God exists. I utter:
   a. God exists.
   b. I believe that God exists.

Only the bare assertion can be challenged. Neither the belief statement nor the prejacent embedded under it can be. Consider this more closely:

(65) A: "I believe that God exists."
    B: "No you are wrong." A: "I only said that I believe it"!

(66) A: "God exists."
    B: "No you are wrong." A: #"I only said that I believe it"!

We have put forth the same argument for future expressions (Giannakidou and Mari, 2018), which we claimed are universal epistemic modals akin to MUST.

If we are correct, belief in some languages and under a suppositional interpretation, becomes the attitude counterpart of MUST. How can we reconcile these observations with the claim, which we have been defending based on the Greek data, that belief is strong and reveals full d-commitment? We propose that we can distinguish between two beliefs: the classic Hintikka belief which is veridical and solipsistic, and the MUST-like belief which is suppositional. Just like MUST, suppositional belief features two modal bases, a veridical doxastic one (just as with Hintikka belief) and a nonveridical epistemic modal base, like MUST.

Greek verbs are lexically specified, as we showed, as solipsistic doxastics, hence the mood rigidity. Italian verbs, on the other hand, are underspecified in the lexicon. They indicative is a signal that the verb is used solipsistically; and the subjunctive is signal to add the nonveridical do not know presupposition. The co-existence of a nonveridical \( M(i) \) (as with modals), and a veridical \( Dox(i) \) in

\(^4\)Mari (2016) characterized Hintikka belief ‘credence’. 
a single lexical entry is sufficient to explain the licensing of the subjunctive in Italian and in other languages. Dox is the single modal base relevant for classical doxastics in Greek, French and the languages that select indicative; but Dox is only one of the two parameters for suppositional belief. The two types of belief are given below (in a preliminary format). Following Mari (2016):

(67) Solipsistic belief (also called ‘expressive’ in Mari, 2016)
\[ i \text{ believe}_{sol} p ]^{Dox ; i} = 1 \text{ iff } \forall w' (w' \in \cap Dox \rightarrow p(w') \]

(68) Suppositional belief: (called ‘conjectural’ in Mari, 2016)
\[ i \text{ believe}_{sup} p ]^{M, Dox ; i} \text{ is defined if } M(i) \text{ is nonveridical (partitioned epistemic modal base). If defined, } \forall w' (w' \in Dox) \rightarrow p(w') \]

Solipsistic belief is the veridical Hintikkean belief described in section 3. It only features a doxastic modal base, or variants thereof. Suppositional belief, on the other hand, has a presupposition, like MUST, that the epistemic space is nonveridical. It is, in other words, a weakened belief, unlike the solipsistic belief which lacks any presupposition. It is the requirement that the epistemic modal base be nonveridical that renders a suppositional belief verb akin to ‘believe but not know’. Both types of doxastics have d-commitment in the doxastic space; in other words, Italian belief is not weaker. It is the presupposition, i.e., the existence of the nonveridical epistemic modal base, that produces the weakness, i.e., the fact that what is believed by the attitude holder \( i \) is contrasted with what is known by \( i \).

Suppositional belief is thus a double layer belief with mixed veridicality, like MUST. The two kinds of belief, crucially, can be expressed also by Greek and French modal adjectives which are attitudinal, and have the structure in (68), which explains that they are subjunctive licensors.

(69) Il est probable qu’il vienne.
‘It is probable that he comes.’

(70) Ine pithano na erthi. (Greek)
‘It is probable that he comes.’

Here again, the matter is not settled in the epistemic modal base, but in those worlds that better comply with the stereotypicality conditions are worlds in which the prejacent is true. The subjunctive is thus predicted, as we elaborated in chapter 2.

It is important to acknowledge this distinction between two types of belief is a more general phenomenon, and does not concern just Italian. However, in Italian
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this distinction is made visible by the flexibility of mood. In other languages, especially those lacking systematic mood distinctions in clausal complements, the distinction may surface in other ways. We are not saying that mood is a prerequisite for the two kinds of belief to exist; we are simply saying that the subjunctive versus indicative distinction is a safe diagnostic to track the difference.

To provide a fuller picture, consider fictional predicates which are indicative selectors in Greek but flexible in Italian. As we already noted, the interpretation with the indicative and the subjunctive mood are not identical: when the indicative is used, the fictional space of the attitude holder is described. When the subjunctive is used, the speaker reports a supposition and contrasts it with knowledge (Mari 2016). We thus see across non-bouletic predicates the same divide between a Hintikka, veridical interpretation of the doxastic predicate and a MUST-like interpretation. Letting $Fic$ be the set of propositions corresponding to the imagination of the attitude holder, the two resulting interpretations for $immaginare$ in Italian are the following:

(71) Private or solipsistic imagination (Mari, 2016 calls this ‘expressive fictional’)

\[ [i \text{ immaginare}_{sol} p]^Fic,i = 1 \text{ iff } \forall w'(w' \in Fic) \to p(w') \]

(72) Suppositional imagination: (Mari, 2016 calls this ‘conjectural fictional’)

\[ [i \text{ immaginare}_{inq} p]^{M,Fic,i} \text{ is defined iff } = 1 \text{ iff } M(i) \text{ is nonveridical (partitioned epistemic modal base). If defined, } \]

\[ \forall w'(w' \in Fic) \to p(w') \]

As we have noted, predicates of certainty also license the subjunctive. Let us recall the examples:

(73) Sono sicura che Maria sia/é incinta. –

‘I am certain that Mary is pregnant.’

(74) Sono convinta che Maria sia/é incinta. –

‘I am convinced that Mary is pregnant.’

We treat certainty just as we treat belief (in the same way as in a Hintikkean semantics belief and certainty amounts to the same).

(75) Solipsistic certainty:

\[ [i \text{ believe}_{sol} p]^{M,Cer,i} = 1 \text{ iff } \forall w'(w' \in Cer) \to p(w') \]

(76) Suppositional certainty: (Mari, 2016)

\[ [i \text{ believe}_{sup} p]^{M,Cer,i} \text{ is defined iff } = 1 \text{ iff } M(i) \text{ is nonveridical (parti-} \]
tioned epistemic modal base). If defined, \( \forall w'(w' \in Cer) \rightarrow p(w') \)

By using Cer instead of Dox we intend to signal that probably the modal base is construed based on different evidence. While doxa includes personal opinions, guesses, consideration of normality conditions, certainty involves inferential evidence (see discussion in Mari 2016, 2017a,b). As with belief, certainty does not imply knowledge; unlike belief, to form a thought that can be qualified as certain, the speaker uses more reliable knowledge such as facts, and inferences. A careful analysis of the evidential underpinnings of the modal constitution of the bases of the attitudes is outside our scope here. We also note that ‘be aware’ in Italian can license subjunctive. Although ‘be aware’ is an epistemic factive, it shares this feature with emotives and we will return to it in chapter 7.

Consider, finally, the role of negation. When doxastic verbs get negated, they can allow subjunctive (see Giannakidou 1995, Quer 1998, 2001). This was the use of the subjunctive that initiated the characterization ‘polarity subjunctive’ in the literature:

(77) Dhen pistevo oti/na efije i Ariadne. 
not believe.1sg that.IND/SUBJ left.3sg the Ariadne. 
‘I don’t that Ariadne left.’

(78) Pistevo oti/*na efije i Ariadne. 
believe.1sg that.IND/*SUBJ left.3sg the Ariadne. 
‘I believe that Ariadne left.’

If I don’t believe that Ariadne left, then it is not the case that all world in Dox are worlds where Ariadne left. The subjunctive is therefore licensed.

(79) \[ \langle i \text{dhen pistevo ‘not believe’ } p \rangle^{Dox,i} \text{ is } 1 \text{ iff } \neg \forall w'' \in Dox(i)(p(w'')). \text{ (pistevo na)} \]

The effect of negation on the attitude is thus simply understood as a consequence of the fact that Dox is no longer veridical, and the subjunctive is fully expected.

To sum up, in Italian, mood flexibility between indicative and subjunctive with doxastic verbs reveals that doxastic verbs can be construed as obeying the Non-veridicality axiom of MUST, i.e., as taking an epistemic modal base and presuppose that it is contains non-p worlds too. This component is absent from classical belief verbs, which we labelled here solipsistic. These track only the doxastic dimension, and have simple, uni-dimensional lexical entries lacking the nonveridical presupposition. With suppositional doxastics, what is known and what is believed can be distinguished, and it appears that Italian doxastic verbs are systematically construed this way.
Generalizing, we propose the following lexical entry for Suppositional Doxastic V, which will select SUBJUNCTIVE also in Romance languages:

(80) Suppositional doxastic verbs
Suppositional Doxastic V : \([\text{CAT: } [V]; \text{SEL: } \text{[SUBJUNCTIVE]}]\)
Lexicalizations: Italian doxastics, Greek memory verbs, SEEM (to be discussed next)

Italian doxastics can be construed suppositionally or veridically, and they will select the respective moods. In other words, Italian doxastics appear to be massively underspecified. We will see that such underspecification applies to some Greek doxastics too, specifically those that denote memory and semblance attitudes. Greek perception verbs behave similarly, and as we will see in chapter 5, a lot of bouletic verbs, which also select both moods.

4.5 More layers in doxastics: memory, semblance, perception

Let us summarize our analysis of epistemic and doxastic verbs in Greek and Italian.

(81) Typology of doxastic verbs
a. Indicative-selecting solipsistic doxastic verbs: they are unidimensional, contain only the veridical doxastic layer and assert doxastic commitment.

b. Subjunctive-selecting suppositional doxastics: the doxastic assertion is augmented with an epistemic nonveridical presupposition. Dox and M coexist in the lexical entry: full doxastic commitment in the truth condition, and nonveridicality in the presupposition.

c. Some doxastic verbs are lexically specified as solipsistic (Greek doxastics). Other verbs are underspecified, and can accept the nonveridical presupposition. Underspecified verbs allow both moods.

Given this typology, we can see that there is a continuum between assertion and doxastic statements. By having postulated veridicality and commitment as preconditions on assertion, we assume that, when asserting \(p\), the co-operative truthful speaker is BOTH doxastically and epistemically committed to \(p\). The speaker believes and knows (always relatively to the best of her knowledge) that \(p\) is true.

With Italian-style subjunctive belief, the speaker believes that \(p\) is true, but does not know that \(p\) is true (to the best of her knowledge, she knows that she does not
4.5. MORE LAYERS IN DOXASTICS: MEMORY, SEMBLANCE, PERCEPTION

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<tr>
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<th>Assertion</th>
<th>Subjunctive Belief</th>
<th>Indicative Belief</th>
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<tr>
<td>d-commitment</td>
<td>X</td>
<td>X</td>
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<tr>
<td>e-commitment full</td>
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<tr>
<td>e-commitment partial</td>
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<td>X</td>
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Table 4.1: Assertion, beliefs, and types of commitments

know whether \( p \) is true). With Greek-style indicative belief (which, do not forget, is also an option in Italian), the speaker believes that \( p \) is true and knowledge of whether \( p \) is true or false is not relevant. The doxastic verb meaning is more flexible in Italian that it is in Greek. But as we will see next, Greek too have some doxastic verbs that allow the indicative subjunctive flexibility of Italian.

This view thus negates the widespread assumption that subjunctive belief is ‘weaker’ than indicative belief. This view is incorrect: suppositional belief is as strong as Hintikka belief doxastically. Both solipistic and suppositional doxastics express d-commitment and are therefore equally strong doxastically. It is the presence of the nonveridical ‘do not know’ presupposition that weakens the suppositional doxastic by introducing epistemic uncertainty. However, this weakness is not commensurable with the strength of indicative beliefs, as those do not contain the epistemic dimension.

To complete the picture, it will be necessary to emphasize that the choice between indicative and subjunctive is not a a choice about languages (Greek vs. Italian), but about how doxastic attitude classes lexicalize in the two types of languages. As a general observation, we have indeed posited that a systemic difference between the two languages is that in Italian doxastic verb meanings tend to be flexible— the verbs can therefore be construed also with epistemic nonveridicality. Greek lexical entries of doxastics, on the other hand, appear to be more rigidly solipistic; the blocking of subjunctive is the reflex of that. Yet, Greek too has doxastics that seem to behave like Italian suppositional doxastics: memory, semblance, SEEM predicates, and perception verbs. We discuss these next.

4.5.1 Mood flexibility with memory verbs

Recall that memory verbs can take subjunctive:

(82) O Nicholas thimate na kleini ton the Nicholas remembered.3sg that.SUBJ close.NONPAST.3sg. the porta, alla den ine sigouros. door, but not is sure. ‘Nicholas remembers closing the door, but he is not entirely sure.’
The subjunctive is compatible with a context where Nicholas is not fully sure about his memory, and he has some doubt, i.e., he ‘does not know for sure’. This is by now a familiar context: ‘believe but not know’. The _oti_ clause is incompatible with such context:

(83) #O Nicholas thimate oti eklise ton porta, alla den the Nicholas remembered.3sg that.IND closed.3sg. the door, but not ine sigouros.
is sure.

‘#Nicholas remembers that he closed the door, but he is not entirely sure.’

Note the exact parallel with the English -ing clause. The _that_ vs. _ing_ difference is reflected in Greek with the _oti_ vs. _na_ distinction.

Recall that with verbs such as _thimame_ ‘remember’, we are looking at M_Memory_ (subject), that it to say, the set of propositions that are remembered by the attitude holder:

(84) _Memory state of an individual anchor i_
A state M_memory (i) is a set of worlds associated with an individual i representing worlds compatible with what i remembers.

(85) \[ [i \text{ remember-} ot i \ p]_{w,M_{memory}},i \text{ is } 1 \iff \forall w'' \in M_{memory}(i)(p(w'')) \].

Memory is thus construed solipsistically as a variant of belief when it takes indicative (as we explained earlier). What is remembered is indeed a form of belief, and memories are not photographic snapshots of the world, but rather inner representations of events, construed, compensated to, or even made up by the person who remembers.

Memory, on the other hand, can also be construed as remembering a fact, in which case we have _pu_ and an epistemic M:

(86) O Nicholas thimate pu eklise ton porta, (#alla den the Nicholas remembered.3sg that.IND closed.3sg. the door, but not ine sigouros).
is sure.

‘Nicholas remembers the fact that he closed the door, (#but he is not entirely sure).’

(87) \[ [i \text{ REMEMBER-} pu \ p]_{w,M_{epistemic}},i \text{ is } 1 \iff \forall w'' \in M_{epistemic}(i)(p(w'')) \].

Notice the paraphrase above: remembers the fact. In this case, we use an epistemic veridical state.

The subjunctive variant, however, uses M_Memory_ and the presupposition that M_epistemic_ is nonveridical. In this case, what is remembered will be contrasted
4.5. MORE LAYERS IN DOXASTICS: MEMORY, SEMBLANCE, PERCEPTION

with what is known. What we remember does not always correspond to what is real.

(88) Suppositional memory:
\[ [i \text{ remember}_{\text{sup}} p]^M \text{Memory} \text{,}^i \text{ is defined iff } M(i) \text{ is nonveridical (partitioned epistemic modal base). If defined,} \]
\[ [i \text{ remember}_{\text{sup}} p]^M \text{Memory} \text{,}^i = 1 \text{ iff } \forall w'(w' \in M_{\text{Memory}} \rightarrow p(w')) \]

The interplay is crucially between d-commitment (veridicality) in Memory, but partition (nonveridicality) in the presupposition. The subjunctive is triggered, exactly parallel to Italian, in case the subject remembers but doesn’t know for sure.

4.5.2 Semblance verbs

The attitude SEEM/APPEAR behaves in a similar way. We have not discussed these predicates before, and it must be they also have raising construals, unlike the typical attitude verbs. Implicative verbs and ability modals to be discussed in chapter 6 have similar syntactic properties. It is useful to consider here semblance verbs both for their flexibility, as well as because they raise important questions about perception and veridicality. Notice also the lexical differences in English. Observe:

(89) Ta paidia fenonde na ine kourasmena (ala bori ke na the children seem.3pl that.SUBJ be.3sg tired (but might and subj min ine).
not be.3pl).
‘The children seem to be tired (but they might not be).’

(90) Ta paidia fenonde oti ine kourasmena (#ala bori ke na the children seem.3pl that.IND be.3sg tired (but might and subj min ine).
not be.3pl.
‘It is obvious that the children are tired (#but they might not be).’

(91) Ta paidia fenonde pu ine kourasmena (#ala bori ke na the children seem.3pl that.IND be.3sg tired (but might and subj min ine).
not be.3pl.
‘The children are tired, and it is apparent.’

The subjunctive complement of a semblance SEEM predicate allows the non- veridical inference: \( A \text{ seems } P \) does not entail that \( A \text{ is } P \). Semblance is non-veridical objectively. However, it can also be construed as commitment, in which
case it will be veridical subjectively. The indicative complement correlates with a meaning of the verb as a purely doxastic, and shows variability depending on what kind of \( M \) they quantify. In the case of \( oti \), we have Dox, in the case of \( pu \) we have the, by now familiar, presupposition of an epistemic non-veridical \( M \). The anchor \( i \) is the speaker:

\[
(92) \quad \left[ i \text{ seem}_{\text{epistemic}}(p) \right]_{M_{\text{epistemic}}(i)} \in \mathcal{W} \quad \forall w'' \in M_{\text{epistemic}}(i)(p(w'')) \quad (\text{fenete } pu)
\]

\[
(93) \quad \left[ i \text{ seem}_{\text{solipsistic}}(p) \right]_{M_{\text{Dox}}(i)} \in \mathcal{W} \quad \forall w'' \in D_{\text{Dox}}(i)(p(w'')) \quad (\text{fenete } oti)
\]

We see first that the verb is flexible with respect to the model it will combine with—a flexibility otherwise attested with modal verbs, going back to Kratzer’s original observation (Kratzer 1977). The flexibility in modal base will be shown to produce meaning change likewise with bouletic verbs in chapter 5. Just like in the case of modals, there is no need to have ambiguity of the actual words, but flexibility—as we are arguing—in what kind of \( M \) a verb can take as argument. It is then in the nature of SEMBLANCE to be a flexible attitude, sometimes intended as belief, and sometime as knowledge.

With the subjunctive, we have the epistemic unsettledness presupposition that we found with suppositional belief:

\[
(94) \quad \text{Suppositional SEEM (fenete NA)}: \quad \left[ i \text{ seem}_{\text{sup}}(p) \right]_{M_{\text{Dox}}(i)} \quad \text{if \( M(i) \) is nonveridical (partitioned epistemic modal base). If defined,}
\]

\[
\left[ i \text{ seem}_{\text{sup}}(p) \right]_{M_{\text{Dox}}(i)} = 1 \quad \forall w'(w' \in M \Rightarrow p(w'))
\]

The Greek verb \( \text{fenete} \) is apparently flexible in the kind of \( M \) it associates with, and can combine, in the suppositional version, doxastic \( \text{Dox} \) and an epistemic partitioned \( M \), producing nonveridicality.

In essence, then, we have seen that the flexibility in mood choice does not necessitate imposing ambiguity in the lexical entries of propositional attitude verbs. It rather shows that doxastic propositional attitudes exhibit the variability that we see typically with modals in being able to pick different modal bases, and in some cases, to take two. Our account therefore poses no ambiguity for the flexible propositional attitudes, and offers a new way of understanding them by acknowledging their similarities with modals.

In Italian we observe indicative/subjunctive alternations, as one can expect. Note right from the start that the attitude holder is always the speaker. When the speaker does not know, only the subjunctive is possible. In this case, there is epistemic uncertainty and the embedded clause expresses a likelihood judgment about \( p \), very similarly to \( \text{credere} \).
4.5. MORE LAYERS IN DOXASTICS: MEMORY, SEMBLANCE, PERCEPTION

(95) Sembra che sia arrivato.
Seems that be.SUBJ.3sg arrived.
‘It seems that he has arrived.’

When the speaker knows that $p$ is false, both the indicative and the subjunctive are possible.

(96) Sembra che ha/abbia vent’anni.
Looks like tha have.IND/SUBJ.3sg twenty-years.
‘It looks like he is twenty years old’

When the subjunctive is used, we obtain an effect different from those that we have described in this chapter, and upon which we will comment later in the book when we will discuss emotives. For now, it suffices to say that the subjunctive enhances an effect akin to the one described in Heim, of widening of the common ground: in most similar worlds, which are not part of the common ground, he is twenty.

Note also that with the ‘I do not know’ component an infinitival is possible. The infinitive, as we argued, is equivalent temporally to the subjunctive clause with NONPAST.

(97) Sembra essere contento.
Seems be happy.
‘He seems to be happy.’

Let us move on now to perception verbs.

4.5.3 Perception verbs

Perception patterns are very similar to semblance and memory:

(98) O Nicholas idhe ton Flavio na
the Nicholas saw.3sg the Flavio that.SUBJ
kleini ton porta, alla i porte dhen ine
close.NONOPAST.IMPERF.3sg the door, but the door not is
kleisti.
closed.
‘Nicholas saw Flavio closing the door, but the door is not closed.’

(99) O Nicholas idhe oti o Flavio eklise ton porta, #alla
the Nicholas saw.3sg that.IND the Flavio closed.3sg the door, but
i porta den ine klisti.
the door not is closed.
‘#Nicholas saw that that Flavio closed the door, #but the door is not closed.’

Observe again the contrast in finiteness in English between an -ing or bare infinitival complement and a that complement. The subjunctive complement (equivalent to the -ing complement) conveys direct perception, seeing with Nicholas’ own eyes. In addition, the closing of the door need not necessarily include the result state of the door being closed. The indicative complement, on the other hand, includes the result state. The difference, we will argue, illustrates that in the indicative complement we have a veridical doxastic state that includes the result, but in the subjunctive complement we have the presupposition of not knowing that the door is closed in all worlds.

For \( p \) being indicative: ‘Flavio closes the door and the door is closed’:

\[
\text{\footnotesize \textbf{see} \text{\footnotesize \text{\textbraceleft belief} \text{\textbraceright} \text{\textit{p}}}}^{w,\text{Dox}(i)} \text{ is } 1 \text{ iff } \forall w'' \in \text{Dox}(i)(p(w'')), \text{ (\textit{vlepo oti})}
\]

Here, seeing is understood as a solipsistic belief that the door is closed. It cannot be contradicted without producing Moore paradoxical effects. The subjunctive reveals the following structure (\( \text{Per} \) is for ‘perception’):

\[
\text{Suppositional \text{\textit{see}} (\text{\textit{vlepo na}}):}
\text{\footnotesize \textbf{see} \text{\footnotesize \text{\textbraceleft sup \text{\textbraceright} \text{\textit{p}}}}^{M,\text{Per},i} \text{ is defined iff } M(i) \text{ is nonveridical (partitioned epistemic modal base)}. \text{ If defined,}
\text{\footnotesize \textbf{see} \text{\footnotesize \text{\textbraceleft sup \text{\textbraceright} \text{\textit{p}}}}^{M,\text{Per},i} = 1 \text{ iff } \forall w'(w' \in Per \rightarrow p(w'))
\]

Here, \( i \) perceives that Flavio closes the door, but doesn’t know that the door is closed. The modal base has changed (\( Per \) stands for perception worlds), as with semblance, and the nonveridical epistemic presupposition is added. This explains both the direct perception effect and non-entailment to the result.

We think it is useful here to consider that there are additional temporal constraints on the perception verb. Observe:

\[
\text{\footnotesize \textbf{see}^1 \text{\footnotesize \text{\textbraceleft subj \text{\textbraceright} \text{\textit{Gianni}} \text{\textit{pernai}/\textit{perasi}/\textit{perase}} \text{\textit{to} \text{\textit{John cross.PRES/NONPAST/PAST.3sg} \text{\textit{the}} \text{\textit{dromo}}.}}}} \text{ street.}
\text{\textit{I see John cross the street.’}
\]

The subjunctive complement accepts only the PRES from. Why is that? Let us explain this by showing why the other options are bad. The NONPAST is bad because it forces future reference. PAST is bad because perceiving requires simultaneity. Hence, the true perception reading forces simultaneity: you cannot perceive now an event of the past. Perceiving and happening of the event must
coincide.

With indicative seeing there is no problem with past or even future, because the modal base is not \textit{Per}. The reading is, in other words, not true perception. HEAR behaves similarly. HEAR plus indicative is indirect perception, so temporally independent, but HEAR plus subjunctive is just like the seeing variant:

\begin{enumerate}
\item[(103)] \text{Akouo} \ton \text{Gianni} \na \text{xtipai/**xtipisi/**xtipise}
\text{hear.1sg} \text{the John subj knock.PRES.3sg/**NONPAST.3sg/**PAST.3sg}
\text{tin} \text{porta.}
\text{the street.}
\text{‘I hear John knock on the door.’}
\item[(104)] \text{Akousa oti o Giannis} \text{*xtipisi/**xtipise}
\text{hear.1sg ind} \text{the John } \text{*knock.NONPAST.3sg/**PAST.3sg}
\text{the} \text{street.}
\text{‘I heard that John knocked on the door.’}
\end{enumerate}

In both cases the direct perception reading forces the necessity of PRES. The shift of modal base, therefore, dictates the temporal orientation of the complement. We will discuss more of these shifts in the next chapter in the domain of bouletics.

To sum up: what is crucial in the licensing the subjunctive, in all the cases of doxastic predicates that we studies in this chapter is the presence of an non-veridical epistemic modal base \textit{M} in the meaning of the lexical entry. This rendered suppositional doxastic verbs similar to modals: they both obey the Non-Veridicality Axiom. We saw this to be the case with:

\begin{enumerate}
\item Modals;
\item Belief and certainly attitudes;
\item Imagination and fiction attitudes ;
\item Perception attitudes;
\item Memory attitudes;
\item Semblance attitudes.
\end{enumerate}

It becomes clear, then, that the subjunctive mood depends on the nonveridical epistemic component of attitudes. It is the presence of the nonveridical presupposition that renders doxastic attitudes when they select subjunctive akin to modals, which obey the Non-Veridicality Axiom. Subjunctive is, in other words, the mood indicating that the attitude holder does not know \textit{p}:
(105) Subjunctive as epistemic uncertainty

For a proposition $p$ and an individual anchor $i$ (where $i$ is the speaker or a propositional attitude subject):

\[
\text{SUBJUNCTIVE} (p) \text{ entails that } i \text{ does not know } p \text{ to be true.}
\]

The above is the broadest generalization for the subjunctive given what we have discussed so far— and it can account for all uses of subjunctive to be discussed in this book. Epistemic uncertainty is expressed formally as obeying the Nonveridicality principle.

At the same time, doxastic verbs at their truth conditional core — both when they select the subjunctive and when the select the indicative— are strong in that they denote veridical states, expressing commitment of the attitude holder to the complement proposition. In combining these two components, the subjunctive doxastics become very similar to MUST.

Let us now address the pragmatics of mood.

### 4.6 The pragmatics of mood: anchoring instructions

In this section, we will address the question of what the function is of the mood morpheme. Semantically, as we saw, the subjunctive is an indicator that the higher environment is nonveridical. By itself, the subjunctive creates epistemic uncertainty, as we saw this to be the case in relative clauses. Recall:

(106) Theloume na proslavoume mia gramatea [pu na gnorizi want.1pl subj hire.NONPAST.1pl a secretary that subj know.3sg japonezika.] Japanese.

‘We want to hire a secretary that knows Japanese. But it is hard to find one, and we are not sure if we will be successful.

#Her name is Jane Smith.’

(107) Theloume na proslavoume mia gramatea [pu gnorizi want.1pl subj hire.NONPAST.1pl a secretary that know.3sg japonezika.] Japanese.

‘We want to hire a secretary that knows Japanese. Her name is Jane Smith.

(#But it is hard to find one, and we are not sure if we will be successful.)’

When a subjunctive is used, the indefinite nominal receives a \textit{de dicto} reading: we do not have a particular secretary in mind, and there are worlds \(w\) where we find a secretary that speaks Japanese but we do not know if the actual world will turn out
to be such a world. This is epistemic uncertainty: there are doxastic alternatives \( w \) such that there is a secretary in \( w \) and she speaks Japanese, but there are also doxastic alternatives \( w' \) where there is no such secretary, and it may turn out that real world is one of those. So, we don’t know, at the time of utterance, if there exists in the real world a secretary who speaks Japanese that we can hire. Because we don’t know that, the continuation *Her name is Jane Smith*, as indicated, is not permitted. The indicative version, on the other hand, has a *de re* specific interpretation, and it is about the specific (= epistemically known to the speaker) person Jane Smith who we want to hire.

As we said earlier following Giannakidou (2013a), the effect of the mood choice in relative clauses is epistemic, and depends on whether the speaker knows that there exists a specific value to the indefinite or not. If a specific value is known to the speaker, indicative will be chosen. The subjunctive will be chosen when the speaker is uncertain about the value of the indefinite.

Now, consider the cases discussed by Giannakidou (2016), where the subjunctive is licensed in questions. In this case, the subjunctive contributes an epistemic possibility modal:

(108) \( \text{Ti na theli?} \)
\( \text{What that.SUBJ want-3sg.} \)
\( \text{‘What might he want?’} \)

(109) \( \text{Na tou arese to fagito?} \)
\( \text{That.SUBJ he-GEN liked-3sg the food.} \)
\( \text{‘Might it be the case that he liked the food?’} \)

The addition of the subjunctive is addition of a possibility epistemic modal *might*. Importantly, these questions are ‘weaker’ than without subjunctive, as expected if the subjunctive is a possibility modal. Giannakidou calls this subjunctive epistemic, and has the following denotation:

(110) Epistemic subjunctive as a possibility modal
\[ [ ?(\text{Subjunctive } p)]^{M,i,S} = ?(\exists w' \in M(i) : p(w')) \text{; where ‘?’ is the question operator} \]

This is a case where we see the subjunctive to contribute actual modal meaning itself, i.e. an epistemic possibility modal. Notice that epistemic MUST is notoriously bad in questions (see Hacquard and Wellwood 2014 for some recent discussion and data):

(111) a. #What must he want?
    b. #Must he be here already?
Our approach to explaining this contrast was that possibility modals and questions have similar meaning which is characterized by nonveridical equilibrium. Necessity modals, on the other hand, convey positive bias towards the adjacent proposition \( p \); their use in question is disfavored, thus, because of this conflict. In order to be able to articulate this difference, it must be admitted that the subjunctive indeed has meaning.

In complementation, the semantic action is with the (non)veridicality of the main attitude verb. We used the subjunctive as a diagnostic for whether the verb contain an epistemic uncertainty presupposition or not. So, what else do the mood morphemes do?

Recall that in Greek mood morphemes are appear as subordinators. Their function then is to give instruction about how to anchor the embedded proposition to the main main clause. Anchoring will result in updating the attitude M with the complement proposition, thus creating a sub-context within the larger context and the common ground that main clause are anchored to. The complement has no access to the common ground. Temporal anchoring happens at Now Anchoring, we said at the Mood position. At the C level, sentential anchoring happens.

Recall the semantic generalizations:

(112) a. The subjunctive is sensitive to the nonveridicality in the presuppositional component of an attitude verb.
   b. The indicative \( oti \) is sensitive to the veridicality the truth condition. It is selected by veridical solipsistic verbs.
   c. The indicative \( pu \) is sensitive to the veridicality of the presupposition. It is selected by verbs that have a veridical presupposition (either a factive one, or a presupposition of subjective veridicality, as we explore further in chapter 7).

The subjunctive versus indicative difference appears to be not just a difference in veridicality (indicative) vs. nonveridicality (subjunctive), but also a difference at the level at which the sensitivity applies: the truth conditions (indicative) vs. the presupposition (subjunctive). But there is also presuppositional indicative, manifested in Greek in \( pu \). The indicative can therefore not be de facto identified with assertion, as we emphasized also in chapter 1.

The indicative \( oti \) performs assertive anchoring. We will call this Private Anchoring!:

(113) Indicative anchoring: Private Anchoring!
   Anchor \( p \) to epistemic M(subject), or Dox(subject).

The \( oti \) proposition is a signal to add \( p \) to the local M(subject) or Dox (subject). Because it is an embedded clause, addition cannot happen to the common ground,
as we said; only the propositional attitude sentence itself (i ATT p) gets added to the common ground. The addition of p to M or Dox, narrows down the worlds in those spaces by intersection, as expected.

(114) \( \text{Dox}(i) + p = \{ w' \text{ in Dox}/M \text{ where } p \text{ is true} \} \)

The update Private Anchoring! anchors p to the main subject’s private space, thus performing a kind of context shift, and adds p to the private space. The private spaces can expand by adding propositions, just like unembedded assertions add to the context set W(c). Embedded indicative in Italian functions in exactly the same way. Oti is unnecessary in main clauses, where addition happens in the common ground, and this explains without any additional assumptions, the absence of oti in main clauses. Oti performs only private assert; it is not a lexicalization of the Assert operator.

The indicative can also perform presuppositional anchoring. This is revealed with pu in Greek. In this case, p is required to already be in the common ground:

(115) PU-update: Presuppositional anchoring

\( p \) is already in the common ground.

This captures the distribution of pu with KNOW, and presuppositional factive verbs such as emotive factives (to be discussed further in chapter 7). The fact that Greek lexicalizes an assertive and a non-assertive distinction in the indicative suggests quite clearly that the indicative mood is not fully isomorphic to assertability, contrary to what e.g. Farkas (2003) claims.

For subjunctive, we propose Non-veridical anchoring:

(116) Subjunctive anchoring: Non-veridical anchoring

Add p only if M is not-veridical.

The subjunctive mood is a prohibition: do not add p to the entire space M. Given that, as we saw in chapter 3, main clause subjunctives are non-assertions, we can generalize that the subjunctive mood is an instruction not to add p to the common ground.

Finally, we have inquisitive anchoring with embedded questions (Greek an, ‘whether’). Inquisitive anchoring is a special case of nonveridical anchoring, which we find in Italian with inquisitive belief (Mari, 2017c,d).

(117) C-AN: Inquisitive anchoring

Anchor p to a subpart of C

Inquisitive anchoring adds specifically a question to the common ground C. The subjunctive does not have this function.
Here we can show in pictures what the output of the anchoring rules are, as a mnemonic tool for the reader (see Mari 2015a, 2017a,b for more discussion about possible spaces and their interactions).

(118) OTI/indicative-anchoring: C=M(subject). Anchor $p$ to M(subject).

\[
\begin{array}{c}
\text{M} \\
\text{C} \\
\end{array}
\]

We see here that what it is being anchored is the private state of the epistemic agent and that anchoring to the common ground is irrelevant.

(119) PU-Anchoring: $p$ is already in the common ground.

\[
\begin{array}{c}
\text{M} \\
\text{C} \\
\end{array}
\]

(120) NA/subjunctive-anchoring: non-assertive anchoring to M; is partitioned into $p$ and non-$p$ worlds.

\[
\begin{array}{c}
\text{M} \\
\text{M} \\
\end{array}
\]

Our anchoring approach acknowledges that mood morphemes have sentential mood functions (Portner 2009, 2018), just like, e.g., the imperative. And the
imperative too is signal of nonveridicality, i.e., the proposition that follows is not objectively true, or known to the speaker. In fact, as we will argue in chapter 4, the imperative has an anti-veridical presupposition (that \( p \) is objectively false, or is believed to be false by the speaker) at the time of utterance. Hence, one can generalize that non-indicative moods are all sensitive to the nonveridicality in the presupposition. Unlike the imperative, the subjunctive in complement clauses and adjuncts does not have illocutionary force, because illocutionary force is a property of main contexts only.

Our pragmatic account, finally, shares some similarities and differences with Farkas (2003). Farkas uses updates of private states, but unlike in our theory, for her it is the ATT verb is responsible for the update of \( p \). For us, it is the mood morpheme itself that is responsible for anchoring \( p \). Quer (2001), at the same time, proposes to consider mood in a dialogical perspective, where subjunctive means, in essence, disagreement and lack of endorsement. As we showed in the four preceding chapters, the subjunctive does not depend on disagreement, but on the nonveridical presupposition of epistemic uncertainty. This characterizes all uses, including the adjuncts, e.g. in BEFORE clauses.

### 4.7 Conclusions

1. Propositional attitudes that select the indicative in Greek and Italian are veridical the following sense: they are construed solipsistically as epistemic or doxastic commitments of the attitude subject \( i \) to the truth of the complement proposition \( p \). Epistemic attitudes also have a factive, i.e. objective veridicality, presupposition; but solipsistic doxastics lack any presupposition whatsoever.

2. Doxastic verbs can also be construed suppositionally in which case they license subjunctive in the complement. Suppositional doxastics, we argued, unlike solipsistic doxastics but indeed like modals, obey the Nonveridicality Axiom and have a presupposition of epistemic uncertainty, namely that \( i \) doesn’t know \( p \) to be true.

3. The use of subjunctive mood indicates that the attitude obeys the Nonveridicality Axiom, which is thus not just a precondition for modals, but also for some attitudes.

4. The concept of preference was shown to be unnecessary for the explanation of mood choice.

5. Syntactically, mood selection is encoded in the subcategorization frame of the lexical entry of the verb. The dual patterns suggests that the lexical en-
tries are underspecified. The mood morphemes are like polarity items subject to licensing by being in the scope of a higher veridical or nonveridical operator. The licensing requirement applies at the level of presupposition for subjunctive and assertion (LF) for the indicative.

From our study of modal verbs (chapter 2) and doxastics in this chapter, the following emerged as the licensing conditions for subjunctive and indicative:

(121) **Licensing condition for the subjunctive mood**
The subjunctive will be licensed in the complement of a propositional attitude or modal that obeys the Nonveridicality axiom, i.e., the attitude presupposes that epistemic uncertainty of the attitude holder as to whether p is true or not.

(122) **Licensing condition for the indicative mood**
The indicative will be licensed in the complement of a propositional attitude that is veridical (objectively or subjectively), and lacks a nonveridical presupposition.

Hence, when we say ‘nonveridical’ attitude, we mean propositional attitude that obeys the Nonveridicality axiom and has a nonveridical presupposition; and when we say a ‘veridical’ attitude, we mean a solipsistic attitude that lacks the nonveridical presuppositional layer. The subjunctive is the mood of epistemic uncertainty and the indicative is the mood of objective and subjective veridicality which produces various kinds of certainty and commitment.

We continue this discussion in the next chapter, where we strengthen our theory by showing that the nonveridical presupposition is also the key to selecting the subjunctive with volitional and directive verbs.
Chapter 5

Bouletic attitudes: volition, hope, promising, and persuasion

In this chapter, we focus on some ‘classically’ subjunctive and infinitival predicates such as verbs of volition and desire. We will argue that the truth conditions of these predicates require the notion of bouletic commitment, as the counterpart of doxastic commitment in the realm of doxastics. Like pure belief—which can be construed solipsistically, as we illustrated, and selects the indicative—some volitional verbs (such as those meaning PROMISE, and PERSUADE) are also construed as solipsistic desires, defined on variants of bouletic models (on a par with variants of Dox such as imagination, dream, and memory models). When construed solipsistically, volitional attitudes select indicative as expected.

HOPE can also be constructed as suppositional, with a non-veridical ‘I do not know’ presupposition, and a Boul veridical assertion.¹ In this case, it will select the subjunctive, in agreement with what we have observed so far. The suppositional and assertive layers are also featured by WANT. However, WANT selects the subjunctive strictly in all languages we know, and is never compatible with indicative—suggesting that WANT cannot ever be construed as solipsistic. Why is that? We will propose that WANT, in addition to the suppositional layer, also features an antiveridical presupposition that $p$ is not true, or is believed by $i$ not to be true, at the time of utterance. We will think of this anti-factivity. Anti-factivity prevents the indicative, and forces subjunctive or other non-indicative moods such as the optative and imperative.

The landscape of desiderative predicates that emerges is reminiscent of the landscape we just observed with doxastics—hence supporting our intended parallelism between the two realms and further strengthening our theory. Crucially,

¹Anand and Hacquard (2013) also propose that HOPE contains an epistemic layer, but this layer, by being representational, triggers indicative according to these authors.
nothing in our analysis necessitates the concept of ordering or preference, in stark contrast with what much of the current literature proposes (Heim 1992, Giannakidou 1997, 1998, 2009, Portner 1997, Villalta 2008, Moulton 2014, Grano 2017, 2018 and references therein). The concept of ordering became unnecessary in the realm of doxastics, as we showed, and it is unnecessary for volitional attitudes too. The ingredients of veridicality (bouletic commitment) and the layers of meaning (specifically the presence or not of a nonveridical presupposition indicating lack of knowledge, and antifcativity) are sufficient to derive the mood patterns in Greek, Italian and French—and have the welcome result of avoiding the empirically problematic overgeneralizations that preference accounts would have to make. Our analysis has repercussions for the that vs. to choice in English, as we shall see, thus challenging the idea that preference plays any role in that choice either.

Finally, in contrast with the preference based accounts, the action in mood choice for us lies in the meaning of the attitude predicate, and not in the syntax of the complement clause. We will show that relying on the semantics of the predicate is a more appropriate way of explaining the issue of complement choice, not in the least because it acknowledges that lexical meaning determines the distribution of morphological moods.

5.1 Introduction

Let us start with our main findings thus far about the licensing of the indicative and subjunctive:

1. Propositional attitudes that select the indicative in Greek and Italian are veridical in the following sense: they are construed solipsistically as epistemic or doxastic commitments of the attitude subject $i$ to the truth of the complement proposition $p$. Epistemic attitudes also have a factive, i.e. objective veridicality, presupposition; but solipsitic doxastics lack any presupposition whatsoever.

2. Doxastic verbs can also be construed suppositionally in which case they trigger a subjunctive complement. Suppositional doxastics, we argued, unlike solipsistic doxastics, have an epistemic nonveridical presupposition that $i$ doesn’t know $p$ to be true. This presupposition is identical to the one observed with modal verbs which obey the Nonvericality Axiom. Suppositional doxastics are thus similar to modals in this regard, and the choice of subjunctive in both cases follows.
3. The use of subjunctive mood indicates that the attitude holder does not know \( p \). Thus the Nonveridicality Axiom is not just a precondition for modals, but also the general prerequisite for the subjunctive.

4. The concept of preference fails to explain the triggering of subjunctive with suppositional doxastics, which remain doxastic and express d-commitment with indicative.

From our study of modal verbs (chapter 2) and doxastics (chapter 4), the following emerged as the licensing conditions for subjunctive and indicative:

(1) Licensing condition for the subjunctive mood
The subjunctive will be licensed in the complement of a propositional attitude that obeys the Nonveridicality axiom, i.e., the attitude presupposes that the attitude holder \( i \) does not know that \( p \) is true.

(2) Licensing condition for the indicative mood
The indicative will be licensed in the complement of a propositional attitude that is veridical (objectively or subjectively), and lacks a nonveridical presupposition.

Hence, when we say ‘nonveridical’ attitude, we intend to refer to a propositional attitude that obeys the Nonveridicality axiom, i.e., the attitude presupposes that the attitude holder \( i \) does not know that \( p \) is true; and when we say a ‘veridical’ attitude, we intend to refer to a solipsistic attitude that lacks the nonveridical presuppositional layer. The (non-factive) indicative attitudes are solipsistic, as we said, contributing simply a veridical assertion and lacking the nonveridical presupposition layer. The indicative can thus also be understood to be the mood of (various kinds of) certainty and commitment. The subjunctive, on the other hand, is the mood of epistemic uncertainty.

Syntactically, as we said, mood selection is encoded in the subcategorization frame of the lexical entry of the verb. The dual patterns suggest that the lexical entries are underspecified and that subcategorization is not strict. The mood morphemes are like polarity items, i.e., subject to licensing by being in the scope of a higher veridical or nonveridical operator, but the licensing requirement applies at the level of presupposition for subjunctive and assertion (LF) for the indicative. In chapter 7, we will offer some more discussion on how this difference correlates with the update instructions we argued mood morphemes encode.

By distinguishing nonveridicality in the assertion vs. in the presupposition, our system allows, as we illustrated, for mixed lexical entries which combine veridicality and nonveridicality in the one or other level. This enables explanation of dual mood patterns—something that remained mysterious in all the previous accounts we know, which have to resort to ambiguity. Our analysis does not pose...
ambiguity, but rather allows mood morphemes to be sensitive to the presupposition or the assertion. Mood selection thus becomes a more flexible procedure—as is indeed required to be by the empirical data. A mixed lexical entry with a nonveridical presupposition will always trigger the subjunctive, even though the assertion might be veridical.

Our goal in this chapter is to develop this theory in the domain of bouletic verbs. By bouletic verbs we mean, as will become clear, verbs that involve in their truth condition a bouletic model, i.e., a set of worlds compatible with what \( i \) wants, hopes, intends, is required to do, promises to do and the like. These verbs typically come with future orientation, hence at present there is uncertainty as to whether the complement \( p \) will come to be true.\(^2\) The tense of the complement of volitional verbs, by extension, is the future oriented \textsc{Nonpast}, the infinitival \textsc{Nonpast}, or actual future when we have indicative. The bouletic model comes in various forms, depending on the lexical meaning of the attitude, as is the case with doxastics.

We confirm that the nonveridical presupposition is the key to understanding the selection of subjunctive with volitional verbs. We propose that the concept of bouletic commitment as homogeneity of \textit{Boul}, i.e., universal quantification over \( p \) worlds in \textit{Boul}. Verbs that only have this component will select indicative— and this, we will argue, is an option with with verbs meaning \textsc{Hope}, \textsc{Persuade} and \textsc{Promise}. On a par with suppositional doxastics, in the subjunctive pattern of \textsc{Want}, the verb has a nonveridical presupposition across all languages. \textsc{Hope} can also come with a presuppositional variant. All bouletic worlds consistent with \( i \)'s desires are worlds where \( p \) is true, but an additional presupposition for wanting is anti-veridicality; one wants what one does not have have at the present moment. Our semantics for pure volition is novel, and includes no preference, no ordering. It is therefore quite different from the ordering semantics of Heim, Portner, Villalta, Grano, and the semantics proposed by Giannakidou in earlier work. If ordering is not needed for volitionals, then it is an unnecessary device for the grammar of mood.

In mood choice patterns, just like with suppositional doxastics, the determining factor for whether the subjunctive will be possible is whether the verb will be construed as having a nonveridical presupposition or not. Attitude verbs that express commitment only will select indicative, in agreement with what we have observed thus far.

The discussion proceeds as follows. In section 2, we offer our analysis of \textsc{Want}, including discussion of previous accounts based on ordering. We argue that such accounts fail to unify the use of subjunctive with both suppositional

\(^2\)The literature also uses labels such as \textit{desiderative}, \textit{directive}. We assume that these all refer to the same class
doxastics (which do not involve ordering in any sensible way). In ordering based accounts, these two uses of subjunctive remain coincidental. Following the analysis of doxastics, our theory succeeds in unifying these two uses of subjunctive. In section 3, we discuss HOPE and PROMISE. In section 4, we discuss the dual patterns with Greek and Italian equivalent of verbs meaning PERSUADE. In section 5, we discuss dual patterns with verbs of assertion such as SAY and DENY. We close in section 6 with some general discussion about the typologies observed, which will help guiding our further exploration of implicatives, ability modals, and attitudes of emotion in the following chapters.

5.2 WANT: bouletic commitment, nonveridical presupposition, anti-factivity

Volition verbs of desire are what one can think of as the prototypical subjunctive verbs. They select the subjunctive and infinitive, and univocally reject the indicative. The pattern is remarkably stable across languages. Here are some basic examples from Greek and Italian:

(3) Αριάδνη θέλει να/ΩΤΙ η νίκη του Τζάνις.
Ariadne theli na/otí kerdisi o Janis.
‘Ariadne wants (for) John to win.’

(4) Αριάνη επιθυμεί να/ΩΤΙ η νίκη του Τζάνις.
Ariadne epithimi na/otí kerdisi o Janis.
‘Ariadne desires (for) John to win.’

(5) Αριάνη εφχει να/ΩΤΙ η νίκη του Τζάνις.
Ariadne efxete na/otí kerdisi o Janis.
‘Ariadne wishes (for) John to win.’

(6) Τζάνινε λα κάνει τη Μαρία να πάει στο σχολείο.
Gianni vuole/desidera che Maria vada a scuola. (Italian)
‘Gianni wants/desires that Mary goes to school.’

Notice that the verb *efχome* ‘wish’ is not counterfactual, but indeed a regular volitional.

*Na* is typically followed, with verbs of volition, by the familiar form glossed above as NONPAST which gives future orientation as discussed in chapter 3. Generic PRES with stative verbs is also possible, but not with eventives. PAST is excluded:

(7) Αριάνη θέλει πάντα να/ΩΤΙ η καλοτάμνη.
Ariadne theli panda na/otí einai kalontymeni.
‘Ariadne wants always that ΣUBJ/IND be.3sg well-dressed.'
‘Ariadne wants to always be well-dressed.’

(8) *I Ariadne theli na grafei to gramma tora. 
the Ariadne want.3sg that.SUBJ write.PRES.3sg the letter now.
  **Ariadne wants to be writing the letter now.’

(9) *I Ariadne theli na egrapse to gramma xthes. 
the Ariadne want.3sg that.SUBJ write.PAST.3sg the letter yesterday.
  **Ariadne wants to wrote the letter yesterday.’

The pattern is almost parallel in Italian. PRES with statives are allowed (although with a reinterpretation whereby the state $s$ is coerced into a ‘becoming $s$’, but PAST is banned.

(10) Maria vuole sempre che Susanna vada vestita bene a scuola. 
Mary wants always that Susan go.SUBJ.3sg dressed well at school.
  ‘Mary always wants that Susan dresses well at school.

(11) Maria vuole che Susanna sia contenta. 
Mary wants that Susan be.SUBJ.3sg happy.
  ‘Mary wants that Susan be happy.’

(12) *Maria vuole che Susanna sia stata contenta. 
Mary wants that Susan be.SUBJ.3sg been happy.
  ‘*Mary wants that Susan had been happy.’

Recall that epistemic modals can combine a $na$ complement with past.

(13) I Ariadne prepi/bori na efije xthes. 
the Ariadne must/may that.SUBJ leave.PAST.3sg yesterday.
  ‘Ariadne must/may have left yesterday.’

(14) Maria crede che Susan sia stata contenta. 
Mary believes that Susan be.SUBJ.3sg been happy.
  ‘Mary believes that Susan has been happy.’

So there is no problem with $na$/subjunctive and PAST generally, and we will see in the next section that with HOPE $na$/subjunctive can accept PAST; but the PAST is excluded with $na$/subjunctive when in a volitional complement. Volition is clearly future oriented: you want now something that will happen in the future.

As a convention for ease of exposition, we will say that the Greek and Italian (the same Italian pattern can be replicated for French) attitude verbs presented here denote the volition meaning WANT. We will continue using upper case to denote the abstract meaning that is realized by the specific Greek, French, and Italian words. WANT uniformly selects the subjunctive in the languages we know, but
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it contrasts with HOPE which, as we saw at the beginning and discuss further in
the next section, can appear with either mood. The English verb want has been
argued to have an ordering or preference component (pace Anand and Hacquard
take a look at this idea.

5.2.1 Volition as preference

Volition attitudes, along with persuasion and intention attitudes, select to infiniti-
val complements in English, and contrast with doxastics which take that comple-
ments. Notice, however, that the contrast is not absolute:

(15) a. Nicholas believes this to be the best solution.
b. Ariadne is believed to be the favorite for winning the game.

Hence the to vs. that divide does not fully correlate descriptively with the
doxastic vs. volitional distinction. In any case, let us accept the general idea
that volition attitudes, along with persuasion and intention attitudes, are ‘preference based attitudes’, according to the initial characterization in Bolinger (1975)
(see for recent work, Anand and Hacquard, 2013; Grano 2018). Most of the
literature working on to vs. that distinction in English (Portner 1997, Moulton
2006, Anand and Hacquard 2013, Grano 2018) assumes a clear difference be-
tween that-selecting attitudes as being epistemic (Grano calls them ‘rational’), on
the one hand, and preference to-selecting attitudes that convey priority or dynamic
modality (Portner 2009), also referred to as preference modality. In English, in
other words, the semantic contrast correlates not with mood but with finiteness: fi-
nite complements express doxastic modality, but non-finite complements express
preference modality:

(16) a. Mary wants/intends [for John to be happy].
b. *Mary believes/claims [for John to be happy].
(17) a. *Mary wants/intends [that John is happy].
b. Mary believes/claims [that John is happy].

The for-infinitive is sometimes distinguished as a special designator of preference;
however, it is really unclear whether for actually conveys more than simply be-
ing the vehicle for obviation in English. In the above obviating cases, for does
not combine believe, but in the non-obviating doxastic cases just mentioned, the
to infinitive is fine. The modality is doxastic, crucially, in both cases. Despite
the obvious empirical shortcomings of the correlation, the typical thesis in this
literature is that (for) to infinitives contribute preference modality, whereas that
complements convey doxastic modality.
In the initial and foundational characterization of bouletic attitudes (Heim, 1992 and see later Villalta, 2008), these attitudes convey ordering of doxastic worlds according to a bouletic ordering source. According to Heim (1992: 197) and in her dynamic framework, the lexical entry for WANT is as follows:

(18) Heim 1992, WANT:

\[
\begin{align*}
  c + a \text{ wants } \phi &= \\
  &= \left\{ w \in c : \text{for every } w' \in Dox_a(w) \right\} \\
  &\quad Sim'_w Dox_a(w) + \phi <_{a, w} Sim'_w (Dox_a(w) + \neg \phi)
\end{align*}
\]

According to this, WANT introduces the e ordering source, ranking \( \phi \) worlds higher than \( \neg \phi \) worlds.

But when we expand our scope and consider the Greek and Italian mood facts, the idea of preference becomes problematic. Of course, the subjunctive versus indicative choice is only parallel to the \textit{to, that} contrast, not identical to it. But the generalizations proposed for English are proposed as generalizations about verb classes that could in principle be extendable to the problem of mood choice that we are studying.

When one tries to generalize the observations about \textit{to} vs. \textit{that} complements in English, and the idea that subjunctive denotes preference ordering, one is faced with a number of challenges. First, modal verbs of all modalities (doxastic, priority, deontic, etc) select subjunctive and infinitive; it is therefore impossible to say that the infinitive and the subjunctive correlate with one type of modality, namely priority or dynamic modality. This is simply not the case. Giannakidou (2009, 2016) further points out that temporal connectives such as those meaning \textit{BEFORE} and \textit{WITHOUT} select the subjunctive but do not convey any preference:

(19) Prin (na) vreksi, as pame spiti.
before SUBJ rain.3sg, that.OPT go.1pl home.
‘Before it rains, let’s go home.’

(20) Andiamo a casa prima che piova.
Go.IMP.1pl to home before that rain.SUBJ.3sg.
‘Let’s go home before it rains.’

(21) Ekane tin metafasi xoris na xrisimpopiisi leksiko.
did.3sg the translation without that.SUBJ use.3sg dictionary.
‘He did the translation without using a dictionary.’

The use of subjunctive and infinitive above is clearly at odds with the idea that the infinitive expresses or requires preference. It would be simply wrong to say that there is a component of preference or priority modality in these cases.
Thirdly, the suppositional doxastics we studied in chapter four, along with subjunctive with perception and the memory verbs in Greek, also do not convey preference. The subjunctive or infinitive does not alter the type of modality with doxastics. Hence, the preference idea fails to capture a major aspect of the subjunctive choice, and fails specifically to capture that with doxastic predicates and modals, the subjunctive correlates with epistemic uncertainty, i.e. the nonveridicality presupposition of not knowing $p$.

If one takes a look at the English infinitivals from the perspective of subjunctive doxastics, one has to admit that even in English it is not accurate to say that the infinitive maps onto non-doxastic modality, as we already said. ECM infinitives, likewise, have been argued by Moulton (2009) to contribute doxastic modality. Hence, the split to vs. that in terms of belief vs. preference is not clearcut in English either. Rather, what matters more seems to be the temporal orientation of the complement—future or past and present; and this in turn seems to be dictated by the nature of the propositional attitude.

Which brings us to a fourth problem of the preference based works. The approaches that posit to vs. that complements in English differ categorically in modality attribute the semantic difference NOT to the attitude predicate, but to some head in the complement, in some cases for. The idea that there is a modal in the complement clause appears in Bhatt (1999), Kratzer (2006, 2013), Moulton (2009), Anand and Hacquard (2013), Gosselin (2013) White (2014), Bogal-Allbritten (2016), Grano (2016), Gluckman (2018); for earlier references to this end, see Bresnan (1972), Stowell (1982), Pesetsky (1992). Apart from lacking empirical evidence, this idea (namely that there is modality in the complement clause and that it is due to some modal head) leaves unexplained the selection problem: why is it that some verbs select the particular complement with the specific modality, while others require another modality, and some are compatible with both? The selection patterns become arbitrary in such approaches, and the link with the higher propositional attitude is only indirect (if present at all).

Our approach, on the other hand, has exactly the opposite orientation. We start with the meaning of the higher verb, and understanding the (layers in the verb) meaning is then used as the basis for explaining the mood patterns. As we have argued, there is little to zero evidence that the actual mood morphemes contain themselves any modality. In fact, the most reasonable position seems to be to accept that the mood morphemes do not convey modality in selection, but only pragmatic content about how to anchor the upcoming proposition to the context, as we said. In the case of the indicative it is possible to have a modal particle below mood, specifically the future particle; but in this case, clearly, the modality is contributed by a head other than mood. The key to understanding the choice of complement, in our case, is the meaning of the attitude verb – and the selection patterns, including the flexible ones, are reflections of how the attitude meaning
is grammaticalized. The temporal properties of the complement, crucially, also
follow for the nature of the higher predicate.

Let us proceed now with the analysis of WANT.

5.2.2 A new semantics for WANT

WANT is the prototypical volitional attitude, like BELIEVE can be seen as the
prototypical doxastic. On a par with BELIEVE, WANT expresses bouletic com-
mitment in the worlds consistent with one’s desires. However, unlike belief, voli-
tion is never solipsistic, and it always construed with reference to what is actually
the case, or what \( i \) believes to be the case. To see this consider the following:

(22) Context: I just received a letter from Bill:
    #I want so much to receive a letter from Bill!

(23) The door is open.
    # I want to open the door.
    #Open the door!

These examples show that a precondition for wanting something is to not have
what you want at the time of wanting. If \( p \) is already true, an appropriate attitude to
have is to be happy or sad about it, i.e, a factive attitude (to be discussed in chapter
7). Likewise, the issuing of an imperative requires that the action has not been
undertaken (Portner 1997, Kaufmann 2012). Issuing an imperative, as we see,
when the required effect already holds is redundant. At the time of utterance, then,
it seems necessary to assume that a precondition for the use of volition predicate
is not simply uncertainty about \( p \), but rather certainty that \( p \) is not true. We will
call this anti-factivity:

(24) Anti-factivity presupposition of WANT attitudes
    \( i \) WANTS \( p \) at \( t_u \) can only be defined if \( p \) is not true at \( t_u \), or if \( i \) believes
    that \( p \) is not true at \( t_u \).

Antifactivity is an antiveridicality presupposition, either objective anti-veridicality
or subjective one. For instance, \( i \) might erroneously believe \( p \) to not hold:

(25) Ariadne wants Flavio to buy her a nice gift for her birthday. He did that
    already, but she doesn’t know.

Wanting, then, is the opposite of factive emotive attitudes such as being happy or
sad: it is what you experience before you come to know that \( p \) is true. We chose to
refer to this property as anti-factivity — to reflect that it is the dual of the factivity
presupposition, which is objective or subjective veridicality. The anti-factivity
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The effect we get is similar to the oddity of MUST when we see the rain, therefore we know that it is raining: MUST, like WANT, is odd when \( p \) is a fact. Modal verbs are therefore also anti-factive. Anti-factive verbs strictly select the subjunctive and are never construed solipsistically.

Anti-factivity manifests itself also with counterfactual desires and wishes:

(26) I wish John were here!
(27) Ariadne is 14 years old, does not have a driver’s license, but she wants to drive this car.

Clearly, there is no contradiction in the above sentence: Ariadne wants something impossible given that she is only 14 and doesn’t have a driver’s license. The fact that she knows that her desire can never be true doesn’t block her from having it. Likewise, counterfactual verbs express a subject’s desire for something that is clearly not true at the time of utterance.

We define *Boul* as follows:

(28) *Bouletic state of an individual anchor* \( i \)

A bouletic state \( \text{Boul}(i) \) is set of worlds associated with an individual \( i \) representing worlds compatible with \( i \)'s desires.

In a Portnerian perspective, \( \text{Boul} \) is useful for priority modality, and indicates will of doing. According to Copley (2009,) WANT also relates to plans and goals. Here we do not endorse any specific view, but acknowledge that *want* can also be directed towards a state, as in *I want Cuomo to be the winner!* In this case, I have my desire without necessarily taking any action towards that end.

(29) \( \text{Boul}(i) : \lambda w' (w' \text{ is compatible with what the subject } i \text{ is wants in } w_0 \text{ at } t_u) \)
(30) \( \lbrack \ lbrack \text{WANT} p \rbrack \rbrack_{i,\text{epistemic,Boul}} \text{ is defined iff} \)

a. \( \exists w' \in M_{\text{epistemic}}(i) \neg p(w') \land \exists w'' \in M_{\text{epistemic}}(i) p(w'') \), and \( p \) is not true at \( t_u \), or if \( i \) believes that \( p \) is not true at \( t_u \). If defined,

b. \( \lbrack \ lbrack \text{WANT} p \rbrack \rbrack_{i,\text{epistemic,Boul}} = 1 \text{ iff } \forall w''' \in \text{Boul}(i) p(w'''). \)

Verbs that denote WANT obey the Nonveridicality Axiom and trigger the subjunctive, just like suppositional doxastics. In addition, as we said earlier, WANT is anti-factive and presupposes metaphysical or subjective antiveridicility. This antiveridical presupposition of WANT is crucial to understand why the subjunctive is unequivocally across languages, and obligatory. By being exclusively future oriented, WANT forces \( p \) to not be true at the time of utterance. Attitudes that are compatible with past orientation, cannot be antificative. The antiveridical presupposition therefore explains why subjunctive is the only choice cross-linguistically.
Finally, WANT predicates can never be construed solipsistically as merely expressing commitment in Boul(i), again because of their future orientation which prevents epistemic or doxastic commitment to $p$ (Giannakidou and Mari 2018a). Volition, in other words, is always done relative to reality or the perception of it, unlike belief, imagination, memory, or fiction where the doxastic space can be construed without reference to the actual world at all.

### 5.3 Hope

*Elpizo* (hope) and *spero* in Greek and Italian exhibit flexible mood:

(31) a. Elpizo na kerdisi/kerdise o Janis. hope.1sg that.SUBJ win.PERF.NONPAST/PAST.3sg the John. I hope for John to win/to have won.

b. Spero che Gianni abbia vinto/vinca. Hope.1sg.PRES that John have.3sg.SUBJ won/win.3sg.SUBJ. I hope that John has won.

(32) a. Elpizo oti kerdise o Janis. hope.1SG that.IND won.3sg the John. ‘I hope that John won.’

b. Elpizo oti tha kerdisi o Janis. hope.1sg that.IND FUT win.nonpast.3sg the John. ‘I hope that John will win.’

c. Spero che il Milan vincerà/ha vinto. Hope.1sg.PRES that the Milan win.3sg.FUT.IND/has won. ‘I hope that Milan AC will win/has won.’

Notice the correlation with tense. The past is now allowed, even after *na* / subjunctive – something impossible, as we said, with WANT predicates. Recall:

(33) *I Ariadne theli na egrapse to gramma xthes. the Ariadne want.3sg that.SUBJ write.PAST.3sg the letter yesterday. (Greek)

‘*Ariadne wants to wrote the letter yesterday.’

In other words, the *na* / subjunctive complement after HOPE is equivalent to the *oti* complement temporally, which means that the HOPE attitude is not restricted temporally: one can hope things about the past, present, or future. HOPE is, therefore, not anti-factive and can be construed solipsisitically—as, we will argue, is the case with the indicative version.
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Strikingly enough, and in sharp contrast with WANT, in Italian the indicative version is exclusively restricted to future orientation.

(34)  
Spero che verrà.  
Hope.IND.1sg that come.IND.FUT.3sg.  
‘I hope that he will come.’

(35)  
*Spero che venuto.  
Hope.IND.1sg that be.IND.3sg come.  
‘I hope that he has come.’

The solipsistic version reveals that the speaker is expressing a mere state of desire, rather than relying on reasonable evidence that can trigger a supposition about what will happen.

Equivalents of ‘hope’ are also flexible in other languages. According to Anand and Hacquard (2013), English *hope* features a preferential and an epistemic layer. The epistemic layer comprises *p* and ¬*p* worlds. According to these authors, it is not non-homogeneity that triggers subjunctive, and the preferential layer is responsible for it. The epistemic layer (even if partitioned) triggers the indicative. In our approach, nonveridicality in the epistemic layer, which is presupposed, is what triggers subjunctive, in a way parallel to doxastics and modals. Fear predicates, as we will show in chapter 6, just like HOPE also feature a nonveridical epistemic layer, and select subjunctive. This is unexplained under Anand and Hacquard theory. Also unexplained in this theory is the doxastic subjunctive, of course.

In order to capture cross-class variation, we will maintain the idea that a nonveridical epistemic presupposition is a subjunctive trigger rather than an indicative trigger. The duality of patterning shows that, as with doxastics in Italian, that HOPE can be construed solipsistically like pure bouletic commitment, without the epistemic component. We start with solipsistic HOPE: this conceptualization of HOPE identifies hoping with pure bouletic commitment with no epistemic or doxastic uncertainty:

(36)  
Solipsistic HOPE (indicative)  
$\lambda w'[w \in \text{Boul}(\text{Nicholas}) \iff \forall w'[w' \in \text{Boul}(\text{Nicholas}) \rightarrow w' \in \lambda w''\{w''|p(w'')\}]$  

The Greek and Italian words *elpizo* and *spero* can be used to denote solipsistic HOPE. In this use, they select the indicative. Since there is no presupposition of uncertainty, solipsistic hoping is understood as stronger, and this is sometimes described in the literature as indicating that a plan is underway.

But the meaning HOPE can also be construed as having the extra nonveridical uncertainty layer, in which case it becomes equivalent to WANT (but without anti-
factivity).

(37) Suppositional hope (subjunctive)
\[ [i \text{ HOPE } p]_{i,M,Boul} \text{ is defined iff } \exists w' \in M_{\text{epistemic }}(i) \neg p(w') \land \exists w'' \in M_{\text{epistemic }}(i) p(w''). \]
If defined, \[ [i \text{ HOPE } p]_{i,M,Boul} = 1 \text{ iff } \forall w''' \in Boul(i) p(w'''). \]

The Greek and Italian words *elpizo* and *spero* can also be used to denote suppositional HOPE, in which case they select subjunctive. Hence, unlike the verbs used for anti-factive WANT, HOPE verbs are underspecified lexically as to which version of HOPE they convey. This is not, as we argued with suppositional doxastics, ambiguity— as the truth conditional component remains the same in both cases: veridicality in the model. It is a matter of whether the verbs will be construed presuppositionally or not. This dual strategy, as we see, is available at the bouletic realm as much as it was available at the doxastic realm in Italian. The HOPE verb thus emerges as the obvious dual of the Italian BELIEVE verb.

Our semantics also indicates another difference with WANT predicates: the speaker believes \( p \) possible in the case of HOPE, but not with WANT (see discussion in Portner and Rubinstein, 2013). (38) is felicitous only if marrying Brad Pitt is inferred to be a possibility. This inference does not come about with (39):

(38) **Spera**
Hope.PRES.3sg of sposare Brad Pitt.
‘I hope to marry Brad Pitt.’

(39) **Vuole**
Want.PRES.3sg sposare Brad Pitt.
‘I want to marry Brad Pitt.’

HOPE verbs convey more certainty, which we attribute to the potentially solipsistic nature of this attitude.

### 5.4 Promising

The verbs meaning PROMISE also feature mood shifts, but their profile is yet different from HOPE and WANT. Like WANT, the PROMISE attitude is clearly future oriented. This is so because promise is known to be performative, i.e., it is said to involve commitment of \( i \) to perform an action to bring about \( p \). Like HOPE, on the other hand, PROMISE is flexible in the mood it takes, as can be seen in Greek:
5.4. PROMISING

(40) a. I Ariadne iposxethike na fiji the Ariadne promised.3sg that.SUBJ leave.NONPAST/PAST.3sg noris.
early.
‘Ariadne promised to leave early.’
b. I Ariadne iposxethike oti tha the Ariadne promised.3sg that.IND FUT fiji noris.
leave.NONPAST/PAST.3sg early.
‘Ariadne promised that she will leave early.’

If the PROMISE attitude if necessarily performative, what does the subjunctive entail? The problem is observed initially in Giannakidou 1997, where it is claimed that only the indicative version involves performative PROMISE; the *na* version does not convey the commitment of the speaker to carry out the action indicated by the *oti* clause. Past tense is excluded with the *oti* clause because of the nature of promise, which is like WANT:

(41) #I Ariadne iposxethike oti efije noris the Ariadne promised.3sg that.IND left.NONPAST/PAST.3sg early.
‘Ariadne promised that she will leave early.’

Here is our lexical entry for performative PROMISE:

(42) Performative PROMISE (Greek: *iposxome*)

\[ [\text{Nicholas promises that } p] \text{ is true in } w \text{ with respect to } \text{Boul}(\text{Nicholas}) \]
iff:
\[ \forall w' w' \in \text{Boul}(\text{Nicholas}) \exists t' t' > t_u p(w', t'); \text{ where } Boul \text{ is plan to bring about} \]

This reveals commitment of *i* to *p*, just as in the solipsistic case. In the case of PROMISE, however, it is commitment to bring about *p*.

With the subjunctive version, PROMISE is gauged against uncertainty and has a suppositional layer: it is not certain that there will be a time in which *p* will turn out to be true. This is non-performative PROMISE, and triggers subjunctive.

(43) Non-performative PROMISE (Greek: *iposxome*)

\[ [\text{Nicholas promises that } p]^{M, i, Boul} \text{ is defined iff } \exists w' \in \text{M}_{\text{epistemic}}(i) \neg p(w') \land \exists w'' \in \text{M}_{\text{epistemic}}(i)p(w''). \text{ If defined,} \]
\[ [\text{Nicholas promises that } p]^{M, i, Boul} \text{ is true in } w \text{ with respect to } \text{Boul}(\text{Nicholas}) \]
iff:
\[ \forall w' w' \in \text{Boul}(\text{Nicholas}) \exists t' t' > t_u p(w', t'); \text{ where } Boul \text{ is plan to bring about} \]
CHAPTER 5. BOULETICS

The Greek verb *iposxome* can be used in both ways, which means again that it can be used presuppositionally— in which case it selects the subjunctive— or solipsistically, in which case it selects indicative. It is not clear to us that the difference is traceable in English since the description of English *promise* has always been that it is performative. In our theory, performativity is solipsistic promise, and non-performative belief is promise with uncertainty.

In both HOPE and PROMISE, the attitude remains the same but there is an observed difference in ‘strength’, as was with doxastics. The strength change that mood brings about concerns whether the attitudes are construed as obeying or not obeying the nonveridicality axiom (solipsistically). Being strong refers to the latter case; being weaker is the result of uncertainty that is being added by the nonveridicality presupposition. We move on now to examine cases where the choice of two moods is not simply about strength in this sense, but produces an apparent difference in the meaning of the attitude verb.

### 5.5 Attitudes of persuasion

Apparent meaning change is observed with attitudes of persuasion, assertives, and certain negative verbs. We will show that in these cases the difference in meaning indicates, in addition to the presence or not of a presuppositional nonveridical layer, also a shift in the type of model chosen (bouletic or doxastic). The lower tense is crucial in triggering the shift in the modal base as we shall see.

The verb for PERSUADE in Greek is *pitho*, and allows both moods. Likewise its Italian counterpart:

(44) a. I Ariadne epise ton Nikolas na the Ariadne persuaded.3sg the Nicholas that.SUBJ fiji noris leave.NONPAST/.3sg early. ‘Ariadne convinced Nicholas to leave early.’

b. I Ariadne epise ton Nikolas oti i idea tou ine the Ariadne persuaded.3sg the Nicholas that.sg the idea his is.3sg kali. good. ‘Ariadne convinced Nicholas that his idea is good.’

(45) Gianni ha persuaso Maria che era ora di partire. Gianni has persuaded Mary that be.IND.3sg time to leave. ‘John has persuaded Mary that it was time to leave.’
5.5. ATTITUDES OF PERSUASION

(46) Gianni ha persuaso Maria che fosse ora di partire.
Gianni has persuaded Mary that be.SUBJ.3sg time to leave.
‘John has persuaded Mary that it was time to leave.’

Notice the change in meaning and the alteration in English between convince to (equivalent to pitho na), and convince that (equivalent to pitho oti). The English difference is discussed in a recent paper by Grano (2018). Like in English, pitho na means convince someone to act, but pitho oti means to make someone believe that the complement proposition is true. This difference is brought about in Greek by the mood, in English by the to vs. that choice. Italian also allows the infinitive with the expected ‘convince to act’ reading:

(47) Gianni ha persuaso Maria a partire.
Gianni has persuaded Mary to leave.
‘John has persuaded Mary to leave.’

As in the case of the attitudes discussed so far, there is no evidence that we are dealing with preference. We will start our discussion of the English verb persuade with some comments from Grano (2018), who defends the following generalization:

(48) a. When persuade combines with a nonfinite control complement, the meaning is roughly ‘cause to intend’;
b. when persuade combines with a finite complement, the meaning is roughly ‘cause to believe’.

For Grano, the difference in the two patterns of persuade correlates with finiteness and control, as we see. This is in the spirit of works mentioned earlier about WANT. In Greek, this generalization is not transferable, since with both subjunctive and indicative we have finite clauses. Moreover, in Greek it is not even about control. Notice below the pattern of obviation:

(49) a. I Ariadne epise ton Nikola na fijoun ta paidhia noris.
the Ariadne persuaded.3sg the Nicholas that.SUBJ leave.NONPAST.3pl the children early.
‘Ariadne convinced Nicholas for the children to leave early.’

In Greek, instead, the contrast is between subjunctive with non-past and future orientation versus indicative with past or present. The same holds in Italian: the imperfective indicative indicates PRES, whereas with the subjunctive version (fosse, (46)) the question whether it was time to leave is open and forward shifting of the time of evaluation is conveyed. This specific subjunctive pattern is by
now familiar for all bouletics.

Are the Greek, Italian, and English verbs of persuasion ambiguous? Not really. Our method of explanation is the one we have developed so far: the verbs can be construed with or without a nonveridical presupposition, and accordingly they select indicative or subjunctive. In addition, a model shift happens with this group of verbs from bouletic to doxastic.

Grano follows a different route, and distinguishes between what he calls ‘rational’ and preference attitudes. Belief is a clearly rational attitude, and desire a clearly preference attitude for him, with intention having features of both. Given our own analysis of volitionals without ordering, the distinction is not motivated. But in his framework, the divide implies the following for persuade:

(50) Informal summary of analysis (Grano 2018:49)
   a. persuade = cause to have a rational attitude
   b. p finite = information that p is true
   c. p for to= preference for p to be true
   d. RATIONAL + PREFERENCE = INTENTION

(51) a. #I persuaded John to quit smoking, although he still doesn’t intend to.
   b. I persuaded John to quit smoking, although he still doesn’t want to.

_Persuade_, according to Grano, targets rational attitudes, which include belief and intention but not desire. Intention and desire constitute a semantically natural class (preference-based attitudes) to the exclusion of belief. In addition, he proposes that there is another class of attitudes that crosscuts this distinction, including belief and intention but not desire, and this is the class that includes persuasion verbs. Grano’s account remains informal, but he suggests that rational attitudes are those that have a Hintikkan semantics— the ones that we called solipsistic here. Non-rational attitudes, such as desire reports, have a semantics that is "either non-Hintikkan (as in Heim 1992; Villalta 2008) or Hintikkan but context-sensitive in a way that may nullify some of the effects of a Hintikkean semantics (as in von Fintel 1999)" (Grano 2018: 14).

In our approach, the choice is fundamentally between a solipsistic versus a suppositional construal of _PERSUADE_ on a par with the other cases we discussed thus far. But in order for the suppositional construal to produce the intend to act meaning, we will postulate that there is a shift also in the model chosen. Consider first the subjunctive variant which is persuade to act. The resulting lexical entry is as follows:

(52) **PERSUADE** to act (with NONPAST)
    \[i \text{ persuade } NONPAST(p)\]^{i,M,Boul} is defined iff
5.5. ATTITUDES OF PERSUASION

a. At $t_u$: $\exists w' \in M_{\text{epistemic}}(i) \neg p(w') \land \exists w'' \in M_{\text{epistemic}}(i)p(w'')$. If defined,

b. $[\text{[i persuade NONPAST}p]\text{]}^M_{\text{Boul},i} = 1$ iff

\[ \forall w''' \in \text{Boul}(i) \exists t' \in [t, \infty)(w''', t') ; \text{where Boul is intend to bring about} \]

The choice of subjunctive and the ensuing nonpast produces intend to act in the future. The effect is similar to promise, only here Boul is intend to act, and not plan to act, as it was with PROMISE. We call this PERSUADE performative to point out the similarity. The only difference with PROMISE lies in who is in charge of bringing about $p$. With promise it is the subject, with PERSUADE it is the object.

Persuade plus PAST or present, on the other hand, produces the meaning ‘cause to believe,’ and there is no reference to action. This is a solipsistic construal, with a shift to a doxastic model:

(53) Solipsistic persuasion (indicative)

\[ [\text{Nicholas is convinced that } p] \text{ is true in } w \text{ with respect to } \text{Dox}(\text{Nicholas}) \text{ iff}: \]

\[ \forall w'[w' \in \text{Dox}(\text{Nicholas}) \rightarrow w' \in \{w''|p(w'')\}] \]

In this construal, to be convinced means to believe. Crucially, the shift is brought about by the PAST and PRESENT tenses. The verbs meaning PERSUADE are compatible with these tenses. Interestingly, the HOPE meaning in the solipsistic construal can sometimes also give the flavor of a doxastic reading. Consider:

(54) Elpizo oti kerdise o Janis.

‘I hope that John won.’ Sounds like “I believe that John won” and this is desirable.

In other words, a bouletic verb, when combining with a tense other than the NONPAST— which is its natural choice because of the nature of desire to be future oriented— may shift to the doxastic type of model of evaluation. Such models are more naturally compatible with past and present, since only facts about the past or the present can be known or believed. The lower tense is crucial in triggering the shift in the modal base as we saw, not the mood particles. Our account thus offers a simple explanation for what otherwise could be thought as lexical ambiguity. If models of evaluation are available for attitudes, and if doxastic/epistemic and bouletic are the two major types of models shifts between the two are not unexpected, but are in fact consistent with the properties of the lower tense.
5.6 Verbs of assertion

Verbs of assertion display a similar change of model and correlation with tense reminiscent of persuasion verbs. We illustrate below with the Greek verbs *leo*, and *arnoume* (examples from Giannakidou 2016, and Giannakidou and Staraki 2013).

(55) a. O Janis lei oti efijan noris.
   The John says that.IND left.3pl early.
   ‘John says that they left early.’
   
b. O Janis lei na figoun noris.
   The John says that.SUBJ leave.3pl early
   ‘John says for them (=wants) to leave early.’

(56) a. O Janis arnithike oti efijan noris.
   The John denied that.IND left.3pl early.
   ‘John denied that they left early.’
   
b. O Janis arnithike na fiji noris.
   The John says that.SUBJ leave.3sg early.
   ‘John refused to leave early.’

The choice of *na* and the nonpast correlates with action or thought of the future. The difference lexicalizes in two distinct ways in English (refuse, deny and say, want). With both *lei* and *arnithike*, the *na* complement is about future action, i.e. it acquires a volitional, intentional meaning, and we translate it as *wants*. The *oti* complements, on the other hand, with veridical past or present tense remain assertive.

For assertive verbs, the model of reported conversation is relevant:

(57) Reported conversation (rc) information state of an individual anchor i
A reported conversation information state state $M_{rc}(i)$ is a set of worlds associated with an individual $i$ representing worlds compatible with what $i$ knows or believes to be true in the reported conversation.

The *oti* complement adds the proposition to the common ground of reported conversation, with a possible intent to also add it to the common ground. This is, however, only possible intend:

(58) O Janis lei oti efijan noris, (but I don’t believe him)
   The John says that-IND left.3pl early.
   ‘John says that they left early, but I don’t believe him.’

(59) $\forall w' [w' \in M_{rc}(Nicholas) \rightarrow w']$
Hence, the speaker can believe or disbelieve the reported fact, but the subject of SAY has to accept it as part of the conversation. This renders leo veridical, and allows the subjunctive.

Leo na, on the other hand, contains bouletic component.

(60) Bouletic assertive

\[
[i \text{ SAY } p]^{i, \text{epistemic}, \text{Boul}} \text{ is defined iff}
\]

a. \[\exists w' \in M_{\text{epistemic}}(i) \neg p(w') \land \exists w'' \in M_{\text{epistemic}}(i) p(w'').\] If defined,

b. \[\llbracket i \text{ SAY } p \rrbracket^{i, \text{epistemic}, \text{Boul}} = 1 \text{ iff } \forall w''' \in \text{Boul}(i) p(w''').\]

In other words, verbs that denote SAY can combine with a bouletic M, and in this case they produce a bouletic meaning. The verb ask is similar: Ariadne asked what time it is versus Ariadne asked me to read her a story. Again, these systematic switches in verbal meaning need not be thought of as ambiguities, but rather as flexibility in what kind of M the verbal meanings can take as arguments. We find, then, that there are interactions between Dox and Boul, and verbs can combine with both. This argues against the strict separation of attitudes often assumes in the literature between epistemic (or rational) versus priority, or preference. A single word can take a priority of epistemic M, and shift in meaning accordingly.

In Italian, there is meaning shift, but the resulting interpretations are similar to the alternations we observed with doxastics. With the indicative there is full commitment of the speaker (and possibly request of adding \(p\) to the common ground); with subjunctive, there is no full commitment, and the speaker is in a state of uncertainty of whether \(p\) is true (see Mari 2015a, 2016). As we see, in Italian, there is no shift to bouletic worlds. Instead, it is worth noting that reportative say triggers subjunctive in Italian. The relevant lexicalization is not truthfulness in the reportative space, but epistemic uncertainty that the reported status of \(p\) enhances.

(61) La gente dice che è incinta.

People say that she is pregnant.

‘People say that she is pregnant.’

(62) La gente dice che sia incinta.

People say that she is pregnant.

‘People say that she is pregnant.’

(63) Subjunctive \text{ say}, Italian

\[
[i \text{ say } p]^{i, \text{epistemic}, \text{M say}} \text{ is defined iff}
\]

a. \[\exists w' \in M_{\text{epistemic}}(i) \neg p(w') \land \exists w'' \in M_{\text{epistemic}}(i) p(w'').\] If defined,

b. \[\llbracket i \text{ say } p \rrbracket^{i, \text{epistemic}, \text{M say}} = 1 \text{ iff } \forall w''' \in \text{M say}(i) p(w''').\]
CHAPTER 5. BOULETICS

Notice also crucially that the tense in Italian remains the same, unlike in Greek, where the shift to the Bouletic M correlates with the use of nonpast— which itself necessitates na. In Italian, there is no shift in tense, therefore also no shift in the model. This lends support to our idea that it is the tense that forces the shift rather than the mood itself.

Regarding, DENY, recall our earlier discussion in chapter 2:

(64) O Nicholas arinthike oti/*na i Ariadne ton voithise. the Nicholas denied.3sg that.IND/*SUBJ the Ariadne him helped.3sg. ‘Nicholas denied that Ariadne helped him.’

(65) O Nicholas arinthike *oti/na voithisi tin the Nicholas denied.3sg that.*IND/SUBJ help.NONPAST.3sg the Ariadne. Ariadne. ‘Nicholas refused to help Ariadne.’

We see the by now familiar correlation: subjunctive with NONPAST, indicative with PAST (and present). The indicative version is a negative assertion (briefly mentioned in chapter 1). DENY is a variant of belief, hence subjectively veridical, committed to ¬p, it makes sense that they select indicative:

(66) [[Nicholas denied that p] is true in the world of the utterance context w iff:
∀w′[w′ ∈ Dox(Nicholas, w) → ¬p(w′)]

In other words, if i denies that p and i is truthful, then i knows or believes ¬p to be true. The point here is that the subjective veridicality of the solipsistic construal explains why we get indicative with even negative assertives.

The subjunctive version, on the other hand, comes with a NONPAST and shifts the model to a bouletic one: all bouletic worlds are non-p worlds. In Italian we do not have NONPAST, therefore no forward shifting with the subjunctive, hence no triggering of a bouletic M. Rather, the indicative subjunctive shift appeals to whether p is settled in the common ground, and, as we have made explicit already in chapter 3, mood morphemes can indicate whether p should be appended to the mental space of the attitude holder or to the common ground. DENY is a typical example of the shift to the common ground.

(67) Maria nega cha ha ucciso Marco. Mary denies that have.IND.3sg killed Marco. ‘Mary denies that she has killed Marco.’

(68) Maria nega cha abbia ucciso Marco. Mary denies that have.SUBJ.3sg killed Marco.
5.7. **THE (NON)VERIDICALITY THEORY OF MOOD SELECTION**

‘Mary denies that she has killed Marco.

In the subjunctive case, it is not settled in the CG that Mary has killed Marco. In the indicative case, all participants but Mary are committed to \( p \). In this case, nonveridicality is part of the CG, rather than the epistemic space (see Mari, 2015).

### 5.7 The (Non)veridicality theory of mood selection

Now that have finished the analysis of bouletic attitudes, we want to take stock in this final section to put together our theory of mood selection as it emerges from the study of doxastics, bouletics and modals. The result is semantic typology of propositional attitudes based in nonveridicality and a small number of premises that allow predictions for other attitudes and larger sets of data.

Our primary goal is to provide a methodology for crosslinguistic research, by establishing a concrete set of predictions. Here are the basic premises that hold crosslinguistically in Greek and Italian/French:

(69) Two kinds of propositional attitudes \( \text{ATT} \)
   i. Solipsistic \( \text{ATT} \): no presupposition
   ii. Presuppositional \( \text{ATT} \): \( \text{ATT} \) has a mixed lexical entry with presupposition(s) and a truth condition. ii. \( \text{ATT} \) includes attitudes and modals

(70) Veridical propositional attitudes
   i. Solipsistic attitudes are nonveridical: they entail that \( p \) is true in the anchor’s \( i \) modal space.
   ii. The modal space is a variant of Dox(i) and Boul(i).

Belief is the prototypical doxastic solipsistic attitude, and hope the prototypical solipsistic bouletic.

(71) Nonveridical propositional attitudes and modals
   \( \text{ATT} \) is nonveridical iff \( \text{ATT} \) obeys the nonveridicality Axiom.

(72) Nonveridicality axiom
   i. For any propositional attitude or modal \( \text{ATT} \), \( \text{ATT} \) obeys the Nonveridicality Axiom iff \( i \) \( \text{ATT} \) \( p \) presupposes that \( M(i) \) is nonveridical, i.e. partitioned into \( p \) and not \( p \) worlds.

Some propositional attitude verbs in Greek and Italian can only be construed as solipsistic, and some as only presuppositional. Doxastic verbs in Greek are the former, and modal verbs in both languages and English are the latter. Some attitude verbs \( \text{ATT} \) can be construed solipsistically or presuppositionally. The presuppositional variants of \( \text{ATT} \) are weaker: the veridicality of the assertion
(commitment in Dox or Boul) co-exists in the lexical entry with the nonveridical-
ity presupposition that brings uncertainty. Presuppositional attitudes have mixed
veridicality.

The mood morphemes indicative and subjunctive are sensitive to the assertion
(indicative), and the presupposition (subjunctive). Here are the licensing condi-
tions for subjunctive and indicative:

(73) Licensing condition for the subjunctive mood
The subjunctive is licensed in the complement of a nonveridical ATT, i.e.
iff ATT obeys the Nonveridicality axiom.

(74) Licensing condition for the indicative mood
The indicative is licensed in the complement of a veridical ATT, i.e. iff
ATT is solipsistic or epistemic (therefore factive).

The mood morphemes are therefore markers of the veridicality or nonveridicality
of the ATT predicate. Their pragmatic contribution, as we stated in chapter 4 is to
give anchoring instructions.

Factivity characterizes epistemic verbs such knowledge verbs, and also emo-
tive factive verbs, as we discuss in chapter 7. Factivity is objective or subjective
veridicality. WANT verbs are anti-factive in that they have an anti-veridicality
presupposition that $p$ is not true, or that i believes $p$ to not be true.

(75) Anti-factivity presupposition of ATT
$i$ ATT $p$ at $t_u$ can only be defined if $p$ is not true at $t_u$, or if $i$ believes that
$p$ is not true at $t_u$.

WANT verbs cross-linguistically have the anti-factivity presupposition and select
invariably the subjunctive.

Given this system, the picture we are building looks as follows:
### Notion Value Attitude Type Greek Italian

<table>
<thead>
<tr>
<th>Notion</th>
<th>Value</th>
<th>Attitude Type</th>
<th>Greek</th>
<th>Italian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solipsistic</td>
<td>Believe</td>
<td></td>
<td>stevo, nomizo 'believe', 'think'</td>
<td>creedere, pensare, 'believe', 'think'</td>
</tr>
<tr>
<td>Solipsistic</td>
<td>Dream</td>
<td></td>
<td>onirevome 'dream'</td>
<td>sognare 'dream'</td>
</tr>
<tr>
<td>Solipsistic</td>
<td>Imagine</td>
<td></td>
<td>fandazome 'imagine'</td>
<td>immaginare 'imagine'</td>
</tr>
<tr>
<td>Doxastic</td>
<td>Believe</td>
<td></td>
<td></td>
<td>creedere, 'believe', pensare 'think', essere sicuro 'be certain', essere convinto 'be convinced'</td>
</tr>
<tr>
<td>Doxastic</td>
<td>Certainty</td>
<td></td>
<td>thimame 'remember'</td>
<td>ricordarsi 'remember'</td>
</tr>
<tr>
<td>Doxastic</td>
<td>Convinced</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doxastic</td>
<td>Memory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doxastic</td>
<td>Perception</td>
<td></td>
<td>vlepo, akouo 'see, hear'</td>
<td>sembrare 'seem'</td>
</tr>
<tr>
<td>Bouletics</td>
<td>Solipsitics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bouletics</td>
<td>Want</td>
<td></td>
<td>thelo 'want'</td>
<td>Volere 'want'</td>
</tr>
<tr>
<td>Deontic</td>
<td>deontic modals</td>
<td></td>
<td></td>
<td>È necessario (it is necessary)…</td>
</tr>
<tr>
<td>Deontic</td>
<td>Modals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOULETIC (HOPE type) / PERSUADE</td>
<td>Hope</td>
<td></td>
<td>elpizo 'hope'</td>
<td>Sperare, 'hope'</td>
</tr>
<tr>
<td>BOULETIC (HOPE type) / PERSUADE</td>
<td>Promise</td>
<td></td>
<td>ipoxsomme 'promise'</td>
<td>promettere 'promise'</td>
</tr>
<tr>
<td>BOULETIC (HOPE type) / PERSUADE</td>
<td>Persuade</td>
<td></td>
<td>pitho 'persuade'</td>
<td>Persuadere 'persuade'</td>
</tr>
<tr>
<td>BOULETIC (HOPE type) / PERSUADE</td>
<td>Say</td>
<td></td>
<td>leo, arnosame 'say, deny'</td>
<td>Dire 'say'</td>
</tr>
<tr>
<td>BOULETIC (HOPE type) / PERSUADE</td>
<td>Deny</td>
<td></td>
<td></td>
<td>Negare 'deny'</td>
</tr>
</tbody>
</table>

Figure 5.1: Notions, values and attitude types: solipsistic and suppositional variants

(76) **DOXASTIC**

a. Solipsistic doxastics: *oti*-belief in Greek, indicative belief Italian.
b. Suppositional doxastics: subjunctive belief Italian.

(77) **BOULETIC (HOPE type) / PERSUADE**

a. Solipsistic bouletic: *oti*-hope in Greek, indicative hope Italian.
b. Suppositional bouletic: subjunctive-hope Italian.
(78) **BOULETIC (WANT type)**
Suppositional only. Subjunctive WANT across languages, in virtue of the antiveridical presupposition.

(79) **SAY**
   a. Solipsistic say. *oti*-say in Greek; indicative-say Italian: total commitment to *p*, the attitude holder aligns with the common ground.
   b. Suppositional say. Subjunctive-say Italian: partial commitment, the attitude holder does not align with the common ground.

As Table ?? shows, Greek lexicalizes attitudes as solipsistic (when not antifactive). Italian has a preference for the suppositional lexicalization. French is in between: it lexicalizes non-factive epistemics as solipsistic, but has a preference for suppositional bouletic. A we will argue once we will have introduced more attitudes types, we can conceive the lexical realizations in each language, as different instantiations of lexical concept for attitudes (which we refer to as ‘notions’). While we can foresee blocking rules for Greek and Italian (in Greek the suppositional version is blocked, whereas Italian blocks the solipsistic version), as we have extensively argued in our discussion in chapter 3, any theory of mood will have to allow for flexibility intra and cross-linguistically. Recall, indeed, that there is flexibility even in Greek in the class of bouletic. No theory of blocking will be able to account for such complexity of pattern in mood shift, that can be the result of diachronic variation and contamination across verb classes. What we hope we have shown, is that attitudes have different lexicalizations, which can be conceived as manifestations of an abstract meaning or notion (see Mari 2003). In this line of thought, attitudes classes can be conceived as attitudes concepts, and the two variants, can be seen as the linguistic realization of the values that these conceptual category (in our specific case, solipsistic and suppositional). Which variant is realized in which language, can be predicted to some extent in terms of preferences, but no theory can fully predict the multi-factorial variation observed.
Chapter 6

Ability modals and implicatives

In this chapter we want to accomplish three tasks: the first one is to explain why the subjunctive and infinitive is chosen with ability modals and implicative verbs in Greek, instead of a finite tensed clause. The selection of the subjunctive is expected with ability modals since, as modals, they obey the nonveridicality axiom. We propose a new analysis of ability modality (building on earlier work by Giannakidou 2001, Mari, 2010, 2013, 2015a, 2017c, Giannakidou and Staraki 2013, and Thomason 2005) by treating the modal ABLE as the dispositional counterpart of epistemic MUST, entailing action to \( p \) only in the Ideal worlds.

Implicatives, on the other hand, appear to pose a challenge for the subjunctive since it looks like—at least in Karttunen’s initial approach—that they entail that \( p \) is true. We offer an analysis of MANAGE as an aspectual operator on the eventuality \( p \), which presupposes that a volitional agent \( i \) tried to being about \( p \), without, in fact, entailing actualization of \( p \). This presupposition alone suffices to license the subjunctive, which, as we argued, is triggered by a nonveridical presupposition. At the same time, we will challenge Karttunen’s initial assumption that MANAGE \( p \) entails \( p \), echoing recent voices in the literature (Baglini and Francez 2015, Nadathur 2016).

Under certain circumstances, ability modals do allow entailment to \( p \), i.e., the entailment that the ability was actualized and led to \( p \) ( ‘actuality’ entailment). The actuality entailment renders the prejacent true at a past time, and depends crucially on ABLE being embedded under past. We offer a thorough analysis of this phenomenon, consistent with the fact that the choice of subjunctive mood is not affected. We show the actuality entailment depends on PAST, or perfective aspect as previously thought, and it does arise with epistemic modals because these never scope under tense. In our analysis, implicative operators and ability modals in the veridical reading are not equivalent, contrary to popular claims in the literature (e.g. Bhatt 1999). Extending the view that we have been unravelling, we argue that when the actuality entailment arises, the modal is nonveridical in the

6.1 Introduction: ability modals and implicatives

Ability in English is expressed through modal verbs and expressions such as *can*, *be able to*, *be capable of*, etc.:

\[ (1) \]
\[ a. \text{ Ariadne can solve this problem.} \]
\[ b. \text{ Ariadne is able solve this problem.} \]
\[ c. \text{ Ariadne is capable of solving this problem.} \]

In Greek, Italian, and French lexicalizations of ability relate to the possibility modal *boro, pouvoir, potere*; see Staraki (2013) for an extensive presentation for Greek; Mari (2015a) for Italian and French. The ability modal appears to be homophonous to the possibility modal; but unlike the latter, the ability modal has personal syntax:

\[ (2) \]
\[ \text{Ta pedia borun na/*oti pane sto spiti mona} \]
\[ \text{The children can.3pl that.SUBJ/*IND go.IMPF.3pl to-the home alone tus.} \]
\[ \text{them.} \]
\[ \text{Ability: ‘The children are able to go home on their own.’} \]
\[ \text{Deontic: ‘The children are allowed to go home by themselves.’} \]

Here we see the verb ‘boro’ in the 3rd person singular. A deontic reading is also possible, but an epistemic one is excluded. In Greek, the epistemic possibility arises with the impersonal form ‘bori’, that we saw earlier:

\[ (3) \]
\[ \text{Ta pedia bori na/*oti ine sto spiti mona} \]
\[ \text{The children can.3sg that.SUBJ/*IND go.IMPF.3pl to the home alone tus.} \]
\[ \text{them.} \]
\[ \text{Epistemic only: ‘The children may be home alone (as far as I know).’} \]

\[ (4) \]
\[ \text{Ta pedia borun na/*oti ine sto spiti mona} \]
\[ \text{The children can.3pl that.SUBJ/IND go.IMPF.3pl to-the home alone tus.} \]
\[ \text{them.} \]
\[ \text{Permission only: ‘The children are allowed to be home alone.’} \]

Notice here that the stative predicate ‘be home alone’ cannot combine with the ability *borun*; the only possible reading with the stative is that of permission.
In Italian and French, we have similar effects. Ability and epistemic modals have the same morpho-syntactic profile, but ability is incompatible with stative meaning:

(5) a. Gianni può aprire la porta con il naso.
   Gianni can open the door with the nose.
   ‘Gianni can open the door with his nose.’

b. Gianni può essere malato.
   Gianni can be ill.
   ‘Gianni might be ill.’

(6) a. Jean peut ouvrir la porte avec son nez.
   Jean can open the door with his nose.
   ‘Jean can open the door with his nose.’

b. Jean peut être malade.
   Jean can be ill
   ‘Jean might be ill.’

We immediately note that abilitative modals require a non-stative predicate, as ability is ability to act. The abilitative - epistemic distinction correlates with embedding of eventive and statives respectively, as can be recalled from our discussion in chapter 2. The Italian ability modal selects an infinitive and not a subjunctive. This is because obviation is not tolerated, and it is obviation that allows the subjunctive generally in Romance. In Greek, the infinitive is not an option because all sentential complement must be finite, as we know. We will continue to take the infinitive and the subjunctive to be equivalent, and specifically in the case of ability modals—and similar control verbs—we will argue that it contains zero tense, although it is a morphological non-past.

We also assume, following Giannakidou and Staraki 2013 and Staraki 2013, that the Greek ability verb is a separate lexical item from the possibility modal bori which is invariant. As modal verbs, boro, pouvoir, pottere ability modals are expected to obey the Nonveridicality Axiom which requires that the modal base be nonveridical. They are also objectively nonveridical: ABLE (the children go home) does not entail that the children went, will, or are going home.

Ability itself is a disposition, i.e., a state, which can be precondition for action. However, the mere disposition, as can be seen in the sentences above, does not entail that action is taken. The ability of Ariadne to solve this problem does not entail that she does, or did solve the problem. Pure ability is thus nonveridical (Giannakidou 2001, Mari, 2010,2015), and does not trigger actual truth of the prejacent clause.
6.1.1 Basic questions about ability

Portner (2009: 135) characterizes the modality expressed by ability expressions *dynamic* and considers it a subcase of volitional modality, thereby distinguishing ability from epistemic or deontic (which are characterized by Portner as *priority* modals. Unlike epistemic modals, where the key anchor is the speaker, with ability verbs the subject is important, i.e., she has the ability to do something. The subject of the ability modal is typically agentive (see also Hackl 1998, Staraki 2013), in contrast with the subjects of epistemic or deontic modalities.

The proper treatment of ability has not been an easy task. One dimension of complication has to do with the quantificational force of the ability modal. Kenny (1975, 1976) argued that ability modality cannot simply be analyzed as a possibility operator within modal logic; likewise Giannakidou (2001) and Thomason (2005) propose analyses of CAN as a universal quantifier (hence like MUST). Thomason rejects the existential analysis as weak: "To put it roughly, Cross’s theory of the can of ability is based on equivalence between *I can* and *If I tried I might*. This doesn’t seem right; *If I tried I would* is a more intuitive conditional explication. This raises a fairly complex and delicate issue, one that is crucial for the logical analysis of ability." (Thomason 2005: 7). The data discussed in Giannakidou 2001, and Giannakidou and Staraki, support this stronger analysis of ability, which we will adopt in this chapter.

Another fact about ability is that it can be understood in terms of enabling factors as well as temporal constraints. As Thomason, again, puts it: "In general, ability can depend on favorable circumstances, on the presence of appropriate knowledge, and on non-epistemic properties of the agent. I can truly say *I can’t write a check* either because my bank balance is negative, or because I don’t know where my checkbook is, or because my hand is injured. I believe that the same sense of *can* is involved in each case." (Thomason 2005: 3). Additionally, ability can be understood as a general disposition of the subject (holding generically), or as being anchored to a specific situation and time. An example like *I can lift a 50 pound rock* would be most plausibly understood as generic; it attributes a property to an agent that holds under a wide variety of times and circumstances, perhaps to all that are Ideal, as we will argue here (see also Thomason 2005: 3). J.-H. Lee 2006 further shows that, in Korean, generic and time-bound CAN are realized by lexically distinct verbs, showing that the difference between generic ability and time-bound ability can be lexicalized in a language. So, abilities may be generic or time-bound dispositions for action; but neither generic, nor time bound abilities imply acting on the ability, ability is therefore nonveridical and the choice of subjunctive in Greek is expected.

Ability expressions, however, can also be used to refer to real actions. Aristotle expresses this difference in the following way (On Interpretation 23a 7-13):
"'Possible' itself is ambiguous. It is used, on the one hand, of facts and things that are actualized; it is possible for someone to walk, inasmuch as he actually walks, and in general we call a thing possible2, since it is now realized. On the other hand, possible1 is used of a thing that might be realized; it is possible1 for someone to walk, since in certain conditions he would." Crucially, Aristotle aims to distinguish two readings of possible, and possible2 expresses an 'actualized possibility' (puissance en acte, as Mari and Martin 2009 put it). "In fact, if possible2 expresses an actualized possibility, on this reading, ABLE \( p \) entails \( p \), since actualizing an ability involves performing an action" (Mari and Martin 2009: 9).

This actualized ability, as one may think of it, has been studied recently in a number of works under the label ‘actuality entailment’, due to Bhatt (1999) (who discussed Hindi and Greek examples). This entailment has been assumed to be due to the perfective aspect on the modal verb. We give below two examples from Greek (from Giannakidou and Staraki 2013). Recall that Greek, unlike English, has a perfective-imperfective distinction in the past (as well as in the nonpast; recall chapter 3 for details):

(7) John was able to escape.

(8) O Janis borese na apodrasi. #ala
The John can.PERF.PAST.3sg that.SUBJ escape.PERF.NONPAST.3sg (but dhen apedrase.
not escaped).
‘John was able to, and he did escape (#but he did not).’

(9) O Janis boruse na apodrasi. (ala
The John can.IMPF.PAST.3sg that.SUBJ escape.PERF.NONPAST.3sg (but dhen apedrase).
not escaped).
‘John could/was able to escape (but he did not).’

The sentence with perfective aspect borese entails that John escaped, an entailment lacking with imperfective aspect, as we see. The imperfective sentence is a statement of pure ability, and is nonveridical, since it does not imply \( p \). The perfective ability statement is also in the past, and it is factual: it implies that John engaged actually in a series of actions the result of which was the fact that he escaped.

French and Italian are similar to Greek, and have also been thoroughly discussed in the literature (see, e.g. for French, Hacquard, 2006; Mari and Martin, 2007, Homer, 2010; for Italian, Hacquard, 2006; Mari, 2010,2012,2015a,2017c).\(^1\)

\(^1\)Several authors do not subscribe to an aspectual analysis, though, and some of them argue that causality also plays a role (see e.g., Giannakidou and Staraki 2013).
(10) Jean a pu prendre le train, #mais il ne l’a pas pris.
    John has can.PAST.PART to take the train, #but he not that-has taken.
    ‘John managed to move the table, #but he did not do it.’

(11) Gianni ha potuto prendere il treno, #ma non lo ha preso.
    Gianni has can to take the train, #but not that has taken.
    ‘Gianni managed to take the train, #but he did not take it.’

The *imparfait* cancels the actuality entailment in French (*a contrario*, see Giannakidou and Staraki 2013; Davis et al. 2009).

(12) John pouvait prendre le train, mais il ne l’a pas pris.
    John can.IMPF to take the train, but he not that-has taken.
    ‘John could have taken the train, but he did not take it.’

(13) Gianni poteva prendere il treno, #ma non lo ha preso.
    John can.IMPF to take the train, #but not that has taken.
    ‘John managed to take the train, #but he did not take it.’

Bhatt and others (Hacquard 2006, 2009, Pinon 2003) argue that the actuality entailment with ability is an aspectual phenomenon. Bhatt suggests actualized ability has the logical structure PERF (ABLE p), whereas pure ability is GEN(ABLE p), and most of the literature assumes some variant of this thesis. Mari and Martin and Giannakidou and Staraki challenge the aspectual analysis, and offer alternative accounts. In this chapter, we will offer a thorough discussion of the relevant facts in Greek, French and Italian, and offer an analysis of the actuality entailment that is consistent with the ability modal obeying the Non-veridicality Axiom. The effect will de derived from the ability statement being in the scope of PAST. The role of PAST has been under-appreciated in previous accounts.

### 6.1.2 Implicatives

Bhatt further points out a similarity between the action reading of ability and implicative verbs such as MANAGE:

(14) I Ariadne katafere/borese na/*otí na/*otí
    The Ariadne managed.could.PERF.3sg that.SUBJ/*IND
    ftiaksi to aftokinito.
    fix.PERF.NONPAST.3sg the car.
    ‘Ariadne managed to/was able to fix the car.’
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(15) a. Mario è riuscito a riparare la macchina.
   Mario is managed to repair the car.
b. Mario ha potuto riparare la macchina.
   Mario has could to repair the car.
   ‘Mario managed to repair the car.’

Notice that PRES (which is the present progressive in English) is either odd, or doesn’t produce the actuality entailment:

(16) #John is managing /is being able to fix the car.
(17) John is forcing Ariadne to sign the papers. Does not entail that Ariadne signed or is signing the papers.
(18) John is getting Ariadne to sign the papers. Does not entail that Ariadne signed or is signing the papers.

The implicaitive structure, thus, isn’t inherently veridical, i.e. it does not entail $p$. Whether or not the veridical inference will be possible depends largely on tense. It is crucial to make this observation wight at the beginning, because the role of tense tends to be overlooked in almost all the accounts we know. None of the existing accounts explains why the intended veridicality entailment doesn’t arise with PRES. On the contrary, under Bhatt’s account, and because PRES is not generic, the veridicality inference should be allowed, contrary to fact.

Crucially, the future also doesn’t license the veridical inference:

(19) I Ariadne tha kataferi/boresi na ftiaksi to
    The Ariadne will manage.3sg/can.3sg that.SUBJ fix.perf.3sg the aftokinito.
    car.
    ‘Ariadne will manage/will be able to fix the car.’

Despite the presence of perfective aspect, embedding under FUT doesn’t give actuality. This casts doubt on the idea that implicatives inherently entail $p$, and it also shows that actualization, contrary to what is claimed in most of the literature, cannot be simply due to perfective aspect. It seems rather to be an effect of PAST . We will offer an analysis based on this idea. The crucial element will be that with ability, unlike with other modals, semantic PAST applies (but *MUSTED, *COULD), unlike with epistemic readings are always anchored to the the time of utterance (Portner 2009, Giannakidou and Mari 2016a,b, 2018a,b). So the application of PAST to the ability modal is meaningful, and we want to hold it responsible for the veridicality inference.\(^2\)

\(^2\)Ability modals are often called ‘root’ modals, a term that we don’t find particularly useful.
The semantics of MANAGE has been an issue of considerable debate. Karttunen (1971) and Karttunen and Peters (1979) present the earliest discussions. Karttunen posits that MANAGE $p$ entails $p$— which would render MANAGE veridical. The use of a nonveridical tense, however— i.e., the morphological nonpast— is inconsistent with a veridical analysis. The literature typically focuses on English, and the problem of tense and mood choice is not adequately appreciated. It sheds, however, new light on implicatives.

Crucially, unlike the ability modal, MANAGE does presupposes trying; and it implicates that it took (some or considerable) effort to bring about the $p$:

(20) John didn’t manage to fix the car entails that John made an effort to fix the car.

(21) John managed to fix the car entails that John made an effort to fix the car.

TRY itself is nonveridical (Giannakidou 2013) and selects the subjunctive. Now, the TRY component often (but not always) gives rise to a difficulty reading. Difficulty, on the other hand, seems to not be a necessary component of actualized ability:

(22) O Janis borese na pji deka bires – kai itan efkolo! The John could that.SUBJ drink ten beers – and it was easy.
    ‘John was able to drink ten beers last night – and it was easy!’

(23) O Janis katafere na pji deka bires – #kai itan efkolo! the John managed that.SUBJ drink ten beers – and was easy.
    J’ohn managed to drink ten beers last night – and it was easy!

In this example, John is a heavy drinker, and 10 beers were easy to drink; but notice the contrast with MANAGE, which is odd. Difficulty thus is weaker with ability.\(^3\) Bhatt (1999) argues that the ability modal in the perfective is an implicative verb, whereas the pure ability has the structure GEN(able). But given the contrast with manage above, simply reducing the ability modal to an implicative will not be sufficient. We will argue that implicatives and ability modals differ importantly in that only the actualized ability entails $p$. We will treat the MANAGE is a non-actualization, therefore nonveridical, aspectual operator thus explaining

\(^3\)Some degree of effort, however, is implicated even with ability. Notice the example below, from Giannakidou and Staraki:

(24) O Janis borese na sikothi. The John can.PERF.PAST.3sg that.SUBJ stand-up.PERF.NONPAST.3sg.
    ‘John was able to stand up?it was a difficult thing!’

Standing up is normally easy, but with borese we need a context in which it takes effort to stand up, i.e. John was sick or John is a non-walking infant.
the use of subjunctive— a puzzle that none of the existing analyses addresses.

Our discussion proceeds as follows. In section 2, we offer an analysis of the ability modals in Greek, Italian, and French as MUST in the realm of ability. In section 3, we consider and reject previous accounts of the actualized reading of ability. In section 4, we offer our own analysis. In section 5 we discuss implicatives. We will argue that the choice of the subjunctive is justified because the implicative presupposes TRY, and try is nonveridical. We will also follow recent analyses of the assertion of MANAGE that argue that MANAGE only entails the means to bring about the prejacent are (Nadathur 2016). This analysis derives nonveridicality for MANAGE $p$ and the subjunctive is justified by nonveridicality both by the assertion and the presupposition.

6.2 Ability modality

6.2.1 Some background notions

Giannakidou (2001) offers an analysis of the ability modal— which we will designate as ABLE— as a universal quantifier. We will start by presenting that analysis; then we will adjust it to the framework developed in chapter 2 so that a full parallel to epistemic MUST will be established.

As we mentioned at the beginning, it has been common to admit that the semantics of mere possibility is too weak for ability verbs. Giannakidou (2001), Thomason (2005), and Portner (2009) are recent discussions (see also references therein); Chierchia and McConnell-Ginet (1992): 238 also admit that the analysis of can as a possibility modal is "certainly not right". The problem with mere possibility is that it conceptualizes ability as occasional, i.e. it makes $\text{ABLE } i \ p$ true in case there is some (and possibly random) outcome associated with a manifestation of $i$'s ability (see Thomason 2005, Kenny 1975, 1976, and Mari and Martin 2009, Mari 2012,2015a,2017c on this point). But, intuitively, $\text{ABLE } i \ p$ has to do with what must happen if i’s ability materializes in action. The basis of our discussion, then, is that in all ideal worlds consistent with $i$’s abilities, $i$ carries out $p$ — and the mere possibility circumstantial modal analysis cannot capture this. The individual anchor $i$, crucially, is the sentence subject, i.e. the subject argument of ABLE. In Greek, Italian and French, the relevance of the agent is suggested clearly by the fact that the ability modal is a personal verb, contrary to the epistemic modal which has impersonal syntax, as we noted earlier. The same holds, as we showed in (1) for the deontic modal.

Giannakidou (2001), to our knowledge, is the first explicit analysis of the ability modal as a universal modal. The reasoning is justified as follows:
"In an example like John can swim, for each world we consider, John will have the ability to swim in that world. Though this definition seems to work fine in worlds where John knows indeed how to swim (and he knows that he knows that), due to training or natural talent, in worlds where John didn’t learn how to swim, or hasn’t discovered his natural talent yet, \( p \) is clearly not true. What we need to do is restrict the set of worlds so that it includes only those worlds in which people have abilities to do things (because of proper training, natural talents, or whatever other reason), and where people are aware of these abilities. Let us call these worlds the *ability modal base*, and let’s think of it as a function from \( w \) to worlds \( w' \), at least as normal as \( w \), compatible with what an agent \( x \) is capable of doing at \( w \).

\[
(25) \quad K_{\text{ability}}(x)(w) = \{ w' : \forall p[x \text{ is capable of } p(w) \rightarrow p(w')] \} \text{ (Giannakidou 2001: 702).}
\]

(Note that one of the problems raised by this definition is that, whenever the agent has an ability in a world, s/he actualizes that ability in that world. We will develop here an account that does not encode this notion of obligatory actualization.)

\( K_{\text{ability}} \) worlds are also worlds in which an agent is aware of his or her abilities to do \( p \). Now, within this modal base, we need to partition between worlds where \( i \) undertakes action to bring about \( p \), and worlds in which \( i \) has not taken such action.

The truth condition for *boro* given by Giannakidou is as follows:

\[
(26) \quad \text{For all worlds } w' \text{ in } K_{\text{ability}}, \text{ there is a world } w'' \text{ in } K_{\text{ability}} \text{ such that } w'' <_w w', \text{ and for every other world } w''' <_w w'' \text{ in } K_{\text{ability}}, p \text{ is true in } w'''. \text{ (ABILITY CAN; Giannakidou 2001: (132))}
\]

Given the fact that abilitative modals can give rise to actuality entailments, the role of the ingredients involved in turning ability into action are going to become crucial and the notion of ability needs some rethinking in order to better understand the role of tense as well as the nature of the relation between ability and action.

We proceed to show now to offer an analysis into our current system.

### 6.2.2 ABLE and MUST: The structure of the ability modal base

The analysis we offer here is exactly parallel to epistemic MUST. We will start by reminding the key features of MUST. Recall the epistemic modal base:

\[
(27) \quad M(i)(t_u)(w_0) = \lambda w' (w' \text{ is compatible with what is known by the speaker})
\]
Recall that our notation $M(i)$ corresponds to the Kratzerian notation using set intersection $\cap f_{\text{epistemic}}(w_0, i, t_u)$, where this returns the set of worlds compatible with what it is known in $w_0$ by $i$. Modality, in our framework, is always subjective, allowing also for cases where the epistemic agent $i$ is a collective individual or group of people (and this may be used to capture what others would call objective modality). The epistemic modality is, as we said, by default ‘subjective’, depending on the speaker’s $i$ or beliefs, and knowledge changes with time. Epistemic modality is therefore parametric to knowledge at $t_u$, as is often acknowledged in the literature (see Portner 2009, Hacquard 2006, 2010, Giannakidou and Mari 2016a, b).

Now, when it comes to ABLE, we will use $K$ to designate the modal base, and $i$ will be the subject of ABLE, as we said. Just as knowledge is parametric to time, ability is also parametric to time, as people have different abilities at different times. Ability as a predisposition is thought to be atemporal (recall that Bhatt’s uses GEN), and certain abilities are indeed atemporal, e.g., such as the ability to talk, to walk, to breath, etc. However, abilities are also skills and they become parametric to time and training, age, and so forth. The ability to drive, to speak French, to cook well are such abilities—and one can actually argue that all abilities are like that.

\begin{align}
K(i)(t_u)(c) &= \lambda w'(w' \text{ is compatible with what the subject } i \text{ is capable of doing in } w_0 \text{ at } t_u) \\
\end{align}

$K$ encompasses what $i$ can do at $t_u$ in $c$. Knowledge is always anchored to $t_u$, but this is not so for ability. Time sensitive variants of ABLE, as in Korean, or embedding ABLE under PAST (the specific configuration producing actuality entailment) have the temporal argument of $K$ affected: it is, by default, $t_u$ if ABLE is in the present tense, but the temporal parameter can be in the past or future depending on whether ABLE is embedded under PAST or FUT. Unlike epistemic modality which doesn’t scope under tense, ability modality is a lower operator and does—hence its characterization often as ‘root’ modality. The actuality entailment is a case where ABLE has narrow scope below PAST, and, anticipating our analysis of the phenomenon, the $K$ parameter in this case is set to a time prior to $t_u$. \footnote{The same, we will argue, holds for deontic modals: the deontic MUST can scope below PAST. In this case, an actuality inference is also triggered, although it is only an implicature. More discussion of this in section 4.}

The modal base of epistemic MUST, as we noted, is nonveridical about the proposition $p$ denoted by its prejacent, and contains both $p$ and $\neg p$ worlds. To de-
rivate the truth conditions of MUST we assumed with the literature (see e.g. Portner, 2009) that MUST uses a set of propositions $S$ which describe shared stereotypical/normalcy conditions. Given the epistemic modal base $M(i)(t_u)(w_0)$, in chapter 2, we have defined $\text{Ideal}_S$ as a function over $M(i)(t_u)(w_0)$. The output $\text{Ideal}_S$ is a subset of $M(i)(t_u)(w_0)$:

$\text{(29)} \quad \text{Ideal}_S(M(i)(t_u)(w_0)) = \{ w' \in M(i)(t_u)(w_0) : \forall q \in S(w' \in q) \}$

So defined, $\text{Ideal}_S$ delivers the worlds in the epistemic modal base, a subset of $M(i)$, in which all the propositions in $S$ are true. $S$ is a set of propositions that corresponds to common ground norms. Since only those worlds are considered in which all the propositions in $S$ are true, the function $\text{Ideal}_S$ determines a cut-off point. (The set $\text{Ideal}_S$ is also parametric to time. Unless otherwise stated, we consider that $\text{Ideal}_S$ is determined at the actual world and at the utterance time).

The basic truth condition of MUST requires that $p$ is true in the Ideal set of $M(i)$. Tense comes from below MUST, and can be either a semantic present (PRES) or past. (FUT is a case of MUST scoping above a NON-PAST, a case that we will not consider here). Given a set $\text{Ideal}_S$ and the utterance time $t_u$,

$\text{(30)} \quad \text{[prepi/devere/must (PAST ($p$))]$_{M,i,S}$} = 1 \iff \forall w' \in \text{Ideal}_S : \exists t' < t_u \land p(w', t')$

$\text{(31)} \quad \text{[prepi/devere/must (PRES ($p$))]$_{M,i,S}$} = 1 \iff \forall w' \in \text{Ideal}_S : p(w', t_u)$

Echoing Giannakidou and Mari (2016a,b) (and Knobe and Szabó 2013 before them), we said that we can think of $\text{Ideal}_S$ as the ‘inner’ domain of MUST, and $M(i)$ as the ‘outer’ domain. The outer domain is a nonveridical epistemic space that does not as a whole support $p$; but the $\text{Ideal}_S$ space is veridical: all worlds are $p$ worlds. In other words, MUST is nonveridical with respect to $M$, but veridical with respect to $\text{Ideal}_S$. This accounts for why we say that MUST expresses partial commitment: it expresses commitment to $p$ in the $\text{Ideal}_S$ subset of $M(i)$. This makes it stronger than MIGHT, and grants MUST mixed veridicality status. Because of the nonveridical $M(i)$, MUST satisfies the licensing condition for the subjunctive we posited, and this explains why the complement of MUST appears in the subjunctive.

ABLE works in a parallel way but now we have $K(i)(t_u)(w_0)(c)$. We define $\text{Ideal}_R$ as a function over $K(i)(t_u)(w_0)$. The output $\text{Ideal}_R$ is a subset of $K(i)(t_u)(w_0)$:
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(32) \( \text{Ideal}_R (K(i)(t_u)(w_0)) = \{ w' \in K(i)(t_u)(w_0) : \forall q \in R(w' \in q) \} \)

Now \( \text{Ideal}_R \) delivers the worlds in the \( K \), a subset of \( K(i) \) where all abilities are carried out. The function \( \text{Ideal}_S \) determines a cut-off point, as with epistemic MUST.

What are the Ideal worlds with ability? In our account, circumstances establish a divide between worlds in which the ability is actualized and those in which it is not. To actualize abilities at least two preconditions must be met. First, the circumstantial preconditions must be satisfied, and again, normality plays a role: the world has to function in the normal way with the usual causal laws. Secondly, the agent must want to carry about \( p \). Volition has been recognized as a precondition of ability several times in the literature (see discussion in Mari and Martin 2007; Giannakidou and Staraki 2012, which develop an account based on volitional causation). The volitional agent \( (i) \) might not be the entity denoted by the subject, but there is a notion of plan and possibly of goal underlying abilitative modality (Thomason 2005; Hacquard 2006; Mari 2015a among others). In this respect, parametrizing the ABLE modal to the volitional agent \( (i) \) is going to be crucial if we want to understand the entailment of actuality. Notice, crucially, that nonvolitional agents are impossible:

(33) #The wind was able to break the window.

Now let us consider the lower tense.

6.2.3 Zero tense, obligatory control

With epistemic MUST, as can be recalled, the lower tense can be either a semantic present, past, or nonpast (in which case the MUST is predictive). However, the complement of ABLE lacks this flexibility, and only accepts morphological nonpast forms, perfective or imperfective:

(34) I Ariadne bori na odigisi (tora).
    the Ariadne can that.SUBJ drive.PERF.NONPAST.3sg now.
    Ariadne is capable of driving right now.

(35) I Ariadne bori na odigi.
    the Ariadne can that.SUBJ drive.IMPF.NONPAST.3sg.
    Ariadne can drive (generally).

Recall that in French and Italian we only have infinitives, the tense of which is also nonpast. Now, in Greek, two nonpast forms are possible: the perfective (which we have seen so far to be a semantic NONPAST and forward-shifts), and the imperfective nonpast, which is a semantic PRES or the generic tense, and does not
forward-shift. The imperfective version above is a statement that Ariadne has generally the ability to drive, but the perfective statement is that Ariadne has at present the ability to undertake driving. In other words, the perfective vs. imperfective contrast with the nonpast marks a divide between general ability versus the time-space bound ability (a difference that can be lexicalized in some languages, e.g. in Korean, Lee 2008). Perfective aspect still does not entail that Ariadne is driving now, but it anchors the ability to now. \( K \) is relativized to \( t_u \) in both cases.

Importantly, there is no forward-shifting, despite the use of nonpast with perfective; this is because the ability holds at the time of utterance—though acting on the ability may happen afterwards.

The ability cannot be followed by a lower past. As we can see here, if we try to embed a past tense under ABLE, only the epistemic reading arises, and the difference between perfective and imperfective goes away (for reasons that are not relevant right now):

\[(36) \] I Ariadne bori na odigise \( \) (xthes).

Epistemic reading only: ‘Ariadne could have driven yesterday.’

‘#Ariadne is capable of having driven yesterday.’

\[(37) \] I Ariadne bori na odigouse \( \) (xthes).

Epistemic reading only: ‘Ariadne could have driven yesterday.’

‘#Ariadne is capable of having driven yesterday.’

This also holds in Italian, as we showed in section 1. We repeat the examples:

\[(38) \]

a. Gianni può aprire la porta con il naso.
   Gianni can open the door with the nose.
   ‘Gianni can open the door with his nose.’

b. Gianni può essere malato.
   Gianni can be ill.
   Gianni might be ill.

Notice the oddity of the English examples too. And in Greek, even with higher past, only the morphological non-past forms in the complement of ABLE are available:

\[(39) \] I Ariadne boroue na odigise/*odigise.
   the Ariadne could.3sg that.SUBJ drive.PERF.PAST.3sg/drive.IMPERF.PAST.3sg.

\[(40) \] *Ta paidia borousan na odigosan/odigiousan (xthes).
the children could.3spl subj drive.PERF.PAST.3pl/drive.IMPERF.PAST.3pl now.

We must conclude, therefore, that the ability modal is incompatible with lower past, which means that the embedded clause cannot refer to a time prior to the ability time (unlike with epistemic modals). The reason for this follows from the relation between ability and action: ability is a precondition for action, action therefore cannot precede ability temporally. The ability to do the action coincides with, and is sustained through the action in the worlds where the action is carried out (for Italian and French, see Mari, 2010,2013,2015,2017). This again follows from the nature of ability, which is is a necessary means (Giannakidou and Staraki 2013) to carry out the action, it can therefore not precede or follow the action.

The only tense that can be used is the nonpast, as we said; but at the same time, nonpast cannot forward shifting the ability. In other words, it does not behave like the semantic NONPAST that we are by now familiar with. What is it then, semantically?

We will assume that ABLE embeds semantically a zero tense. Zero tense characterizes a number of Greek verbs that seem to have raising-like behavior (Grano 2015, based on earlier discussion by Spyropoulos 2008). The ability modal is certainly one of these, and it does exhibit distinctive syntactic behavior in that it does not obviate, i.e. it appears to be obligatory control, a property that characterizes also English ABLE:

(41) *I Ariadne bori na tragoudisi i Maria.
    the Ariadne able that.SUBJ sing the Mary.
    ‘*Ariadne can for Mary to sing.’

Notice the contrast with thelo ‘want’:

(42) I Ariadne theli na tragoudisi i Maria.
    the Ariadne want.3sg that.SUBJ sing the Mary
    ‘Ariadne wants for Mary to sing.’

Grano proposed zero tense for similar verbs such as tolmo ‘dare’, and aspectual ones like those meaning START and FINISH:

(43) *I Ariadne tolmise na antimilisi i Maria.
    the Ariadne dared.3sg SUBJ talk-balk.3sg the Mary.
    ‘*Ariadne dared for Mary to talk back.’

(44) *I Ariadne arxise na antimilisi i Maria.
    the Ariadne started.3sg that.SUBJ talk-balk.3sg the Mary.
‘*Ariadne started for Mary to talk back.’

When you dare do something, the daring and the doing coincide: you cannot first dare and then do. The same with START. With this class of verbs then, the embedded nonpast must logically coincide with the actions, since it is a means for the action. The property of obligatory control then correlates with this form of co-incidence tense which we understand zero tense to be. A zero tense is truly anaphoric, i.e., it identifies with the value of the tense of ABLE, DARE or START.

We are ready now to give the truth condition. Given a set $\text{Ideal}_R$, the utterance $t_u$, $T$ the set of times and $i$ the main clause subject:

$$[\text{ABLE (zero-T}_p)]^{K,i,R}$$

is defined only if $K(i)$ is nonveridical and is partitioned into $\text{Ideal}_R$ and $\neg\text{Ideal}_R$ worlds. If defined,

$$[\text{ABLE (zero-T}_p)]^{K,i,R} = 1 \text{ iff } \forall w' \in \text{Ideal}_R: \exists t \in Tp(w', t)$$

As we see, the generic version, in accordance with our observations and the literature on genericity has no temporal information whatsoever. A zero tense is a kind of anaphor, taking the value of the higher tense, but unlike NONPAST, zero tense doesn’t move the time forward.

We therefore have a difference between temporal and atemporal (generic) ABLE. Aspect brings about the two versions, but semantically it plays no role other than distinguishing a generic from an episodic version of ability. With the above analysis as the base, we move on now to deal with the cases where the acting on $p$ is entailed. The property of obligatory control, as we noted, is used a diagnostics for zero tense.

### 6.3 The actuality entailment: previous accounts

Bhatt (1999) is the first to discuss actuality entailments and he immediately notes that they arise when the modal is in the perfective. We have given examples in Greek, French and Italian- here is an original one from Hindi from Bhatt:

$$\text{(47) a. Yusuf havaii-jahaaz uraa sak-taa hai/thaa (lekin vo Yusuf air-ship fly can.IMPF be.PRES/be.PAST (but he havaii-jahaaz nahii uraa-taa hai/thaaha). air-ship neg fly-IMPF be.PRES/be.PAST).}$$

‘Yusuf was able to fly airplanes (but he doesn’t/didn’t fly airplanes).’
‘Yusuf could fly the airplane (#but he didn’t fly the airplane).’

Bhatt’s observation has been that the perfective aspect triggers actualization, and is replicated across a variety of languages that show the perfective vs. imperfective contrast (recall for French, Hacquard 2006; Mari and Martin 2007, Homer 2010; for Italian, Hacquard (2006); Mari (2015a); for Greek, Giannakidou and Staraki (2013), a.o). In addition, remember that the perfective under future does not license actuality, as we showed earlier:

(48) I Ariadne tha kataferi/boresi na
The Ariadne will manage.PERF.3sg/can.PERF.3sg that.SUBJ ftiaksi to aftokinito.
fix.perf.3sg the car.
‘Ariadne will manage/will be able to fix the car.’

Despite the presence of PERF, embedding under FUT doesn’t give actuality, as we noted—and this fact alone challenges the assumption that actuality is due to perfectivity alone.

But let us accept, for the sake of the present discussion, the role of perfectivity in Bhatt’s account, and subsequent accounts in the same spirit. In the actualization reading, ability modals are argued to be identical to implicatives:

(49) Jean a pu prendre le train, #mais il ne l’a pas pris.
John has can.PAST/PART take the train, #but he not that-has taken.
‘John was able to/managed to move the table, #but he did not do it.’

(50) Gianni ha potuto prendere il treno, #ma non lo ha preso.
Gianni has can take the train, #but not that has taken.
‘Gianni was able to/managed to take the train, #but he did not take it.’

The imparfait cancels the actuality entailment in French (a contrario, see Giannakidou and Staraki 2013; Davis et al. 2009).  

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5 The literature on actuality entailments has been rapidly expanding and it would be impossible to render justice here to the variety of works across languages; see also for Spanish Borgonovo and Cummins (2007); for Blackfoot, see Davis et al. (2010) and Louie (2014). We do not discuss purely syntactic approaches such as Demirdache and Uribe-Etxebarria (2008). For an overview, see Hacquard (2014).
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(51) John pouvait prendre le train, mais il ne l’a pas pris.  
John can.IMPF to take the train, but he not that-has taken.  
‘John could have taken the train, but he did not take it.’

(52) Gianni poteva prendere il treno, #ma non lo ha preso.  
John can.IMPF to take the train, #but not that has taken.  
‘John was able to/managed to take the train, #but he did not take it.’

Bhatt (*ibid.*) proposes that the modal is ambiguous and that in addition to a non-implicative *can*$_1$, there is an implicative *can*$_2$ that behaves just like the implicative *manage to*. Bhatt also argues that the imperfective conveys generic information, which prevents the actuality entailment from arising.

Mari and Martin (2007) observe that imperfectivity *cannot* cancel the implication with implicative verbs, and can be seen in the examples below which are replicated for Greek too; Mari and Martin argue that there is no such thing as an implicative modal.

(53) John arrivait à prendre le train, #mais il ne l’a pas pris.  
John arrive.IMPF to take the train, #but he not that-has taken.  
‘John managed to take the train, #but he did not take it.’

(54) Gianni riusciva a prendere il treno, #ma non lo ha preso.  
John arrive.IMPF to take the train, #but not that has taken.  
‘John managed to take the train, #but he did not take it.’

(55) O Janis kataferne na perni to treno, #ala dhen to eperne.  
that-has taken.  
‘John managed to take the train, #but he did not take it.’

(56) O Janis boruse na perni to treno, ala dhen to eperne.  
that-has taken.  
‘John could take the train, but he did not take it.’

For now, we will describe the previous accounts in order to illustrate the current extend of available analyses. Since Bhatt (*ibid.*), theoreticians have built on the assumption that the modal is non-implicative, nonveridical, and the actualization is the effect of aspect or causality. The debate has been very active since Bhatt (*ibid.*) and, most prominently, Hacquard (2006, 2009, 2010). Given the mismatch between implicative verbs – which remain implicative with the imperfective – and modals – which are only implicative in the perfective – two different accounts seem to be needed, and this is what we do in section 5.
6.3. THE ACTUALITY ENTAILMENT: PREVIOUS ACCOUNTS

6.3.1 Identification of events across worlds

Hacquard (2006, 2009) observed that the actuality entailment does not arise when the modal has an epistemic interpretation.

(57) Jean a pu prendre le train, comme il a pu ne pas le prendre.
John has can.PAST.PART to take the train, as he has can.PAST.PART not to take.

‘John might have taken the train, and he might not have taken it.’

To the best of our knowledge, Hacquard (2006, 2009) remains the only work that provides an explanation for the implicative-epistemic ambiguity of the modal in the perfective in French. She proposes that modal bases are parametric to events, and the interpretations of modals depend on them being anchored to different event types. Hacquard proposes a structural account for the ambiguity, such that the epistemic modal scopes above tense and aspect (consistent with what is known in the literature), and the goal-oriented modal is interpreted below temporal and aspectual operators—a position that we also endorse and which is consistent with the empirical evidence. Because we are not trying to explain the ambiguity of the modal but only actuality entailments, we focus on the theory that Hacquard offers to derive this entailment.

Hacquard seeks to maintain a non-implicative reading of the modal. Let us consider (49), repeated here in (58):

(58) Jean a pu prendre le train, #mais il ne l’a pas pris.
John has can.PAST.PART to take the train, #but he not that-has taken.

‘John managed to take the train, #but he did not take it.’

Modals triggering the actuality entailment are modifiers of event descriptions. The modalized event description denotes a set of events such that there is at least one world compatible with the circumstances in the actual world such that John takes the train in this world.

(59) \[ \text{[[} Mod \text{ can } [GV \text{ John take the train}]]]_{w,B,e,c} = \text{[[} can \text{ }]_{w,B,e,c} (\lambda w' [John take the train]_{w',B,e,c}) = \lambda e. \exists w' \text{ compatible with the circumstances in } w \text{ such that take-the-train}(e, J, w') \]

The ability modal, as we see is simply an existential, which is a major difference with our approach (and the motivating literature we referenced in our earlier discussion). However, we will not focus on that here. Under the scope of aspect, the
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modal receives a ‘root’ (the term is used by Hacquard, *ibid.* - we will not adopt it here cf. *infra*) interpretation from being anchored to a wordily event that is introduced by aspect. The world that is introduced by aspect is the actual world. The time of predication of the temporal property is then restricted as past, and the following interpretation is obtained: ‘There is an event in the actual world that is located in a past interval, and there is a world that is compatible with the circumstances in the actual world in which the event is an event of John taking the train.’ To obtain the actuality entailment, the event located in the actual world at a past time must bear the same description as the ‘possible’ event. To this end, Hacquard proposes the following principle.

(60) Preservation of Event Descriptions Across Worlds: for all worlds $w_1, w_2$, if $e$ occurs in $w_1$ and $w_2$ and $e$ is a $P$-event in $w_1$, then ceteris paribus, $e$ is a $P$-event in $w_2$

Un-noted in the literature is the fact that Hacquard’s account functions properly only in the case in which the modal base contains only $P$-event worlds. This is certainly an unsuitable solution since an existential modal claim is compatible with all worlds being $P$-event worlds, but also with some of the worlds being $\neg P$-event worlds. The latter possibility, however, is blocked under Hacquard’s view. We explain why.

Given the compatibility of existential modals with there being $\neg P$-event worlds in the modal space, it would have to be possible to extend the truth conditions in the following way.

(61) $[Jean \, a \, pu \, prendre \, le \, train]^{w,B,c,\leq} = 1$ iff $\exists e [e \in w \land \tau(e) \subseteq t \land t \prec t_u \land \exists w' \text{ compatible with the circumstances in } w \text{ such that} \ \text{takes-the-train}(e,J,w') \land \exists w'' \text{ compatible with the circumstances in } w \text{ such that} \ \neg \text{takes-the-train}(e,J,w'')$]

As we said, the modalized event description denotes a set of events such that there is at least one world compatible with the circumstances in the actual world, such that John takes the train in this world. There might be other worlds in the modal base in which John does not take the train. According to the principle (60), given (61), the actual world can turn to be one in which the event is a $\neg P$-event. For this reason, it is not possible, under Hacquard’s account, to extend the truth conditions as in (61).

Hacquard can still advance the counter-argument that what we have in bold in (61) is not part of the truth conditional content, but rather, is an implicature that can be cancelled, just as it happens with the *some-all* pair: ‘Some of the students got an A, in fact, all of them did’.
Nonetheless, if the part in bold in (61) is an implicature, it is an implicature that must be cancelled under Hacquard’s view to obtain the entailment. If there are accessible \( \neg P \)-event worlds, the entailment cannot go through. Again, given the preservation of event descriptions across worlds, if some of the accessible worlds are \( \neg P \)-event worlds, the actual world can be identified with either a \( P \)-event world or a \( \neg P \)-event world.

Interpreting the above with a sympathetic eye, we can still concede that the principle of event identification goes through before the calculation of the implicature: the actual world is identified as being a \( P \)-event world in virtue of (60) and then the implicature (that there are \( \neg P \)-event worlds in the modal base) is calculated. This would be the only way to save the account, but there are several questionable assumptions that be must endorsed for it to work. Moreover, even admitting that there is such a principle of preservation of events, we would have to define a precise algorithm allowing the computation of this (pragmatic?) principle and of the implicature of existential modal quantification that the modal base contains \( \neg P \)-event worlds. It is unclear to us that this difficult enterprise would provide insights worth the effort.

6.3.2 Action dependent abilities

Mari and Martin (2007) build on the clash between the stativity of the modal and the perfective aspect. They propose that the perfective introduces a ‘boundedness condition,’ and they newly distinguish two cases: the ‘bare case,’ where no adverbs are used (58) and the cases in which temporal adverbs are used, as in (62).

\[
\text{(62) } \#\text{Le robot a pu repasser les chemises à un stade bien précis de son développement, mais cette fonction n’a jamais été utilisée.}
\]

‘The robot could iron skirts at a precise stage of its development, but this function has never been used.’

They propose that the boundedness condition of the perfective aspect can be satisfied in two different ways. When the adverbs are used, they provide the temporal boundaries within which the possibility holds. In this case, there is no actuality entailment. When there are no adverbs, however, the boundaries of the action itself satisfy the boundedness condition of the perfective. In this case, the action ontologically precedes the attribution of the ability, and thus the actuality entailment arises. Let us explain while walking through the definition of action-
dependent abilities (ADA) that Mari and Martin (ibid.) introduced to explain the entailment.

(63) Action Dependent Abilities (ADA)
   (i) ADAs require an action to exist - actually, an ADA ontologically depends on the corresponding action.
   (ii) A unique and non-repeatable performance suffices to imply the corresponding ADA.
   (iii) ADAs have the same temporal boundaries as the action of which they depend and are thus bounded.

(i) has the purpose of explaining the actuality entailment: the action has to ontologically exist in order to attribute the action-dependent ability to the agent. However, the actuality arises even when the existence of the action is not established, as in questions, in which the speaker is not asking whether John had the possibility of taking the train but whether he actually took it. As ‘No’ is a possible answer to this question, we see that the action need not ‘exist’ to obtain the entailment.

(64) Il devait partir. Est-ce qu’ il a pu prendre le train?
He must.IMPF to leave. he has can.PAST.PART take the train?
‘He had to leave. Did he manage to take the train?’

Claim (ii) states that performing an action implies that the performer of the action had the ability to perform it. So far so good. However, why do we choose to utter an abilitative statement in some cases but not in others? Consider the following scenario. I see a dog running. Then, I utter (65):

(65) Ce chien a pu courir.
This dog has can.PAST.PART run.
‘This dog managed to run.’
Since the ability to run is implied by the running itself, I can feel entitled to utter an abilitative statement. In the absence of any further information, the hearer would mostly likely respond:

(66) Wait a minute: there were some impediments?

In other words, the performance of an action does not always seem to justify the attribution of an ability to act, post facto. In a context in which the speaker knows p but chooses to utter the weaker ◊p, the Gricean maxim is violated. The question
then arises of what renders such a weaker statement felicitous. The constraints on
the context of use of implicative modals must therefore be spelled out.

Mari and Martin (ibid.) importantly propose (iii), namely that ADA has the
same temporal boundaries as the action. They explain this temporal coincidence
by the fact that the ability ontologically depends on the action. However, as we
have seen the action need not to exist, in order to derive the entailment. Other
proposals explaining this coincidence have been advanced. We focus on the cases
where the entailment arises, and return later to the cases in which temporal adverbs
are used ((62)).

6.3.3 Actualistic present perfect

Homer (2010) shows that the perfective on a stative leads to actuality entailment
beyond modal verbs. (67) entails that the house has been sold.

(67) La maison a coûté 200000 euros.
The house has cost.PAST.PART 200000 euros.
‘The house has costed 200000 euros’.

Homer’s explanation resorts to an actualistic operator ACT. The schematic LF
proposed by Homer for modal sentences giving rise to the AE is in (69).

(68) Jean a pu prendre le train.
John has can.PAST.PART take the train.
‘John managed to take the train’.

(69) [PRES [PERF [PFV [Q ACT [pouvoir [Jean prendre le train]]]]]]

The analysis for (68) is in (70).

(70) [Jean a pu prendre le train]^{c.s}(c_w) = 1 iff there is a past interval t s.t., there
is an eventuality e of s(Q) in t in c_w s.t. no proper part of e is an eventu-
ality of s(Q) and e is simultaneous with a state in c_w of John taking the
train being possible.

Homer codes in the semantics of ACT the simultaneity between the state of John
taking the train being possible and of the event e, which is an event, presumably,
in this case, of John taking the train.

Piñón (2011) observes that (70) does not entail the existence of an eventuality
e in which John takes the train though. Homer explains (Homer, ibid., p.11) that
a pragmatically determined event is entailed. As a consequence, one can legiti-
mately wonder, with Piñón (ibid.), how an actuality entailment is ensured, given
that in any realistic context there are a number of available values for Q.
In spite of the several insights that these accounts have provided, the role of PAST is systematically underappreciated, and there seems to be an over-emphasis in event semantics. As can be recalled, under future, perfective aspect and events cannot license the actualization reading of ability. And aspect plays no role with implicative, as we mentioned. In our discussion next, we offer our own analysis which capitalizes precisely on the PAST.

### 6.4 Our account: Actualizing ABLE is scoping below PAST

#### 6.4.1 ABLE under PAST

The key to understand the actuality entailment lies in the following: (a) the relative scope of PAST, i.e., it is a necessary condition that PAST scopes high; (b) the presence of zero tense; and (c) on the semantic-pragmatic side, on the modal makeup of the inner domain (the quantificational domain) of the ability modal, where Ideal_R are parametrized to a volitional agent i (see Mari, 2016). Recall the truth condition:

Given a set Ideal_R, the utterance time t_u, and i the main clause subject:

$$\begin{align*}
[\text{ABLE (zero-Tp)}]_{K,i,R,t}^{K,i,R,t} & \text{ is defined only if } K(i) \text{ is nonveridical and is partitioned into Ideal}_R \text{ and } \neg\text{Ideal}_R \text{ worlds. If defined, } \\
[\text{ABLE (zero-Tp)}]_{K,i,R} & = 1 \text{ iff } \forall w' \in \text{Ideal}_R: \text{ there exists a time } t \text{ such that } p(w', t)
\end{align*}$$

Recall that the zero tense does not function prospectively but it identifies with t, the time of evaluation for ABLE. The ability to do the action coincides with the action in the worlds where the action is carried out. This follows from the nature of ability, as we noted, which is a necessary means to carry out the action and is sustained as the action is carried about, not prior to it.

Crucially, the LF syntax of actualized ability has PAST above ABLE. This means, that the t variable will be set to a time prior to now. There is no need for a special operator PERF, as the morphological form perfective nonpast is now a zero tense. A zero tense is a kind of anaphor, taking the value of the higher tense, in this case past, but unlike NONPAST, zero tense doesn’t move the time forward. Unlike in previous approaches, in our theory PERF plays no role and is therefore unnecessary (see Mari, 2017 for extended discussion and analysis). Notice that English also shows the actuality effect despite the fact that it doesn’t employ aspect.

(72) a. $$\text{ABLE} = \lambda p^{\rightarrow (i \rightarrow t)} \lambda w' \lambda t \forall w' [w' \in \text{Ideal}_R (w) (t) \land p(w')(t)]$$

$$\begin{align*}
[\text{ABLE (zero-Tp)}]_{K,i,R,t}^{K,i,R,t} & \text{ is defined only if } K(i) \text{ is nonveridical and is partitioned into Ideal}_R \text{ and } \neg\text{Ideal}_R \text{ worlds. If defined, } \\
[\text{ABLE (zero-Tp)}]_{K,i,R} & = 1 \text{ iff } \forall w' \in \text{Ideal}_R: \text{ there exists a time } t \text{ such that } p(w', t)
\end{align*}$$
6.4. **OUR ACCOUNT: ACTUALIZING ABLE IS SCOPING BELOW PAST**

b. \( \text{PAST} = \lambda p^{* \to (t \to t' \to t)} \lambda w \lambda t \lambda t' \exists t' \prec t \land p(w)(t') \)

c. \( \text{VP} = \lambda w \lambda t \lambda t' \lambda w' \exists t' \prec t \land \lambda w \lambda t. p(w)(t') \)

(73) a. \( \text{ABLE (VP)} = \lambda w \lambda t. \forall w' [w' \in \text{Ideal}_R(w)(t) \land \lambda w \lambda t. p(w)(t') \]

c. \( \text{t is fixed as } t_u \text{ and } w \text{ is the world of evaluation} \)

Truth conditions:
\[
\exists t'[t' \prec t_u \land \forall w'[w' \in \text{Ideal}_R(w)(t') \land p(w')(t')]
\]

*Paraphrase:* there is a past time at which there is a world accessible from the world of evaluation, at which \( p \) is true (e.g. John takes the train).

(74)

Recall that we have theorized the inner domain of abilitative modal as anchored to a volitional agent \( i \). We now add with Elgesem (1997), reinterpreting Belnap (1992), that the volitional agent projects a choice into the modal base (see Figure 6.1): in this space, for each point in time the options are closed past and present-wise, whereas they are open future-wise. In Belnap choices are conceived as sets of points in a branching-like structure, where, at each point, the future is open (is a set of choice points) and the present and past are closed (choices have been made).

How does the entailment arise? Given the modal-temporal setting underlying the choice space of the agents, the answer is straightforward: in the past the choice space is closed. Moreover, given zero tense, there is not forward-shifting of the
prejacent with respect to the time at which the modal base is projected. In other
terms, given the point of evaluation at which the modal base (the choice space)
is projected (which is past) and at which $p$ becomes true (which is the same time
at which the choice space is projected), the actuality entailment arises because, at
that time, the choice space is closed.

![Figure 6.1: Choice space à la Belnap.](image)

Had a prospective aspect intervened between the modal and the VP, the entail-
ment would have not arisen, as with the imperfect.

### 6.4.2 No entailments when the modal is not agentive and abilitative

Note that our account relies on the specific type of modal base that abilitative
modal triggers— given the anchoring to the volitional agent $i$, the scoping of
ABLE below PAST, and the presence of zero tense: the modal base is a choice
space which has the specificity of being closed past and present-wise. It follows
that if a modal cannot embed under PAST, it won’t be able to get the actualization
entailment.

That this prediction is on the right track is evidenced by the fact that epistemic
modals cannot occur in the past. Below, the form `boruse` "can.3sg" with past is
simply ungrammatical:

(75) Ta pedia *boruse/bori na odhijisoun.
    the children could.3sg/can.3sg that.SUBJ drive.3pl.
    ‘The children can drive.’

Recall that the the invariant ‘bori’ is the epistemic CAN. We see that it cannot
occur in the past. Past can scope below it, of course:

(76) Ta pedia bori na odhigousan.
    the children can.3sg that.SUBJ drove.3pl.
    ‘The children could have driven.’
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This scoping is expected with epistemic modals since, as we said, they can combine will three tenses below. But in Greek, the epistemic modal *boro* itself simply does not combine with past.

Importantly, the personal *boro* can have a use as a permissive modal. We can call it deontic use. Deontic *boro* indeed combines with past, and actualization is possible. Recall our initial example:

(77) Ta pedia borun na pane sto spiti mona tus.
    The children can.3pl that.SUBJ go.impf.3pl to-the home alone them.
    Ability: ‘The children are able to go home on their own.’
    Deontic: ‘The children are allowed to go home by themselves.’

(78) Ta pedia borusan na pane sto spiti mona tus.
    The children could.3pl that.SUBJ go.IMPF.3pl to-the home alone them.
    Ability: ‘The children were able to go home on their own, and they did.’
    Deontic: ‘The children could (were allowed to) go home by themselves, and they did.’

As we can see, deontic and ability *boro* behave similarly. However, with the permissive reading, actualization is not necessary. Unlike with ability, it can be cancelled:

(79) Ta pedia borusan na pane sto spiti mona tus,
    The children could.3pl that.SUBJ go.IMPF.3pl to-the home alone them,
    ala dhen pigan.
    but not went.3pl.
    Deontic: ‘The children could (were allowed to) go home by themselves, but they didn’t.’

The difference, we argue, brings about the significance of the abilitative modal base. Or, it could simply be due to the fact that permission is weaker. If we consider deontic MUST, actualization is stronger, but still cancellable:

(80) Ta pedia eprepe na pane sto spiti
    The children MUST.PAST.3pl that.SUBJ go.IMPF.3pl to-the home
    mona tus, ala dhen pigan.
    alone them, but not went.3pl.
    Deontic: ‘The children had to go home by themselves, but they didn’t.’

(81) The children had to go home and they did.

Hence, the fact that the ability modal base depends on an volitional agent who has a choice (choice space) is key to explaining the effect of the PAST with ability, and why it is either impossible or, at best, weak, with other modals.
Consider now this example, whereby the set of alternatives is not projected from \( i \) who triggers the choice space, but it is projected by the information provided by the adverb (between 3 and 5 pm; see Mari and Martin, 2007 for the first observation of this phenomenon). Here the space does not have the same structure as the choice space, and this is crucial to the derivation of the entailment.

(82) Jean a pu entrer entre 3 heures et 5 heures, mais il n’est pas entré.
‘John had the opportunity to enter between 3 and 5, but he did not enter.’

This is also observed for deontic modals, when they are combined with an overt temporal adverb.

(83) Il a dû lire ce livre pendant tout le mois de septembre et il ne l’a même pas touché.
‘He had to read this book during the whole month of September and he did not even touch it.’

Actuality entailments are specific to abilitative modals, with intentionality (and thus choices).

Likewise, the entailment does not arise with past oriented deontic modality. Here again, there is no agentivity, no choices, and nothing, in the structure of the possibilities makes it possible for the entailment to arise (see also Castroviejo and Oltra-Massuet, 2016).

(84) Pour entrer tu dois avoir acheté les billets.
‘You must have bought the tickets to get in.’

(85) Tu dois être un garçon pour pouvoir utiliser ces toilettes.
‘You must be a male to use this restroom.’

Given this derivation of the entailment, our proposal faces the question, by Gricean reasoning, of why the speaker is choosing to use the modal, in comparison with the bare assertion. Our proposal is that the modal bears its nonveridicality presupposition, as in any other of its uses, excluding the alethic.
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6.4.3 The nonveridicality of the modal with the entailment

How is the nonveridical presupposition of ABLE consistent with actualization?

Recall our distinction between the inner and the outer domain of the modal. In our theory Ideal is parametrized to \( i \) and it is represented as a choice space, with its own specific structure. However, the outer domain, does not have this structure. The abilitative modal base is partitioned between worlds in which \( p \) is carried out and those in which it is not. To put it otherwise, an abilitative modal base is such that certain preconditions must be met in order for the action to be carried out (which include the agent volition and the normalcy of the circumstances, at the very least) and by partitioning the modal base we encode the idea that the action can fail. Note that, when this presupposition that the action can fail is not satisfied, the modal is not felicitous (see Mari, 2017c for extended discussion).

Consider the following scenario. As is well-known, Usain Bolt is the fastest runner in the world, who can run 100 meters in 9.58 seconds.

(86) Usain Bolt a pu battre le record du monde des 100 mètres grâce à son entraînement.

‘Usain bolt was able to break the 100-meter world record thanks to his training.’

Breaking the world record is never granted, and the possibility that even Usain Bolt does not break it is open at a time prior to the race. The sentence is felicitous. Sentence (88), instead, is infelicitous in Context 1 and felicitous in Context 2 described in (87).

(87) a. Context 1 : Usain Bolt is in his best shape and at the climax of his career.
   b. Context 2: Usain Bolt is recovering from a long cold and is far from his highest standards.

(88) (#)Usain Bolt a pu courir 100 mètres en 15 secondes aujourd’hui.

‘Usain Bolt was able to run 100 meters in 15 seconds today.’

Consider context (87-a), in which sentence (88) is infelicitous. Since Usain Bolt can run 100 meters in 9.58 seconds, it is taken for granted that, in his best shape, he can run 100 meters in fifteen seconds, and the possibility that he does not run 100 meters in fifteen seconds was not open.
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Sentence (88) is instead felicitous in context 2 (87-b), where Usain Bolt is recovering from a very bad cold. In this context, running 100 meters in fifteen seconds is not granted; the possibility of \( \neg p \) was open before \( p \) becomes true.

The un-modalized sentence (89) is felicitous in both contexts (87-a) and (87-b), instead. It does not require that \( \neg p \) was an open possibility.

(89) Usain Bolt a couru 100 m\?tres en 15 secondes.

‘Usain Bolt has run 100 meters in 15 seconds.’

Given partitioning of the modal base between worlds in which the action succeeds and worlds in which it does not, we can derive the inferences of difficulty, which, as we mentioned is a cancelable one. In other words, it is the nonveridicality of the modal base that lies at the foundation of the difficulty premise of ABLE.

To sum up, we have argued that the ability modal has a nonveridical modal base and will therefore select the subjunctive if the language allows it. The actualization entailment is derived by simply acknowledging that ABLE scopes under PAST. There was no need to appeal to perfective aspect. The phenomenon, therefore, is not aspectual but rather modal/temporal.

Let us move on now to examine the class of implicative verbs.

6.5 Implicatives verbs and the choice of infinitive and subjunctive

6.5.1 The puzzle from the perspective of Greek and Italian

Karttunen (1971) identifies implicative verbs, illustrated by manage, as verbs giving rise to an implication as follows (examples from Francez and Baglini 2016):

(90) Solomon managed to build the temple implies that Solomon built the temple.

(91) Solomon didn’t manage to build the temple implies that Solomon didn’t build the temple.

It is often assumed that the verb manage contributes no truth-conditional content beyond that of the prejacent. Karttunen (1971:350) says that: "All that takes place when John manages to do something is that he does it. While intending to do is one thing and doing another, managing to do is inseparable in space and time
from doing; it is the same event." In other words, this original analysis renders manage \( p \) equivalent to \( p \), therefore, from our perspective, veridical. Why, then, do implicative verbs select the subjunctive and the infinitive?

\[(92) \quad \text{I } \text{Ariadne } \text{katafere/borese } \text{na/\#oti}
\text{The Ariadne managed.3sg/could.PERF.3sg that.SUBJ/\#IND}
\text{ftiaksi } \text{to } \text{aftokinito.}
\text{fix.PERF.NONPAST.3sg the car}
\text{‘Ariadne managed to/was able to fix the car.’} \]

\[(93) \quad \text{Mario } \text{è riuscito a riparare la macchina.}
\text{Mario managed to repair the car.}
\text{‘Mario managed to repair the car.’} \]

The occurrence of the subjunctive, infinitive, and zero tense is quite unexpected—if semantically manage \( p \) is identical to \( p \), as hypothesized by Karttunen. From the perspective of Greek and Italian (and almost all of Romance, actually) the choice of a non-finite complement and of subjunctive is unexpected if manage operators do not contribute anything to the assertion other than \( p \) itself. Most of the literature focusses on English where this problem is literally invisible. But for us, this discrepancy becomes the springboard to argue that manage \( p \), in fact, is not veridical, and does not entail \( p \).

Karttunen and Karttunen and Peters further observe that manage has presuppositional content. The sentences above presuppose (or ‘conventionally implicate’) that Ariadne and Mario tried to fix the car, and that it took some sustained effort to do it. This has been referred to sometimes in the literature as the ‘effort’ presupposition. Now, it has also been noted that the effort component can be rather weak sometimes. For instance, Coleman 1975 gives examples such as the following:

\[(94) \quad \text{a. Harry managed to insult Ursula without even trying.}
\text{b. My neighbors managed to schedule their one wild party of the year}
\text{on the night before my German exam.} \]

Here we see that the effort can even be explicitly denied without contradiction. Coleman therefore concludes that the manage presupposition varies between one of effort, difficulty, and/or sheer coincidence, depending on the context of utterance. We will argue, however, that even in the case of mere co-incidence, the use of a manage word seems to presuppose that some effort was produced, as can be seen by negating the above sentences:

\[(95) \quad \text{a. Harry didn’t manage to insult Ursula (#without even trying).}
\text{b. My neighbors didn’t manage to schedule their one wild party of the year}
\text{on the night before my German exam.} \]
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Effort seems to be undeniably present with MANAGE. In the a example, for instance, the coincidence reading is lost, and the effort presupposition is sustained. Likewise in the b example. We think it reasonable, therefore, to posit a TRY presupposition for MANAGE:

(96) TRY presupposition of MANAGE
MANAGE \(i \, p\) presupposes that \(i\) tried \(p\).

This presupposition is key, we will argue, to understand why the subjunctive mood is chosen, and why verbs MANAGE \(p\) is not simply the assertion of \(p\). Notice that the verbs meaning TRY also select subjunctive and infinitive:

(97) I Ariadne prospathise/dokimase na/*/oti
The Ariadne tired.3sg/attempted.3sg that.SUBJ/IND
ftiaksi to aftokinito.
fix.PERF.NONPAST.3sg the car.
‘Ariadne tried/attempted to fix the car.’

The choice of subjunctive and zero tense for subjunctive selecting verbs meaning TRY and MANGE sheds new light on the implicative content of this meaning, and allows us to address it knowing that the equivalent between PAST (\(p\)) and MANAGE \(p\) is simply not straightforward. Recall again that whether we get implication to \(p\) (\(p\) to be true) depends on whether we have a higher PAST or not. PRES and FUT block the inference:

(98) #John is managing /is being able to fix the car.

(99) I Ariadne tha kataferi/boresi na
The Ariadne will manage.PERF.3sg/can.PERF.3sg that.SUBJ
ftiaksi to aftokinito.
fix.PERF.3sg the car.
‘Ariadne will manage/will be able to fix the car.’

None of the existing accounts explains the effect of tense, specifically why the intended implication to \(p\) doesn’t arise with PRES or FUT. At the same time, even with the past, the inference to \(p\) seems to be variable when it comes to other members of the implicative class:

(100) I Ariadne tolmise na antimilisi.
Ariadne dared.3sg subjtalk.back.NONPAST.3sg
‘Ariadne dared to talk back.’
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(101) I daskala epetrepse tin Ariadne na fiji noritera, ala telika the teacher allowed.3sg the Ariadne subj leave.3sg earlier, but finally de xriastike. not needed.3sg.
The teacher allowed Ariadne to leave early but in the end it was not necessary.

As we see, there is variability: the allow sentence does not imply p. This again casts doubt on the claim that implicatives, as a class, are identical to bare p in implying p. The fact that they do not embed past further argues against the equivalence:

(102) *I Ariadne katafere na/ eftiakse to aftokinito. The Ariadne managed.3sg that.SUBJ fix.PAST.3sg the car.
‘Ariadne managed to fix the car.’

Again, recall that na clauses are not generally incompatible with past tense. But they exclude it with verbs meaning ABLE and MANAGE (as well as WANT, as we saw in chapter 5). The exclusion of past is at odds with the idea that the MANAGE sentence is simply equivalent to the unembedded past sentence.

Crucially, implicatives do not convey a propositional attitude, they are not propositional attitude verbs. So, wherever inferencing is done, it is done indeed by the speaker who choses to use MANAGE instead of the unembedded sentence, and in doing so he chooses to do something substantially more than merely asserting p. The similarity between MANAGE and TRY is also quite telling.

It appears then, that there are two main issues about MANAGE. The one issue is whether the MANAGE sentence asserts p or not. If it does, it is veridical and the choice of subjunctive seems puzzling. The second issue is the presupposition of TRY. TRY is nonveridical, as we shall see, and if MANAGE has a presupposition of TRY, as we are arguing, then it is of mixed veridicality, even if it entails p. Non-veridicality in the presupposition is the prerequisite for the choice of subjunctive, as we are arguing, and will override veridicality (objective or subjective), since the subjunctive is sensitive to what the sentence presupposes, not what it asserts.

6.5.2 Veridicality of aspectual operators: actualization of an event

We will backtrack now to Giannakidou’s (2013) discussion of the problem of the absence of NPIs in progressives. Giannakidou explains this fact by an analysis of the progressive operator as veridical in entailing some actualization of p. We will describe the main idea here in order to appreciate how MANAGE is different form
PROG. Giannakidou further argues that veridical PROG contrasts with nonveridical TRY which doesn’t entail any realization of $p$. If MANAGE presupposes TRY $p$, then the analysis of TRY carries over to the presupposition of manage.

Consider first PROG, a veridical operator. PROG fails to license NPIs or the subjunctive:

(103) *O Janis egrafe elo to proi kanena grama.  
The J. wrote all the morning any letter.  
*John was writing any letter all morning.

(104) O Janis prospathise na grapsi ena grama pu na  
The J. tried that.write a letter that was 
ian leptomeres.  
‘John tried this morning to write a letter that was detailed.’

NPI and the subjunctive are not licensed here because PROG $p$ is a veridical clause, lacking a proper NPI and subjunctive licenser. How is PROG veridical? Giannakidou (2013) relies on Sharvit’s 2003 analysis. As we can see, in that analysis there is an actuality component (clause a) and a modal component (that relies on earlier work by Landman 1992 and others):

(105) For any event $e$, property of events $P$, and world $w$, $e$ belongs to $\text{PROG}(w)(P)$ iff:

a. $e$ is an event in $w$; and

b. for any realistic continuation branch $C$ for $e$ relative to $w$, there is an event $e'$ and a world $w'$ such that $<e',w'>$ is in $C$ and $e'$ belongs to $P(w')$. (Sharvit 2003: 414)

The idea is that in order to evaluate a sentence such as Mary was crossing the street (when a bus hit her), we build a continuation branch based on the evaluation world and the ongoing event given by the VP. We stay in the evaluation world until Mary gets hit by bus, at which point we shift to a maximally similar world in which a bus does not hit her and which is a reasonable option, and continue to trace the progression of the event. Under normal circumstances, the continuation branch will contain an event in which Mary successfully crosses the street, and so the sentence is judged true. In a sentence like Mary was landing on the moon (when the phone rang), on the other hand, we have a non-realistic evaluation branch and therefore the sentence is judged to be false, or true only in a fictional/dream context.

The important thing is clause $a$, that an event is physically realized in the world. This physical realization, Giannakidou argues, suffices to give us veridicality: a rational speaker choses to use PROG [cross the street] when she knows
that there is an actual, not completed but ongoing event \( e \) of crossing the street. So, all worlds compatible with the speaker’s beliefs, knowledge and perceptions, are worlds where the street is physically being crossed, though the event may not be completed. Likewise, in degree based approaches of the progressive (Pinon 2008), progressive events are realized, in the actual world, to a degree higher than zero. This again makes the progressive actual.

It appears, then, that when we consider events, the veridicality of the sentence correlates with actualization, and actualization is physical realization in the actual world of some portion of the event. The progressive is characterized by Giannakidou as an actualization function ACTUAL:

\[
\text{(106) } \begin{array}{l}
\text{ACTUAL is veridical (Giannakidou 2013b: (53))} \\
\text{(i) When an eventuality } P \text{ is actualized, } P \text{ is at least partially physically realized in the actual world.} \\
\text{(ii) Actualization happens with actualization functions (ACTUAL).} \\
\text{(iii) Application of } \text{ACTUAL to } P \text{ entails veridicality: the speaker knows that } P \text{ is at least partly realized.}
\end{array}
\]

ACTUAL refers abstractly to functions like the progressive (PROG), the perfective, and the past tense. In choosing any of these functions, the speaker knows or believes that there is (at least some) physical realization of the event \( P \). This knowledge renders PROG veridical, and explains why the progressive patterns with the perfective past in being a bad context for NPIs, subjunctives, and other polarity items. Lacking a result doesn’t have any implications: an actualized event can be a complete one (perfective) or an incomplete, ongoing one (progressive).

### 6.5.3 No actualization with TRY

Giannakidou also observes that Greek \textit{prospatho} TRY contrasts with the progressive in that it allows NPIs and subjunctive in relative clauses. She also adds that the TRY sentence contains a negative speaker bias (which, however, is cancelable).

\[
\text{(107) } \begin{array}{l}
\text{Janis prospathise to proi na grapsi kanena grama.} \\
\text{The John tried.3sg the morning that.SUBJ write.3sg any letter.} \\
\text{John tried this morning to write a letter.} \\
\text{Speaker bias: but he didn’t manage to write a word.}
\end{array}
\]

\[
\text{(108) } \begin{array}{l}
\text{Janis prospathise na grapsi ena grama pu na itan} \\
\text{The John tried.3sg that.SUBJ write.3sg a letter that SUBJ was leptomeres.} \\
\text{detailed.} \\
\text{‘John tried this morning to write a letter that was detailed enough.’}
\end{array}
\]
Speaker bias: but he didn’t manage to write anything close to the detail he wanted.

These sentences contrast minimally with the progressive ones saw earlier where *kanena* and the subjunctive are blocked. The contrast suggests that TRY, unlike the progressive, must be nonveridical – notice that it takes a subjunctive complement like nonveridical verbs do, and challenges analyses unifying TRY with progressive (Sharvit 2003). The contrast seems to support the competing idea that TRY is an ‘intentional activity’ that can involve both mental and physical action (Kamp 1999-2007, Grano 2011). Notice also that the uses of the NPI and the subjunctive relative clause impose a bias in the context for a non-realization reading. (The bias is an implicature, however, and can be cancelled.)

Now, the existence of the incremental theme has been central to the discussion of TRY. Sharvit (2003), cited in Grano 2011, argues that *try* is different from *want*, in that it entails existence of the theme:

(109) a. John wanted to cut a tomato, but there were no tomatoes to cut.
    b. John tried to cut a tomato, #but there were no tomatoes to cut.

(110) a. a. Mary wanted to push a cart, but there were no carts to push.
    b. Mary tried to push a cart, #but there were no carts to push. (Sharvit 2003: 405)

She then goes on to say: "Intuitively, it seems that try differs from its cousins want, expect, believe, etc. in that it doesn’t simply express an attitude of some individual toward some proposition?, but that it also expresses some activity . . . This required ‘action” is extensional, in the sense that it has to go on in the actual world for the sentence to be judged true.? (Sharvit 2003: 407). Action, however, as Giannakidou points out, renders TRY an actualization operator, akin to the progressive. But then, the non-licensing of NPIs and subjunctive relatives with TRY becomes a problem.

Is TRY really an actualization operator? Grano 2011 suggests that *try* does not necessarily involve physical action and does not always imply the physical existence of the incremental theme. He offers the following cases; notice crucially the contrast with the progressives:

(111) John tried to find a book, but there was no book.

(112) a. John was eating an apple. Entails: Part of the apple was consumed.
    b. John tried to eat an apple. He looked everywhere but there was no apple, so no apple was consumed.

(113) Context: John is severely injured and cannot move his arm:
    a. #John was raising his arm.
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b. John tried to raise his arm. (But he didn’t.)

These examples are problematic for the assumption that TRY involves action like the progressive, and lead Giannakidou and Grano to the conclusion that although we tend to think of TRY as involving physical action, in fact it need not. According to Kamp (Kamp 1999-2007: 1), TRY (as well as FAIL, SUCCED) is a device for intentional activity, and is one of the cases that indicate "conceptual continuity which often exists between things we intend to find or do or make, and the events in the real world that result when we try to realize those plans and intentions." In $i$ TRY $P$, where $P$ is a predicate of events, an agent $i$ has the intention or a plan to set a path for action that will count as $P$, but what Kamp seems to be saying is that there is a conceptual continuum between the plan/intention and the action, a continuum that includes pure intention as well as action. Grano 2011, likewise, proposes that $TRY P$, unlike the progressive, contains a preparatory phase of the event that need not involve physical action $P$, but just mental action (e.g. planning, etc.)

Hence:

(114) Nonveridicality of TRY

TRY($i$, $P$) does not entail ACTUAL($P$); where $P$ is an eventuality description.

This renders TRY operators veridical. The verb try itself and its cognates in Greek and Italian are TRY operators.

As we are going to argue, TRY is going to be a presupposition of implicatives. However, a possible worry arises: the agentivity of TRY is too strong of a notion when it comes to implicatives proper (see Mari, 2010).

(115) He managed to be dumped by his girlfriend without even trying to be dumped.

We propose to introduce a weaker notion of trying, which we define as follows:

(116) Unintentional TRY: $un$-TRY

$un$-TRY ($i$, $p$) is true iff $i$ brings about an action $A$ that can result in $p$ being true.

In prototypical cases, the implicative manage seems to require an intentional TRY. However, since the more underspecified definition in (116) covers a larger number of cases, we will from now use $un$-TRY.

This definition of $un$-TRY points to a series of actions that can lead to $p$ be true, but TRY itself doesn’t directly address $p$, i.e., if you are trying to eat an apple, you maybe at the store right now doing grocery shopping, but you haven’t taken
action that can be characterized as ‘eating an apple’. This is in line, as we now discuss, with recent proposals on implicatives.

6.5.4 MANAGE, un-TRY, and the subjunctive

Putting it all together now, we will propose that MANAGE has the following TRY presupposition:

(117) MANAGE presupposes trying

MANAGE \((i, p)\) is defined only if \(un\text-Try\ p\) is true.

This presupposition alone is sufficient to explain the use of the subjunctive: \(un\text-Try\ (i,p)\) does not entail that \(p\) is actualized. As we have been arguing, the subjunctive is sensitive to the presence of a nonveridical presupposition. The presupposition that the subject agent \(i\) tried \(p\) does not entail that in all trying worlds \(i\) succeeded in bringing about \(p\). In fact, \(i\) might actually not be engaged in the activity described by \(p\) at all, as we just mentioned. Here is another example below:

(118) John managed to fix the car. He called the mechanic and the mechanic did it.

In this case, the managing of fixing the car does not involve John engaging in the fixing of the car at all. John simply initiated a series of events by calling the mechanic, and this event, followed by other events (such that the mechanic coming to see the car, taking it to his workshop, etc.) that led eventually to the fixing of the car. John’s trying and managing to fix the car did not involve the proposition John fixed the car. There is no trying world where John actually fixed, or was engaged in physical activity that can be successfully described as ‘fix the car’.

But calling the mechanic was indeed a crucial enabling factor, a necessary means or a catalyst (Baglini 2010, Giannakidou and Staraki 2013, Baglini and Francez 2015) for the event of fixing the car to come to fruition. It was the act that initiated a number of events that are related causally to bring about the result state of the car being fixed. We can encode this as follows:

(119) MANAGE \((i, p)\) asserts that there is a path, i.e., a sequence of eventualities \(S\) (<init\((p)\), ..., fin\((p)\)> ) such that \(S\) is a necessary means for \(p\).

If this is the assertion of MANAGE, then all it entails is that there is a path, initiated and sustained through the necessary means \(S\), and that the last stage of the path is fin\((p)\). From this perspective, MANAGE \(p\) is nonveridical in its assertion, as well as its presupposition, and this explains why it invariably selects the subjunctive. At no time does the speaker know that John fixed the car himself:
6.6. CONCLUSIONS

(120) Epistemic uncertainty of MANAGE

\[ i \text{ MANAGE } p \] does not entail that the speaker knows that \( i \) did \( p \).

Hence the use of the subjunctive is not a surprise, but rather follows the patterns we have observed with the modal verbs and attitudes. And it appear to be both nonveridical in the presupposition (having a TRY component and epistemic uncertainty, ) and an objectively nonveridical assertion. Crucially, ability can trigger and sustain a causal path (Giannakidou and Staraki 2013), and it is for this reason that ABLE and MANAGE seem similar— although, as we have shown they are identical, not in the least in that ABLE does not have a presupposition of trying.

This analysis, which owes some inspiration from Giannakidou and Staraki’s (2013) analysis of CAN and Baglini’s (2010) analysis of get, is very close in spirit to a recent proposal by Nadathur (2016). Below is Nadathur’s proposal (Nadathur 2016: (24)):

(121) A statement of the form I(X), with implicative I and complement X:

a. presupposes the existence of a causal factor (ancestor or set thereof) A for X, where A is causally necessary for X in the context of utterance;

b. asserts that A was met in the world of evaluation. Consequently, \( \neg I(X) \) asserts that A was not met;

c. If I is a two-way implicative, I(X) also presupposes that A is the only open prerequisite for X in the utterance context (all A-independent causal ancestors are presumed to be resolved in the X-conducive way).

The presupposition of A’s existence, crucially, does not presuppose that A holds, Nadathur asserts. This lexical entry misses the presupposition of TRY, but if we just focus on the assertion, we read that all the so-called implicative verb asserts is the existence of means A which are causally necessary to bring about X. Our view of the assertion and Nadathur’s are therefore quite close. And in both versions, we do not get entailment to \( p \).

6.6 Conclusions

In this chapter we have shown that ability modals, even when giving rise to the actuality entailment, are no exception to our generalization about modality: like epistemic modals, they are nonveridical in the presupposition, and this explains two puzzles. The nonveridicality presupposition accounts for why past abilitative modals giving rise to the entailment are more informative than bare assertion on the one hand, and why implicative verbs can select subjunctive on the other. We
proposed an account of implicatives that radically differs from Kartunnen in deriving multiple nonveridicality inferences for MANAGE. Mood and tense choice were key elements in advancing new arguments for the nonveridical semantics.

As a side-effect of our analysis, the phenomenon of obligatory control with implicatives and ability modals was correlated to the lexical semantics of ability and implicativity: ability and necessary means for an action have to hold concurrently with the action, the morphological nonpast therefore cannot forward-shift, but contributes zero tense. Zero tense is strictly anaphoric and requires a local relation to the ABLE time. This fact, we think, creates a useful frame within which to understand, and not simply stipulate, obligatory control.
Chapter 7

Propositional attitudes of emotion: gradability and nonveridicality

7.1 Introduction: the puzzles of emotional attitudes

In this chapter, we complete our theory of mood by considering the mood patterns observed in the complements of propositional attitudes of emotion. This class includes verbs and adjectives that are used to convey an emotion. A precise treatment of emotion is lacking in the formal semantics literature, and the notion is often reduced to concepts such as evaluation or expressivity. In dealing with emotion attitudes, we will also articulate a precise semantics for emotion as a gradable and nonveridical space. Emotion predicates will come with lexical entries that are akin to the mixed veridicality patterns that we are, by now, familiar with.

Descriptively, emotion attitudes include (at least) three types of attitudes:

(1) Attitudes of emotion
   a. Attitudes known as emotive such as, e.g., the English be happy, regret, be surprised, be angry; these designate various kinds of emotion towards a fact or something that the subject perceives as a fact. Emotives can be positive or negative.
   b. Attitudes that we will label ‘epistemic’ emotives, such as be aware, remember. Such attitudes combine an emotive component with an epistemic component in their meaning.
   c. Attitudes of fear, known also as verba timendi such as, e.g., the English fear, be afraid. These attitudes express the specific emotion of fear. Fear, in contrast to the above, never relates to a fact.

As we just alluded to, emotive predicates are often treated as factive. Verbs of fear, on the other hand, have not been claimed to be factive. All classes express
psychological states of emotion and show variable, i.e. flexible, mood patterns.

Let us start with emotive predicates which are the most frequently discussed. Across European languages, these predicates select both the indicative and the subjunctive. French and Italian, for example select subjunctive, but Greek chooses the indicative complementizer *pu*.

(2) a. Jean regrette que Marie ait lu ce livre.
   John regrets that Mary have.SUBJ.3sg read this book.
   b. Gianni rimpiange che Maria abbia letto questo libro.
   John regrets that Mary have.SUBJ.3sg read this book.
   c. John regrets that Mary has read this book.

(3) O Pavlos lipate pu/*na*/oti eifie i Roxani.
   the Paul regrets that.*IND-pu/SUBJ/*IND-oti left.3sg the Roxani.
   ’Paul is sad that Roxanne left.’

Crucially, the assertive indicative—*oti*—is not possible, as we see. In chapter 4 we claimed that *pu* is the presuppositional indicative because it appears with the emotive class of verbs that have been claimed to have a factive presupposition. As we noted there, *pu* appears also with the epistemic factive *know*, and with memory or perception verbs adding the presupposition that the *pu* clause is a fact. We will revisit these cases later in the chapter. The key observation at this initial stage is that the emotive class is marked with the presuppositional indicative in Greek, and not with the assertive one. From the point of view that *pu* is sensitive to the presupposition, *pu* is indeed like the subjunctive—which is sensitive to the presupposition of an attitude. But unlike subjunctive which needs a nonveridical presupposition, the presuppositional indicative needs a veridical presupposition.¹

Since emotive verbs are thought to be factive (Kiparsky and Kiparsky 1968, Karttunen 1971) the use of subjunctive is unexpected (Giannakidou 1998, Giannakidou 2006, Giannakidou 2016). Their non-emotive cousins meaning *know* strictly select the indicative:

(4) a. Jean sait que Marie a lu ce livre.
   John knows that Mary has read this book.
   b. Gianni sa che Maria ha letto questo libro.
   John knows that Mary has read this book.
   c. John knows that Mary has read this book.

If emotive attitudes are factive, why do they take the subjunctive in Romance

¹Giannakidou (2016) claims that *pu* has expressive content in the sense of Potts (2007), i.e. containing expressive indices. But *pu* can be used also with memory predicates, *know* and perception verbs, and in these cases there is no emotion. Hence, it seems more reasonable to conclude that it is the presuppositional aspect of these predicates that *pu* responds to, not the emotion.
languages? If both know and emotives have a veridical (factive) presupposition, how can we explain the contrast vis-à-vis the subjunctive?

Giannakidou (2016) observes three types of languages:

(5) Flexibility in mood choice with emotive verbs
   a. Languages that require subjunctive (Spanish, Italian, French);
   b. Languages allowing subjunctive and indicative (Portuguese, Catalan, Turkish);
   c. Languages where emotives select indicative (Greek, Hungarian, Romanian, Bulgarian).

Giannakidou’s previous version of the theory (Giannakidou 1994, 1998, 2009, 2016) predicts indicative after emotives (thus the languages in 3; see also Marques 2004, Baunaz 2015). Emotives have also been argued to denote preference (Villalta 2008, a.o.). Unfortunately, none of the approaches offers a satisfactory way to address the variation observed because the treatment is monolithic, i.e. the selecting predicate is either veridical or nonveridical, therefore it has or does not have the required property for the subjunctive.

In the approach we have developed in this book, the variation in the patterns of mood indicates layers in the attitude meaning, specifically between what a selecting verb asserts and what it presupposes. This allowed us to combine in a single lexical entry a veridical with a nonveridical component, i.e., what we called mixed (non)veridicality. Mixed veridicality, we showed, turns out to be massive, and it is the underlying cause of subjunctive choice in most cases.

In our study of various attitudes so far, we found that the subjunctive is sensitive to the presuppositional content of the predicate, and will be triggered by a nonveridical presupposition in the lexical entry of the predicate. Recall:

(6) Licensing condition for the subjunctive mood
    The subjunctive will be licensed in the complement of an attitude ATT iff ATT obeys the Nonveridicality axiom.

(7) Licensing condition for the indicative mood
    The indicative will be licensed in the complement of ATT iff ATT is veridical (objectively or subjectively).

When we say ‘nonveridical’ attitude, we refer to a propositional attitude or a modal that obeys the Nonveridicality axiom, i.e., the attitude presupposes that the attitude holder \(i\) is in a nonveridical state with regards to \(p\). This nonveridical state is most typically a state of epistemic uncertainty: \(i\) does not know that \(p\) is true. But the nonveridicality condition on the presupposition applies generally, as we will show, as a condition that the relevant space be partitioned.
On the other hand, when we say a ‘veridical’ attitude, we intend to refer to a solipsistic attitude that lacks the nonveridical presuppositional layer. Epistemic attitudes are both presuppositional and veridical. From our study of emotive predicates, it will become clear that the nonveridicality requirement generalizes to this class of predicates too. Emotives too obey the nonveridicality axiom, and require that the emotive space be nonveridical.

Recall also that, pragmatically, the subjunctive mood is a prohibition: do not add \( p \) to a subjective (M), or the common body of knowledge (the common ground). Not adding \( p \) to M is consistent only with a nonveridical state. The pragmatic behavior, therefore, of the subjunctive and its semantic sensitivity to a nonveridical presupposition are interlinked. As said earlier, this generalizes to other non-indicatives such as the optative and the imperative moods which have also been argued to have a nonveridical presupposition (e.g., see Kaufmann’s 2012 non-actuality requirement on the use of the imperative). The licensing conditions we have posed have thus far explained why suppositional doxastics in Italian, bouletic verbs in general, modals and implicatives select the subjunctive: they all have a nonveridical presupposition. Verbs of awareness, and perception can also be construed with this presupposition, as we saw earlier and revisit here, and will therefore also be compatible with the subjunctive. The meaning of these attitudes is multi-layered; and mood flexibility is a diagnostic for that.\(^2\)

Emotives, we will argue here, have mixed veridicality. They convey a presupposition of a nonveridical emotive space which has a positive and a negative extent. But unlike modals, suppositional doxastics and volitions— which only have a nonveridical presupposition— the emotive class also has a veridical presupposition of factivity or, as we will show, subjective veridicality). The indicative is possible because of this veridical presupposition.

Crucially, a similar mood variability is observed with awareness predicates—indicative in Greek, but subjunctive in Italian:

\[
\text{(8) O Nicholas exei epignosi oti/*na i Ariadne tou leei psemata.}
\]

‘Nicholas is aware that Ariadne is lying to him.’

\(^2\)Giannakidou (2016), in a similar vein, acknowledges the subjunctive after emotives as a subspecies of what she calls evaluative subjunctive. The emotive subjunctive, it is claimed, is a case where the subjunctive functions modally, but not as a modal in the assertion, but at the level of presupposition. The emotive subjunctive introduces the presupposition that the individual anchor considered \( \neg p \) possible at a time prior to the assertion (see also for Italian Giorgi and Pianesi, 1996). Thus in this case too, the subjunctive is an indicator of a nonveridical epistemic state prior to the assertion. We will revisit this idea in section 2 below.
7.1. INTRODUCTION: THE PUZZLES OF EMOTIONAL ATTITUDES

(9) È molto/poco cosciente che tu sia stanco.
    Is very/little aware that you be.SUBJ.3sg tired.
    ‘He is very/little aware that you are tired.’

(10) Maria è più cosciente di Gianni dell’accaduto.
    Mary is more aware of John of happened. ‘Maria is more aware of Gianni
    of what has happened.’

We will discuss this alternation in the context we will develop for emotive predicates.

Finally, we will contrast emotives with verbs of fear, that seem to lack the
veridical factivity presupposition. Predicates of fear do allow both subjunctive
and indicative, but this correlates with prospective or past/present orientation in
the lower clause:

(11) O Pavlos fovate *pu/*oti/na vgi ekso.
    the Paul fears that.*IND-pu/*IND-oti/SUBJ go.3sg outside.
    ‘Paul is afraid to go outside.’

(12) O Pavlos fovate *oti/na i aitisi tou aporithike
    the Paul fears.3sg that.*IND-oti/SUBJ the request his
    was-denied.3sg.
    ‘Paul is afraid that his request was denied.’

The subjunctive version is a fear to perform an action. The action is not realized
yet, and the fear does not imply that the action is not desirable. For instance, Paul
might fear to go outside because it is raining and he doesn’t want to get wet, whilt
at the same time he wants to go outside because he has a date he has been looking
forward to for the entire week. The indicative statement, on the other hand, reads
like a statement of belief, qualified with a negative emotive adverb: Paul believes
that, unfortunately for him, his request was denied. In both cases, there is no
factive presupposition.

Notice the parallel in Italian:

(13) Paul ha paura di andare fuori.
    Paul has fears to go outside.
    ‘Paul is afraid to go outside.’

(14) Paul ha paura di aver svegliato il bambino.
    Paul has fear of have woken the baby.
    ‘Paul is afraid of having woken up the baby.’

In both cases, Italian licenses the infinitive, which we take to be equivalent to the
subjunctive, and the past vs. non-past distinction is made. We will argue that verbs
of fear, like emotives, convey an emotional stance which is partitioned between a positive and a negative extent. This explains why they select the subjunctive and infinitives. Verbs of fear lack the veridical presupposition of emotives, therefore never select *pu*. The indicative indicates that the verb of fear is used as a verb of belief. Fear attitudes, thus, have a dual life as predicates of fear to act, and as believing something unfortunate.

Verbs of fear have yet a third dimension in their meaning, revealed in an additional selection pattern, with a special complementizer manifested in English with *lest*, and in Greek with the complementizer *mipos*:

(15) O Pavlos fovate mipos di tin Maria.
the Paul fears lest see the Maria.
‘Paul is afraid lest he sees Mary.’

Here, seeing Mary is truly undesirable for Paul. *Mipos* emerges from a historical path that fused the subjunctive negation *mi* (Veloudis 1984, Giannakidou 1997, 1998, Chatzopoulou 2012)— which might appear here as ‘expletive’— with the indicative complementizer *pos*. Synchronically, it also has uses as an epistemic possibility adverb, exclusively allowed in questions:

(16) Mipos irthe i Maria?
maybe came.3st the Maria.
‘Did Mary come, perhaps?’

(17) Mipos irthe i Maria.
maybe came.3sg the Maria.
‘*Perhaps Mary came.*’

As a possibility modal, *mipos* and questions convey the same kind of nonveridicality: nonveridical equilibrium, not bias, as we noted in chapter 2. Crucially, *mipos*, is used also as an interrogative complementizer, roughly equivalent to ‘whether’:

(18) Me rotise an/mipos efaga.
me askee.3sg if/whether ate.1sg.
‘She asked me if/whether I ate.’

The *mipos* version of the indirect question has a presupposition, absent in the *an/if* version, that the possibility of eating was under discussion. The reading of *mipos*, likewise, with verbs of fear, we will argue, has a presupposition that the possibility raised by the complement was under discussion. The fear space has

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3Expletive negation with verbs of fear has been analyzed by Yoon (2011) as a subjunctive marker, and this is consistent with our approach here. Yoon adds that there is an additional layer of (presupposition or conventional implicature) of expressive meaning (in the sense of Potts 2007) in this case, and we will consider this possibility in section 5.
the additional presupposition of being nonveridical, as all emotive spaces. The sentence in this case asserts that in all fear worlds the possibility of \( p \) is resolved positively. We extend this analysis to *lest*. Italian and French seem to lack this pattern.

To summarize, there are three types of fear:

(19) Varieties of fear
   a. Fear to do something (subjunctive).
   b. Fear as a doxastic attitude towards something unfortunate that hap-
      pened (indicative); and
   c. Fear that an unfortunate possibility will be realized. (special com-
      plementizer)

We proceed with the discussion as follows. We consider first the factivity presupposition of emotives in section 2, and conclude that emotives have a subjectively veridical presupposition, i.e., the attitude can be directed not towards a fact, but also a perceived or believed fact. In section 3, we offer our analysis of emotion space as a partitioned nonveridical space. We rely on the gradable, scalar nature of emotive verbs, and define a morphism between the emotive scale and possible worlds, such that we get a divide into worlds where the emotions hold (positive extent), and those where it doesn’t (negative extent). The existence of a scale thus creates a nonveridical presupposition, in effect unifying the scalar with the truth based aspects of mood choice. In section 4 we extend our analysis to awareness predicates. In section 5 we discuss the consequences for the complementizer system of Greek, and revisit verbs of memory and perception that are also compatible with \( pu \). We discuss fear predicates in section 6.

7.2 The veridical presupposition of emotive attitudes

In this section, we discuss the factive presupposition of emotive predicates. We also consider the possibility of a negative presupposition.

Emotive predicates are known to have a ‘factive’ presupposition:

(20) O Pavlos lipate \( pu \) efije \( i \) Roxani.

the Paul  regrets that.IND left  the Roxani.

‘Paul is sad that Roxanne left.’

(21) O Pavlos *dhen* lipate \( pu \) efije \( i \) Roxani.

the Paul  not  regrets that.IND left  the Roxani.

‘Paul is not sad that Roxanne left.’

(22) Roxane left.
The positive and negative sentence both entail that Roxane left. This has been the standard observation since Kiparski and Kiparksi (1970), who argued that the factive complement is a fact, i.e., a presupposed true statement. This is also the reason why these verbs are characterized as presuppositional: the emotive verb presupposes some fact, and asserts the subject’s emotion towards that fact. The status of the emotive complement as a factive is also consistent with certain syntactic properties that it has, e.g. the fact that it is syntactically a weak island (Roussou 1994, Varlokosta 1994, Giannakidou 1998, Baunaz 2015, among others), it blocks quantifier movement, anaphor licensing, and the like.

Huddleston and Pullum 2002 call into question the factivity of the complement. They call emotives not entailing, and give examples like below:

(23) Falsely believing that he had inflicted a fatal wound, Oedipus regretted killing the stranger on the road to Thebes (Klein 1975, quoted in Gazdar 1979, p. 122).

It is not true objectively that Oedipus inflicted a fatal wound. Egré 2008 offers similar examples:

(24) John wrongly believes that Mary got married, and he regrets that she is no longer unmarried. (Egré 2008: (30)).

These examples show that one can have an emotive attitude towards something that one believes to be a fact, but may not actually be a fact. In the normal case, we are happy or sad about something that we know happened; but one may only believe that something happened (a believed fact) and feel happy or sad about it. Hence, the alleged factivity presupposition need not be satisfied as objective veridicality; mere subjective veridicality, i.e., the emotive subject’s belief of p to be true is enough.

(25) Subjective veridicality presupposition of emotives

\[ [i \text{ V-emotive that } p]^{w, \text{Dox}(i)} \text{ is defined iff } \forall w'[w' \in \text{Dox}(i) p(w')] \]

The presupposition of know, on the other hand, is objective veridicality, namely \( w_0 \in p \):

(26) \[ [i \text{ knows that } p]^{w_0, \text{M}(i)} \text{ is defined iff } w_0 \in p. \]

If defined \[ [i \text{ knows that } p]^{w, \text{M}(i)} = 1 \text{ iff: } \forall w'[w' \in \text{M}(i) p(w')] \]

The factivity of know and its equivalents is unquestionable; know is veridical in both the presupposition and the assertion, subjectively and objectively. Emotive verbs, on the other hand, in the counterexamples above, do not rely on objective veridicality — but on doxastic commitment of \( i \) to the truth of the complement.
Baker (1970) suggested further that emotives express a negativity, a ‘contrari-
ness’ between a perceived fact and some mental or emotional state. According to
Baker, we say that we are surprised when a certain fact does not conform to our
expectations; relieved when it does not conform to our fears; disappointed when
it is not in line with our hopes. Likewise, Baker claims that we say that a certain
fact is odd or strange if it seems counter to our view of what is logical. Emotives,
as a class, appear to convey this perceived contrariness— and it allows them to
license NPIs:

\[
\begin{align*}
(27) \quad &a. \quad *Ariadne \text{ believes/dreams that she talked to anybody.} \\
&b. \quad *Ariadne \text{ knows that she talked to anybody.} \\
&c. \quad Ariadne \text{ regrets that she talked to anybody.} \\
&d. \quad Ariadne \text{ is amazed that we got any tickets at all!}
\end{align*}
\]

Very much in agreement with Baker (and later Linebarger 1980), Giannakidou
(1997, 2006, 2016) argues that the appearance of NPIs with emotive verbs is due
to accessing, in the pragmatics of the emotive verb, an implicit negative inference.
Giannakidou (2006) suggested that the component of emotives responsible for
implicit negation is a counterfactual conditional. The implicit negation is a non-
cancellable counterfactual conditional with a negative protasis:

\[
\begin{align*}
(28) \quad &a. \quad \text{John regrets that I bought a car. Entails } \text{John would prefer it if I had}
\text{not bought a car.} \\
&b. \quad \text{John regrets that I bought a car; #in fact he wouldn’t want me to buy}
\text{a car.}
\end{align*}
\]

Negating \textit{John would want me to buy a car} creates oddity, suggesting that this
inference is "not merely a conversational implicature, as argued in Linebarger, but
rather something stronger, perhaps a presupposition or a conventional implicature
in the sense of Potts (2005). In fact, since emotive factives convey an expressive
attitude toward the propositional content of their complement, it makes sense
to argue that they all encode conventionally this negative attitude." (Giannakidou
2006, p. 595). Giannakidou (2016) further suggests that the negative component
is a presupposition: \(i\) has a \textit{belief or expectation that not }p \textit{was true prior to the}
assertion. It is because of this presupposition that we get the perceived contrari-
ness, and it is this proposition that the NPI accesses to be triggered, it is claimed.
We give below Giannakidou’s version of the presupposition:

\[
(29) \quad \text{Negative (nonveridical) presupposition of emotive factives (Giannakidou}
\text{2016)} \\
\text{\(i\) is surprised that } p \text{ is defined if only if: } i \text{ believed that } \neg p, \text{ at a time } t’ \prec
\text{\(t_u\) (where } t_u \text{ is the utterance time).}
\]
A similar idea is also found in Giorgi and Pianesi (1996), where a counterfactual presupposition is advocated on a par with Giannakidou (2006). Giannakidou and Mari (2016a,b), however, present examples indicating that the negative inference is softer than a presupposition. Observe the following example, where the continuation ‘and she always knew that’ is felicitous:

(30) Arianna è contenta/felice/triste/irritata/... che Nicholas abbia
che
partecipato alla maratona, e ha sempre saputo che lo
he
have.COND.3sg done.
‘Arianna is happy/glad/sad/irritated that Nicholas participate in the marathon, and she always knew that he would do it.’

Example (30) clearly does not convey that the speaker had an expectation or belief that \( \neg p \) prior to \( t_u \). Notice the contrast with surprise where the negative inference cannot be cancelled:

(31) Ariadne is surprised that Nicholas participated in the marathon, #and she always knew that he would do it.’

If we take it that the negative component is presuppositional, we then have to explain why it can get systematically cancelled with non-surprise emotives positive be glad, happy, and even negative irritated, sad. The strength of the negative inference seems to be limited to attitudes of surprise which are inherently akin to a change in expectation; but on the basis of that, it will be unjustifiable to conclude that negativity is a presupposition of all emotives. It is, at best, an implicature.

Let us proceed now to the meaning of the emotive component. The nature of emotion will make obvious a nonveridical presupposition.

### 7.3 Gradability, emotiveness, and nonveridicality

Emotive predicates like glad, sad, happy, surprised etc. express emotions. Emotions are ‘attitudes’ in a broad sense; but in a more narrow and accurate sense, they are psychological states towards facts, perceived facts, or potential facts (as is the case with fear). Emotive states are gradable: one can be very sad, a little bit sad, terribly sad—or, on the other hand, not sad at all, or only a little bit sad. It is therefore no accident that emotional attitudes often employ adjectives that are gradable and scalar. The gradable nature of emotion, we argue (following our earlier work
7.3. GRADABILITY, EMOTIVENESS, AND NONVERIDICALITY

Giannakidou and Mari (2016a,b), is responsible for their nonveridical content.

7.3.1 The presupposition of nonveridicality of the emotive space

No attention has been paid in the literature to the fact that emotives are gradable predicates, with the exception of Villalta (2008) who, however, does not capitalize on what gradability tells us about veridicality. For us, gradability and nonveridicality will be the starting point. Gradability is diagnosed by number of tests in many works (see indicatively Kennedy 2007, and Giannakidou and Mari 2016a,b). Gradable predicates are, first, compatible with degree modifiers e.g. very; so are emotives:

(32) John is very tall.
   a. Gianni è molto alto.
   b. O Janis ine poli psilos.

(33) John is very irritated/happy that Mary came.
   a. Gianni è molto irritato/contento che venga anche Maria.
   b. O Janis ine poli thimomenos pou irthe i Maria.

Second, gradable predicates and emotives can be used in comparative sentences:

(34) John is taller than Mary.
   a. Gianni è più alto di Maria.
   b. O Janis ine psiloteros apo ti Maria.

(35) I am more/less irritated than you.
   a. Sono più/meno irritato di te.
   b. Ime pio/ligotero thimomeni apo sena.

In all analyses of gradability, gradable predicates introduce degree scales and map individuals onto points on the scales. The scales are assumed to contain a designated degree that functions as a threshold between the positive extent of the scale and the negative extent. For instance, if I say John is tall, I am saying that John exceeds the degree $d$ that is the threshold/standard of what counts as tall in the context. If John’s height maps onto a degree $d'$ below $d$, then John cannot be said to be tall, he is not-tall. Let $\mathcal{D}$ be a set of ordered degrees, and $\mathcal{I}$ a set of individuals. We assume that a scalar predicate has the analysis in (36):

(36) $\lambda P. \lambda x. \lambda d. P(x) \geq d$
Variables $x$ and $d$ take their value in the sets $\mathcal{I}$ and $\mathcal{D}$. Given the threshold $d$, two equivalence classes are determined: one above $d$ in which $i$ has the sentiment, and one in which $i$ does not have it (below $d$). We are now going to map scales into modal spaces triggered by propositional attitudes. We propose that there is a morphism $\mathcal{H}$ from degrees $\mathcal{D}$ and individuals $\mathcal{I}$ to worlds.

$$\mathcal{H}(\mathcal{D})(\mathcal{I}) = W$$

The modal base that we obtain via this mapping is non-homogeneous. The worlds in the modal base are partitioned into those in which $i$ has the emotion and those in which she does not. This partition is driven by the threshold $d$. Note (see Figure 1), that the worlds in which $i$ has the sentiment, $p$ is true. In other worlds, $W$ is a set of worlds ordered by $\leq_{S_i}$. The set of worlds is partitioned into two equivalence classes of worlds. One is the set of worlds in which the attitude holder has the emotion and $p$ is true. The other one is the set of worlds in which the attitude holder does not has the emotion and $p$ is false.

$$\text{PE}_p = \{ w' \in \mathcal{E}_p : w' \text{ where the propositions in } \mathcal{P} \text{ are true } \}$$

This partitioning allows us to define Positive-Extent-worlds (PE) for $p$:

---

4Klecha (2014) proposes an account of gradable modal adjectives like important that incorporates degrees into the denotation of the adjectives, combining a degree-based semantics and ordering sources à la Kratzer. Here we propose an analysis of scalar emotive predicates in modal terms.

5On emotivity and non-veridicality, see also Beltrama 2015.
Here, the set $\mathcal{P}$ is the singleton set $\{p\}$. So $\text{PE}_\mathcal{P}$ contains all the worlds in which $p$ is true. In $\text{PE}_\mathcal{P}$ $i$ has sentiment $\mathcal{S}$. But not all worlds in $\mathcal{E}$ are PE worlds for $p$, $\mathcal{E}$ only partially supports $p$. $\text{PE}_\mathcal{P}$ is a subset of $\mathcal{E}$ (the emotive space). The complement of $\text{PE}_\mathcal{P}$ contains $\neg p$ worlds. The semantics we propose here may remind the reader of the Best ordering used for modals (Portner 2009), but our ordering source merely contains $p$.

Hence, the gradability of the emotive predicate triggers an emotion space $\mathcal{E}$, and partitions it into $p$ and $\neg p$ worlds. The emotion space is thus a nonveridical space. Now that we have the semantics for the emotive component, let us put it together with the presupposition of subjective veridicality in the doxastic space. (39) The presuppositions of emotive verbs

\[ [i \text{ V-emotive } p]_{w,\text{Dox}(i)\mathcal{E}} \text{ is defined iff} \]

a. Dox$(i)$ contains only $p$ worlds (subjective veridicality)

b. The emotion space $\mathcal{E}$ is nonveridical and contains $p$ and $\neg p$ worlds (emotive nonveridicality)

The emotion and the doxastic space are independent of one another, as emotion is not a kind of belief. The emotive verb has a presupposition that the emotion space be partitioned, just like with other subjunctive licensers, i.e., modals, suppositional doxastics and bouletics. The portioned space is not epistemic, as was the case with those——it can therefore not be said that the emotion expresses epistemic uncertainty. It is is more appropriate to think of it as emotive uncertainty. From this perspective, subjunctive is absolutely expected, and consistent with the predictions we made so far.

Consider an emotive sentence, say *I am happy that Bridget came today*. There are $p$ worlds in my emotion space, but also $\neg p$ worlds, worlds where I do not have the emotion. The sentence asserts that $p$ worlds are worlds in which I am happy ($\neg p$ worlds are those in which I am sad). The emotive space describes my emotional state in terms of the propositions that make the emotion true. The attitude, just like any other attitude, introduces in the assertion a quantification over those worlds in which the emotion that they denote is true.

### 7.3.2 The assertion of emotives

On the assumption that attitudes and MUST modals introduce universal quantification, emotives are no exception: they introduce universal quantification over the positive extend of the emotion modal base, asserting that in all worlds compatible with the sentiment, $p$ is true.

The mechanics is thus similar to the mechanics we proposed for doxastics, bouletics, and modals. An ordering source carves out the positive extent of the
modal base, that part of the modal base in which the prejacent is true.

\[(40) \text{PE}_E = \{w \mid \forall q \in \text{PE}_q(w)\}\]

The positive extent is thus defined as the set of worlds in which all the relevant propositions (compatible with the emotion at hand) are true. In these worlds \(p\) is true.

The truth condition is then universal quantification over these worlds. Thus the final analysis for emotive is as follows:

\[(41) \text{Emotives: final analysis.} \]

\[\llbracket i \text{ V-emotive } p \rrbracket_{w, \text{Dox}(i), E} \text{ is defined iff} \]

a. \(\text{Dox}(i)\) contains only \(p\) worlds (subjective veridicality)

b. \(E\) is nonveridical and contains \(p\) and \(\neg p\) worlds (emotive nonveridicality).

c. If defined: \(\forall w' \in \text{PE}_E p(w')\)

This analysis entails that, had \(p\) not been realized, the attitude holder would have not have had the emotion. The counterfactual flavor is thus not hard-wired in the semantics, but it is calculated given the presupposition of subjective veridicality (and potentially factivity) and the nonveridical structure of the modal base. This is, we believe, a welcome result, consistent with the intuitions about emotives.

With this analysis at hand, we will move on to awareness predicates, which also behave like emotives.

### 7.4 Attitudes of awareness

Awareness is arguably a layer of epistemic nature, supplementary to the knowledge layer (see also Jäger and Franke 2011). Languages differ as to how they construct this epistemic space, which is independent to knowledge itself within a single agent, i.e., the idea being that one can know something without being aware that she does (see also discussion in Stanley (2008) about knowledge and certainty).

The knowledge space is binary in the sense that one can only know or not know a particular fact \(p\). One cannot know a fact A more than one can know a fact B; if \(i\) knows A and \(i\) knows B then both A and B are known to \(i\). The awareness space, on the other hand, can indeed be conceived of as gradable, on a par with the emotive space, to the point that one is aware of some of the facts s/he knows and not of others. The awareness space, in this respect, can be partitioned in two: those worlds in which the propositions of which I am aware are true and those
Note that \( p \) is objectively true in all worlds. In the Figure here below, we only picture the awareness space \( \mathcal{A} \), which is partitioned between \( p \) and \( \neg p \) worlds, in a way parallel to the emotive space. \( p \) worlds are worlds in which the attitude holder is in a state of awareness of \( p \), and \( \neg p \) worlds are worlds in which the attitude holder is not aware of \( p \).

**Figure 7.2: The non-veridical space of awareness**

Italian illustrates that the epistemic *be aware* space can also be understood as gradable, producing nonveridicality on a par with emotives, as in the schema above. This explains why the awareness predicate selects the subjunctive in Italian:

(42) È molto/poco cosciente che tu sia stanco. *Is very/little aware that you be.SUBJ.3sg tired.*

‘He is very/little aware that you are tired.’

(43) Maria è più cosciente di Gianni dell’accaduto. *Mary is more aware of John of happened.* ‘Maria is more aware of Gianni of what has happened.’

Italian treats the awareness space as gradable. The space for *essere cosciente* now is \( \mathcal{A} \), just like in Greek, but this space is conceptualized as gradable, thus partitioned into positive extent (PE) and negative extent, just like with emotives.

(44) Awareness in Italian.

\[
[i \text{ sono cosciente } p]_{w,M(i),\varepsilon} \text{ is defined iff }
\]
a. \( M(i) \) contains only \( p \) worlds (subjective veridicality)

b. \( \mathcal{A} \) is nonveridical and contains \( p \) and \( \neg p \) worlds (awareness non-veridicality).

c. If defined: \( \forall w' \in \text{PE-Awareness} p(w') \)

(45) Sono consiente che Anna è/sia a casa.

‘I am aware that Ann is home.’

For Italian, the assertion of ‘be aware’ will be like that of the emotive, dividing the awareness space between \( p \) and \( \neg p \) worlds, thereby producing nonveridicality as reflected in the choice of the subjunctive. We see that the space of ‘awareness’ is conceptualized a partitioned one, including worlds of awareness and worlds of non-awareness. Awareness worlds (the Positive Extent \( \text{PE}_\mathcal{A} \)) are \( p \) worlds. We see that awareness is lexicalized along the pattern of emotivity.

In Greek, by contrast, awareness verbs select indicative, thus aligning with belief and imagination verbs. We assume that \( \mathcal{A} \) in Greek is simply a type of veridical, non-partitioned doxastic space like the ones we called solipsistic in chapter 4. And since it has a veridical presupposition, the awareness verb is actually construed like KNOW:

(46) Awareness in Greek
\[[i \text{ exi-epignosi that } p]\, w_0,i,A \text{ is defined iff } w_0 \in p.\]
If defined \( [i \text{ exi-epignosi that } p]\, w,i,A = 1 \) iff:
\( \forall w'' \in \mathcal{A}(i)(p(w'')) \)

(47) O Nicholas exei epignosi oti/*na i Ariadne tou leeī the Nicholas has awareness that.IND/*SUBJ the Ariadne him says psemata.

\[\text{Nicholas is aware that Ariadne is lying to him.}\]

Greek lexicalizes ‘be aware’ as a knowledge verb and Italian lexicalizes it as an emotive. Let us then ask the question: why do we have this systematic difference between Greek and Italian in epistemic and doxastic verbs? We will answer that this difference illustrates a prototypicality effect. In Italian belief verbs can be subjunctive selectors and are not prototypically solipsistic, like the indicative selecting belief verb that we find in Greek. Now, if belief verbs set the standard for subjunctive and indicative, as it is reasonable to assume, then languages seem to choose among possible lexicalizations of epistemic and doxastic attitudes those that better align with the general pattern set by the prototypical case of belief.

Finally, since the consciousness predicate can be a subjunctive selector, gradability per se is not the key in determining mood; *pace* Villalta (2008). This is a
point that we made earlier too in view of the facts that doxastics remain doxastic when they shift to subjunctive in Italian. Gradability, rather, offers the necessary structure for nonveridicality by providing a threshold for $p$ and $\neg p$ worlds that mirrors the positive and negative extent of the scale. The connection between evaluating (via a gradable space) and nonveridicality has broader applications, as seen also in recent work by Beltrama (2015).

With this result, let us now address the implications of the semantics we have proposed for mood morphemes. We will then move to predicates of fear.

7.5 Presuppositional indicative complementizer \textit{pu}

At this point, it will be very useful, we think, to go back to the pragmatic contribution of mood morphemes that we established in chapter 4, and ask the question of how the mood sensitivities are consistent, or even dictate their pragmatic behavior. We will revisit the flexible patterns with knowledge, memory, and perception verbs, addressing not just indicative vs. subjunctive distinction, but also the dimension of assertive vs. non-assertive indicative that emerges in the \textit{pu} vs. \textit{oti} distinction in Greek.

7.5.1 The pragmatics of mood morphemes and their sensitivity to (non)veridicality connected

Thus far, we have been arguing for the following generalizations:

(48) a. The subjunctive is sensitive to nonveridicality in the presuppositional component of an attitude verb. Nonveridicality is partitioning of an epistemic space (epistemic uncertainty), or partitioning of a modal space more broadly, as we saw this to be the case with emotive spaces).

b. The indicative \textit{oti} is sensitive to the veridicality of assertion. It is selected by veridical solipsistic verbs.

c. The indicative \textit{pu} is sensitive to the veridicality of the presupposition. It is selected by verbs that have a veridical presupposition (either a factive one, or a presupposition of subjective veridicality).

The subjunctive versus indicative difference appears to be not just a difference in veridicality (indicative) vs. nonveridicality (subjunctive), but also a difference at the level at which the sensitivity applies: the assertion (indicative) vs. the presupposition (subjunctive). But there is also presuppositional indicative, manifested in Greek in \textit{pu}. \textit{Pu} performs presuppositional anchoring, we alluded to in
chapter 4, and this requires $p$ to already be in the common ground. Given that the emotive complement, as we showed, has a presupposition, rather, of belief of $p$, we will refine presuppositional anchoring here as:

(49) Presuppositional indicative $pu$: Presuppositional anchoring
Presuppositional indicative (Greek $pu$) can be used iff $p$ or i’s belief of $p$ is already in the common ground.

This allows for the cases where the presupposition is not factive, but subjective veridicality. The existence of an indicative marker like $pu$ is important because it illustrates that the indicative can also be sensitive to presupposition, specifically a veridical presupposition. Hence, the indicative vs. subjunctive opposition does not simply map onto assertion vs. non-assertion. Our prediction is that $pu$ will be possible with other lexical entries as long as they contain a veridical presupposition. This is indeed what we find with attitudes meaning KNOW, REMEMBER, and verbs of perception, which we will discuss next.

But before we proceed, consider that most languages that have subjunctive vs. indicative contrast are unable to make the distinction drawn in Greek between $oti$ and $pu$, or assertive vs. presuppositional indicative. Italian, French and the other European languages that distinguish subjunctive vs. indicative mood in selection lack the category of presuppositional indicative. Lacking this category, the only choice for emotives consistent with the mood requirements emerged in this book is the use of subjunctive. With emotive verbs, the assertive indicative can simply not be an option, because assertive indicative requires veridicality in the assertion:

(50) Assertive indicative anchoring: Private Anchoring
i. Assertive Indicative (Greek $oti$, and indicative in Romance) anchors $p$ to M(subject), Dox(subject), or some variant thereof.
ii. Anchoring means that the complement clause is added to M or Dox.

This explains why languages that lack the distinction between assertive and presuppositional indicative won’t be able to use the indicative when a predicate has veridicality in the presupposition, like the emotives. Another important thing to consider is also the stereotypicality effects we pointed out earlier with the awareness predicate. The nonveridicality presupposition, by itself, is enough to license the subjunctive in the stereotypical doxastic predicate, and by extension to all predicates that have it.

The subjunctive, as we said, performs non-assertive anchoring.

(51) Subjunctive/NA-anchoring: Non-assertive anchoring
Do not add $p$ to M, Dox, or the common ground.
The pragmatic behavior of the mood morphemes follows their semantic sensitivity to veridicality and nonveridicality. Greek na and Romance subjunctive can be used only if the relevant states (M, variants of Dox, and the emotive space) in the presupposition are nonveridical spaces. If uncertainty is presupposed, then p cannot be added, hence the non-assertive behavior of the subjunctive follows from the semantics, and is not merely stipulated (as, e.g, in Farkas 2003).

7.5.2 Knowledge, memory and perception

Recall some data that we have presented earlier in the book. The verb ksero ‘know’ may also combine with pu, na:

(52) O Janis kseri na kolibai.
The John knows.3sg that.SUBJ swim.IMPERF.3sg.
‘John knows how to swim.’

(53) O Pavlos kseri₉ pu efije i Roxani.
the Paul knows.3sg that.IND left.3sg the Roxani.
‘Paul knows that Roxanne left.’

KNOW na does not presuppose or add na to common ground. It is merely a statement of how-to ability: John knows how to swim. The pu variant seems to be equivalent to the oti variant. The choice of pu has a mere rhetorical effect, and makes the complement topical. Typically, as indicated, the word KNOW kseri₉ is in focus, which highlights that Pavlos knows (and is not ignorant of, thus the focus is contrastive) the already given fact that Roxanne left. The oti variant of this statement is a mere statement of knowledge with no contrast or any particular discourse weight on either KNOW or the complement.

(54) O Pavlos kseri oti efije i Roxani.
the Paul knows.3sg that.IND left-3sg the Roxani.
‘Paul knows.OTI that Roxanne left.’

The pu use feels marked with ksero, because it is contrastive. Consider now the memory verb thimate ‘remember’. The default, as we said, is the indicative oti, but na can also be used:

(55) O Nicholas thimate na kleini ton porta,
the Nicholas remember.3sg that.SUBJ close.NONPAST.3sg. the door,
alla den ine sigouros.
but not is sure.
‘Nicholas remembered closing the door, but he is not entirely sure.’
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The *na*-version is compatible with a context where Nicholas is not fully sure about his memory or vision, and allows some doubt. He is, thus, in a nonveridical state. The *oti* clauses are incompatible with such context:

(56)  #O Nicholas thimate oti eklise ton porta, alla den
the Nicholas remember.3sg that.IND closed.3sg the door, but not
ine sigouro.
is sure.
‘Nicholas remembered that he closed the door, but he is not entirely
sure.’

Note the exact parallel with the English -*ing* clause. The *that vs. ing* difference is reflected in Greek with the *oti vs. na* distinction.

In Italian, *ricordarsi* (‘remember’) is also able to license both indicative and subjunctive:

(57)  Si ricorda che era andato al mare.
*REFL remembers that be.IMPF.3sg gone at the sea.*
‘He remember that he was gone at the seaside.’

(58)  Si ricorda che fosse andato al mare.
*REFL remembers that be.IMPF.SUBJ.3sg gone at the sea.*
‘He remember that he was gone at the seaside.’

With the indicative, that he went to the seaside is part of the common ground, or it is at least in the memory space of the speaker. This is equivalent to the *pu*-memory in Greek. With the subjunctive version, two interpretations are possible: (i) the attitude holder has a fuzzy memory, or (ii) the memory is not shared in the common ground. In both cases, there is nonveridicality either at the level of the memory space of the individual anchor, or in the collective space (we come back later to the non-assertive update in the common ground). We consider here only the case of fuzzy memory, which is equivalent to the *na*-memory of Greek.

Memory verbs, finally, can also take a *pu* complement. In this case, just as we saw with *ksero* ‘know’, they can’t be used in the following context where the speaker doesn’t know *p*:

(59)  Question: How much did that book cost?
Answer: Thimame *pu/oti kostise 25 dollaria.
remember.1sg that.*IND-pu/IND-oti cost-3sg 25 dollars.
‘I remember that it cost 25 dollars.’

(60)  Question: How much did that book cost?
Answer: Ksero *pu/oti kostise 25 dollaria.
know.1sg that.*IND-pu/IND-oti cost-3sg 25 dollars.
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‘I know that it cost 25 dollars.’

In this context, the person asking the question does not know how much the book costs, in other words, the price of the book is not a topic, and it is not part of the common ground. In this case, *pu* cannot be used, in accordance with what we predict. The *oti* variant is a perfect answer.

Now, consider a case when *pu* and *na* are both felicitous:

\[(61) \text{Thimame pu/oti to vilvio kostise 25 dollaria.}\]
\[\text{remember.1sg that the book cost.3sg 25 dollars.}\]
\[\text{‘I remember that the book cost 25 dollars.’}\]

In this case, the *pu*-memory corresponds to common knowledge.

We can capture these alterations as follows. Recall that with verbs such as *thimame* ‘remember’, we are looking at \(M_{\text{Memory}}(\text{subject})\), that it to say, the set of propositions that are remembered by the attitude holder:

\[(62) \text{Memory state of an individual anchor } i\]
\[\text{A memory state } M_{\text{memory}}(i) \text{ is a set of worlds associated with an individual } i \text{ representing worlds compatible with what } i \text{ remembers.}\]

\[(63) [i \text{ REMEMBER } p]_{w, M_{\text{Memory}}}^{M_{\text{memory}}} \text{ is } 1 \iff \forall w'' \in M_{\text{memory}}(i)(p(w'')).\]

Memory is thus construed solipsistically as a variant of belief when it takes indicative (as we explained earlier). What is remembered is indeed a form of belief, and memories are not photographic snapshots of the reality, but rather inner representations of events, construed or compensated to some extent by the person who remembers. The Greek and Italian verbs can express this meaning.

Memory can also be construed as remembering a fact, in which case we have *pu*, indicative in Italian, and an epistemic M:

\[(64) \text{O Nicholas thimate pu eklise ton porta.}\]
\[\text{the Nicholas remembered.3sg that.IND closed.3sg.}\]
\[\text{‘Nicholas remembers the fact that he closed the door.’}\]

\[(65) [i \text{ REMEMBER } p]_{w, M_{\text{epistemic}}}^{M_{\text{memory}}} \text{ is } 1 \iff w_0 \in p; \text{ if defined,}\]
\[\forall w'' \in M_{\text{memory}}(i)(p(w'')).\]

Notice the paraphrase above: remembers the fact. In this case, we use an epistemic veridical state. The shift to the epistemic modal base is on a par with state shifts observed in chapter 5 for bouletic predicates.

The subjunctive variant, however, uses \(M_{\text{Memory}}\) and the presupposition that \(M_{\text{epistemic}}\) is nonveridical. In this case, what is remembered will be contrasted
with what is known. What we remember does not always correspond to what we know to be real. Suppositional memory is, in other words, fuzzy memory:

(66) Suppositional memory:
\[
[i \text{REMEMBER}_{sup} p]^{M,M_{\text{Memory}}:i} \text{ is defined iff } M(i) \text{ is nonveridical (partitioned epistemic modal base). If defined, }
\]
\[
[i \text{REMEMBER}_{sup} p]^{M,M_{\text{Memory}}:i} = 1 \iff \forall w' (w' \in M_{\text{Memory}} \rightarrow p(w'))
\]

Suppositional REMEMBER takes an -ing or a subjunctive complement. As we said earlier, this is not ambiguity, but underspecification: a memory verb can be construed with or without the suppositional layer, and the subjunctive (and non-*that* complement in English) is the diagnostics for the suppositional construal. The interplay is crucially between d-commitment (veridicality) in the Memory M, but partition (nonveridicality) in the presupposition. The subjunctive is triggered, exactly parallel to Italian, in case the subject has fuzzy memory, u.e., remembers but doesn’t know for sure.

Consider now, finally, verbs of perception like *see*:

(67) O Nicholas idhe ton Flavio na kleini
the Nicholas saw.3sg the Flavio that.SUBJ close.IMPF.NONPAST.3sg
ton porta, alla i porta dhen ine kleisti.
the door, but the door not is closed.
‘Nicholas saw Flavio closing the door, but the door is not closed.’

(68) O Nicholas idhe oti o Flavio eklise ton porta, #alla i
the Nicholas saw3sg that.IND the Flavio closed.3sg. the door, but the
porta den ine klisti.
doors not is closed.
‘#Nicholas saw that Flavio closed the door, but the door is not closed.’

Observe again the contrast between an -ing complement and a *that* complement in English. Two things are noteworthy here. First, the complement conveys direct perception, seeing with Nicholas’ own eyes. Second, in the *na* version the closing of the door need not necessarily include the result state of the door being closed. The *oti* complement includes that state. The difference, we will argue, illustrates that in the *oti* complement we have a veridical doxastic state that includes the result, but in the *na* complement we have the presupposition of not knowing that the door is closed in all worlds.

For \( p \) being ‘Flavio closes the door and the door is closed’:

(69) \[[i \text{vlepo/SEE}_{belief} p]^{w,\text{Dox},i} = 1 \iff \forall w'' \in \text{Dox}(i)(p(w''))\]. (vlepo oti)

(70) Suppositional SEE (vlepo NA):
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\[[i \text{ SEE}^{sup} p]^{M, \omega_{i}}\] is defined iff $M(i)$ is nonveridical (partitioned epistemic modal base).
If defined, $\left[i \text{ SEE}^{sup} p\right]^{M, \omega_{i}} = 1$ iff $\forall w' (w' \in Dox \rightarrow p(w'))$

The $pu$ variant, again, is like $thimame$ and $\text{KNOW}$: it topicalizes the complement, now marked with $pu$:

(71) O Nicholas idhe$_{F}$ pu o Flavio eklise ton porta. the Nicholas saw.3sg that.IND the Flavio closed.3sg. the door. ‘Flavio closed the door. Nicholas saw it.’

To sum up: the mood alternations we see here are systematic and completely predicted by our main ideas, repeated here:

(72) a. The subjunctive is sensitive to nonveridicality in the presuppositional component of an attitude verb.
b. The indicative $oti$ is sensitive to the veridicality of assertion. It is selected by veridical solipsistic verbs.
c. The indicative $pu$ is sensitive to the veridicality of the presupposition. It is selected by verbs that have a veridical presupposition.

Let us move on now to see how this theory explains the behavior or fear attitudes.

7.6 Attitudes of fear

The mood patterns with fear predicates is a choice between indicative and subjunctive, correlating expectedly with prospective nonpast (subjunctive) and past or present tense (indicative), in agreement with the general pattern observed. We also observe a special complementizer in Greek ($mipos$) and English ($lest$) which reveals a possibility modal, and brings in question semantics, as we will argue.

7.6.1 Three empirical patterns

Here are the generalizations about fear attitudes:

(73) Varieties of fear
a. Fear to do something (subjunctive).
b. Fear as a doxastic attitude towards something unfortunate that happened (indicative)
c. Fear that an unfortunate possibility will be realized. (complementizer interrogative possibility modal complementizer, both past and
non-past tenses)

(a) Fear to do something: Subjunctive or infinitive with nonpast

(74) O Pavlos fovate *pu/*oti/na vgi ekso. the Paul fears that.SUBJ go outside ‘Paul is afraid to go outside.’

(75) Paul a peur de sortir. Paul is afraid of going out. ‘Paul is afraid to go out.’

(76) Paolo ha paura di uscire. Paolo has fear of go out. ‘Paul is afraid to go out.’

Pu, as we see is impossible with predicates of fear, which leads us to postulate that there is no factivity or subjectively veridicality presupposition. The subjunctive/indicative version is a fear to perform an action. The fear does not imply that the action is not desirable. For instance, Paul might fear to go outside because it is raining and he doesn’t want to get wet, while at the same time he really wants to go outside because he has a date he has been looking forward to for the entire week.

(b) Fear as a doxastic attitude towards something unfortunate that happened, is happening or will happen: assertive indicative

(77) a. O Pavlos fovate *oti/*pu/na i aitisi tou the Paul fears that.*IND-oti/*IND-pu/SUBJ the request his aporifithike was-denied. ‘Paul is afraid that his request was denied.’

b. O Pavlos fovate *oti/*pu/na i aitisi tou the Paul fears that.*IND-oti/*IND-pu/SUBJ the request his tha aporifithi FUT be-denied. ‘Paul is afraid that his request will be denied.’

c. O Pavlos fovate *oti/*pu/na vrex. the Paul fears that.*IND-oti/*IND-pu/SUBJ rain. ‘Paul is afraid it is raining (unfortunately).’

The indicative statement reads like a statement of belief, qualified with a negative emotive adverb: Paul believes that, unfortunately for him, his request was denied. The use of oti is expected, and likewise note how the English words fear, be afraid
acquire the same doxastic flavor.

There is a parallel in Italian, but the indicative version is only allowed with the first person subject, and has the flavor of politeness (see Tahar, 2018 and references therein). In French, the indicative cannot be used, and the subjunctive is mandatory across all these interpretations. In French, expletive negation is also mandatory with fear predicates in this use:

(78)  
\[
\begin{align*}
a. & \text{ Paolo ha paura che la sua richiesta sia stata negata.} \\
& \text{ Paul has fear that the his request be.SUBJ.3sg been denied.} \\
& \text{ ‘Paul is afraid that his request was denied.’ }
\end{align*}
\]
\[
\begin{align*}
b. & \text{ Paolo ha pura che la sua richiesta sia negata.} \\
& \text{ Paul has fear that the his request be.SUBJ.3sg denied.} \\
& \text{ ‘Paul is afraid that his request will be denied.’ }
\end{align*}
\]
\[
\begin{align*}
c. & \text{ Ho paura che piove.} \\
& \text{ Am afraid that rain.IND.3sg.} \\
& \text{ ‘I am afraid that it is raining.’}
\end{align*}
\]

(79)  
\[
\begin{align*}
\text{J’ai peur qu’il #pleut/ne pleuve.} \\
& \text{I have fear that-it rain.IND.3sg/expletive-negation-rain.IND.3sg.} \\
& \text{‘I am afraid that it is raining.’}
\end{align*}
\]

The use of so-called expletive negation with fear predicates is quite common, and is found even in typologically unrelated languages with French such as Korean and Japanese (Yoon 2012). Yoon in fact argues, based exactly on the parallel between the subjunctive mood and expletive negation, that expletive negation is the realization of subjunctive mood in languages that lack mood morphology (Korean, Japanese).

We will argue that verbs of fear, like emotives, convey an emotional stance which is partitioned between and a positive and a negative extent. This explains why they select the subjunctive and infinitives. But verbs of fear lack the veridical presupposition of emotives, therefore they never select the $pu$. The indicative is triggered because the verb of fear is used as a verb of belief. In Italian, the indicative is possible only when there is hedging. Fear attitudes, thus, have a life as true predicates of fear to act, and as believing something unfortunate.

Verbs of fear have yet a third dimension in their meaning, revealed in an additional selection pattern, with a special complementizer manifested in English with \textit{lest}, and in Greek with \textit{mipos}.

(c) Fear of a possibility: \textit{mipos, lest}

(80)  
\[
\begin{align*}
\text{1 O Pavlos fovate mipos di tìn Maria.} \\
& \text{the Paul fears lest see the Maria.}
\end{align*}
\]
‘Paul is afraid lest he see Mary.’

English employs the special complementizer *lest* which is construed with a subjunctive. The *lest* complement is admittedly of higher register, therefore not as common and somewhat archaic sounding and marked. Greek *mipos*, on the other hand, is a quite common word with other related uses, and the pattern of *mipos* with the fear predicate is also quite common and unmarked.

*Mipos* emerges from a historical path that fused the subjunctive negation *mi* with the indicative complementizer *pos*. Synchronously, it also has uses as a possibility epistemic adverb, but only in questions (Giannakidou 2009):

(81) Mipos irthe i Maria?
    maybe came.3st the Maria?
    ‘Did Mary come, perhaps?’

(82) Mipos irthe i Maria.
    maybe came.3sg the Maria.
    ‘*Perhaps Mary came.*’

The above shows a link between *mipos* and interrogatives. Recall that, as a possibility modal, *mipos* and questions convey the same kind of nonveridicality: nonveridical equilibrium, not bias, as we noted in chapter 2. Crucially, *mipos* is used also as an interrogative complementizer, roughly equivalent to ‘whether’:

(83) Me rotise an/mipos efaga.
    me asked.3sg if/whether ate.1sg.
    ‘She asked me if/whether I ate.’

The *mipos* version of the indirect question has a presupposition, absent in the *an/if* version, that the possibility of eating was under discussion. The reading of *mipos*, likewise, with verbs of fear has a presupposition that the possibility raised by the complement was under discussion. The fear space has the additional presupposition of being nonveridical, as all emotive spaces. The sentence in this case asserts that in all fear worlds the possibility of *p* is resolved positively. We will extend this analysis to *lest*.

### 7.6.2 The semantics and pragmatics of fear

Consider first the case of subjunctive fear to do something:

(84) O Pavlos fovate *pu/*oti/na vgi ekso.
    the Paul fears that/*IND-pu/*IND-oti/SUBJ go.3sg outside.
    ‘Paul is afraid to go outside.’
This could say, is the most prototypical case of fear. The attitude bearer Paul fears to do some future action, in this case to go out. Notice the infinitive and nonpast in English, along with the subjunctive in Greek and Italian. Notice also the absence of expletive negation in French. Recall that we argued that the fear does not imply lack of desirability because Paul might actually want to go out but it’s raining and he fear to go out for this other reason, namely not to get wet. Since fear is an emotion, it is reasonable to assume an emotive space:

![Diagram of the non-veridical space of emotivity]

Figure 7.3: The non-veridical space of emotivity

This partitioning allows us to define Positive-Extent-worlds (PE) for $p$:

$\text{(87)} \quad \text{PE}_p = \{ w' \in \mathcal{E}_P : w' \text{ where the propositions in } \mathcal{P} \text{ are true } \}$

Here, the set $\mathcal{P}$ is the singleton set $\{p\}$. So $\text{PE}_p$ contains all the worlds in which $p$ is true. These are the feared worlds. But not all worlds in $\mathcal{E}$ are PE worlds for $p$. $\mathcal{E}$ only partially supports $p$. $\text{PE}_p$ is a subset of $\mathcal{E}$ (the emotive space). The complement of $\text{PE}_p$ contains $\neg p$ worlds. These are the worlds where $i$ does not fear to do $p$. The structure is exactly parallel to the one we posited for the general emotive case. Recall that the semantics we propose may remind the reader of...
CHAPTER 7. EMOTIVES

the Best ordering used for modals (Portner 2009), but our ordering source merely contains $p$.

Fear, unlike the emotive class, lack the veridicality presupposition. Here is the lexical entry:

(88) Fear predicate (FEAR to)

\[
\begin{array}{l}
[i \text{FEAR } p]^{w,E} \text{ is defined iff } E \text{ is nonveridical and contains } p \text{ and } \neg p \\
\text{worlds (emotive nonveridicality).} \\
\text{If defined: } [i \text{FEAR } p]^{w,E} = 1 \text{ iff } \forall w' \in \text{PE-fear}_E p(w')
\end{array}
\]

Words such as *fovame, be afraid, aver paura, ...* and the like denote FEAR and select the subjunctive, as expected, since the presupposition is nonveridical. $Pu$ is not licensed because there is no veridicality presupposition.

The indicative version *FEAR that*, on the other hand, is a case where fear is grammaticalized as a kind of solipsistic belief just like in the case of awareness, memory or perception with indicative.

(89) a. Paolo ha paura che la sua richiesta sia stata negata.
Paul has fear that the his request be.SUBJ.3sg been denied.
‘Paul is afraid that his request was denied.’

b. Paolo ha pura che la sua richiesta sia negata.
Paul has fear that the his request be.SUBJ.3sg denied.
‘Paul is afraid that his request will be denied.’

c. Ho paura che piove.
‘I am afraid that it is raining.’

(90) J’ai peur qu’il #pleut/ne pleuve.
I have fear that-it rain.IND.3sg/expletive-negation-rain.SUBJ.3sg.
‘I am afraid that it is raining.’

(91) $[i \text{FEAR}_{belief} p]^{w,Dox,i} = 1 \text{ iff } \forall w'' \in Dox(i)(p(w'')) \text{ and } p \text{ is undesirable. (fear that)}$

This lexical entry has no presupposition. It states merely that $i$ has the belief that $p$ is, will be, or was true (we have abstracted away from time here). The expletive negation is a reflex of the undesirability, we will claim, following the literature (Suwon 2012 and references therein). Hence once would further spell out the above as follows:

(92) $[i \text{FEAR}_{belief} p]^{w,Dox,i} = 1 \text{ iff } \forall w'' \in Dox(i)(p(w'')) \text{ and } \neg p \text{ more desirable than } p.$
7.6. ATTITUDES OF FEAR

Whichever version one chooses, the bottom line is that FEAR TO and FEAR THAT differ in the ways indicated above, including the aspect of desirability. FEAR TO can be fear to do an otherwise highly desirably thing—you might want to fly but you can still have fear to do it, you might want very much to talk to someone, but fear to do it. In other words, the emotion of fear is completely independent of desirability or lack thereof.

FEAR THAT, on the other hand, is contrastive, and expresses that the believed \( p \) is less desirable than the non-believed \( \neg p \). FEAR THAT is the way to state a belief while also disapproving of that belief. Fear THAT is not, in essence, fear at all.

Fear LEST/MIPOS, finally, has the following presuppositions:

(93) Presupposition 1: whether Maria is coming or not is under discussion. This is consistent with the fact that \( \text{mipos} \) is interrogative possibility.
    Presupposition 2: the fear space is nonveridical, as is the case with FEAR TO.
    Assertion: in all fear worlds the question is resolved positively, i.e., \( p \) is the case.

In other words, FEAR MIPOS/LEST is a variant of FEAR TO, with the additional question presupposition—that is motivated in Greek by the fact that MIPOS is an interrogative particle. The use of \( \text{mipos} \) has remained mysterious in the Greek literature for quite a while, and the analysis we offer here is new:

(94) Fear predicate (FEAR to)

\[
[i \text{FEAR } p]^{w,E} \text{ is defined iff:}
\]
(i) whether \( p \) is/was/will be true or not is under discussion (\( p \) or \( \neg p \)); and
(ii) \( E \) is nonveridical and contains \( p \) and \( \neg p \) worlds (emotive nonveridicality).
If defined:
\[
[i \text{FEAR } p]^{w,E} = 1 \text{ iff } \forall w' \in \text{PE-fear}_E p(w')
\]

\text{Mipos} and \text{lest}, in this analysis, are sensitive to the question presupposition, and they need a question presupposition to be licensed. In this sense they are like the subjunctive and \( \text{pu} \) which are also sensitive to the presupposition. We can think of them as special subjunctives, since they presuppose a nonveridical space, differing from the "regular" subjunctive in that they presuppose a question.

Expletive negation in this context behaves similarly, and this explains why it appears to be like a mood—as proposed by Yoon (2012). Yoon further proposes that expletive negation—therefore also \( \text{mipos} \), in our account—carries expressive content in the sense of Potts (2007). Nothing in what we presented here, however, necessitated the use of expressive content.
7.7 Conclusions

In this chapter, we considered the mood patterns observed with propositional attitudes of emotion which include the following:

(95) Attitudes of emotion
   a. Attitudes known as emotive such as, e.g., the English be happy, regret, be surprised, be angry; these designate various kinds of emotion towards a fact or something that the subject perceives as a fact. Emotives can be positive or negative.
   b. Attitudes that we will label ‘epistemic’ emotives, such as be aware, remember. Such attitudes combine an emotive component with an epistemic component in their meaning.
   c. Attitudes of fear, known also as verba timendi such as, e.g., the English fear, be afraid. These attitudes express the specific emotion of fear. Fear, in contrast to the the previous attitudes never relates to a fact.

Emotion attitudes utilize verbs and adjectives that are gradable, and are used to convey an emotion. In dealing with emotion attitudes we articulated a precise semantics for emotion which capitalized on their scalar nature. We proposed a morphism between emotion scales and worlds which renders the emotive space nonveridical, thus sanctioning the indicative. Emotive predicates also have a presupposition of subjective veridicality or factivity, which is responsible for licensing the Greek presuppositional complementizer pu. Languages that lack this complementizer typically resort to the subjunctive (though the indicative may still be an option; Quer 2001). Emotion predicates will come with lexical entries that are akin to the mixed veridicality patterns of modals, bouletic attitudes, and suppositional doxastics that we are, by now, familiar with. Verbs of awareness can also be construed as containing emotive scales— and in this case they select subjunctive, as expected. This is the case of Italian. Again as expected, Greek grammaticalizes awareness as a knowledge predicate.

We distinguished, finally, three kinds of fear attitudes: fear to, fear that, fear lest. Fear is not a monolithic emotion in our framework. We offered a new semantics for fear predicates as denoting gradable emotion, and this semantics explained the variation in the mood patterns observed without appeal to expressive content.

To conclude our discussion, we are now ready to provide a complete picture of our view.
### 7.7. CONCLUSIONS

<table>
<thead>
<tr>
<th>Notion</th>
<th>Value</th>
<th>Attitude Type</th>
<th>Greek</th>
<th>Italian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solipsistic</td>
<td>Believe</td>
<td>istevo, nomizo 'believe', 'think'</td>
<td>credere, pensare, 'believe', 'think'</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dream</td>
<td>onirevome 'dream'</td>
<td>sognare 'dream'</td>
<td>imaginare 'imagine'</td>
</tr>
<tr>
<td></td>
<td>Imagine</td>
<td>fandazome 'imagine'</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Doxastic     | Believe     | credere, pensare 'believe', 'think' |                    |                   |
|              | Certainty   | essere sicuro 'be certain', essere convinto 'be convinced' |                    |                   |
|              | Convinced   |                    |                    |                   |

| Suppositional | Memory     | thimame 'remember' | ricordarsi 'remember' |                    |
|              | Perception | vlepo, aksoso 'see, hear' | sembrare 'see' |                   |
|              |            | fenome 'seem' |                    |                   |

| Epistemic modal verbs | epistemic modal verbs | epistemic modal verbs è necessario, possibile, probabile; it is necessary, possible, probable |                    |

| Bouletics     | Solipsistics | thelo 'want' | Volere 'want' |                    |
|              | Deontic      | deontic modals | È necessario (it is necessary) |                    |

| Factive       | Emotion      | Metanisono 'regret' | Esere contento, be happy |                    |
|              |             | Xairome 'be glad' | Esere sorpreso, 'be surprised' |                    |

| Solipsistics  | Awareness   | exo epignosi 'be aware' | Esere cosciente 'be aware' |                    |

| Suppositional |            |                           |                           |                    |

| Knowledge     | Gnorizo 'know' | Sapere 'know' |                    |                   |

Figure 7.4: Notions, values and attitude types: solipsistic and suppositional variants – final
Chapter 8

Epilogue: Veridical and Nonveridical Stance

8.1 What we found

We set out at the beginning of this journey to investigate the central question—central for language, central for thought—of how truth and veridicality are conceptualized in the grammar of human language. We established a number of phenomena that are particularly revealing for such an exploration, namely modality, propositional attitudes, temporal dependencies and mood selection. In this final chapter, we will highlight what we think the central findings of our investigation have been, and what the implications are for other related phenomena.

One important thing that we found was that knowledge is the only realm of fact—the realm traditionally called factive or realis, and which we identified with objective veridicality. Knowledge verbs are the only verbs whose complement sentences refer to actual facts. In any other embedding, the world and reality are accessed only privately and indirectly, via subjective representations that involve building veridical or nonveridical attitudinal (or mental, or cognitive, if one prefers those terms) states anchored to the speaker—as is the case with modals—or the propositional attitude bearer, as is the case with attitude verbs.

The semantics of modal verbs and propositional attitudes is a privileged locus within which to observe how individuals rely on their own conceptualization of the reality, through language, in the attempt to structure possibilities according to their knowledge, beliefs, and priorities. Across modal verbs, adverbs and propositional attitudes, language reveals how humans structure the reality, by anchoring it to their own partial understanding and expectations. We conceived propositional attitude and modal meanings as postures, or stances, towards propositions, and as spaces that assign truth values to those propositions subjectively. Our approach to
modals and attitudes has been that they are quite similar, differing essentially only in what kind of anchor they have: the speaker for modals, but the attitude subject for propositional attitudes. The logic of, and constraints in, reasoning with these expressions are essentially the same, as we showed.

The veridical stance relies on a homogenous epistemic or doxastic state, and creates commitments of the individual anchors. Commitments are kinds of certainties that the anchors have about the truth of the propositions. We say ‘kinds’ of certainties because, as we saw, veridical commitments can be doxastic (belief based), or they can be based on memory— which we argued can be construed as a kind of belief— , or on perception, desire, and expectations. Expectation can be understood as comprising elements of both desire and belief, as we saw in chapter 5, and some verbs (e.g. verbs of persuasion, assertive verbs, negative verbs) vacillate between the two options and may be anchored to either state. Veridical commitment can even be purely fictional, as is the case with dreams and fictional contexts, in which case they subjective veridical stance replaces reality completely.

On the other hand, agents often reason with uncertainty, and we think of this as the nonveridical stance. Reasoning with uncertainty is one of the features of the human mind that mostly puzzles theoreticians across disciplines in a large variety of domains. In the nonveridical stance, the mental state is partitioned into \( p \) and \( \neg p \) worlds, and this was shown to weaken the meaning of a propositional attitude and a modal. This weakening typically takes the form of a presupposition. Hence, in the subjective realm, while the veridical stance typically dominates the assertion, the nonveridical stance manifests itself as a presupposition. In the objective realm, that is with knowledge, veridicality characterizes both.

At a deep level, we have argued for a unificatory theory of attitudes and modals, whereby belief becomes the counterpart of the modal MUST in the realm of attitudes. MUST, we have shown, conveys a nonveridical stance, i.e. uncertainty in the epistemic state, and combines it with commitment in the doxastic space, and the Italian doxastic verbs we discussed were pretty similar. Given this uniformity across modals and attitudes, we believe that our theory has touched upon a deeper mechanism in human linguistic and cognitive behavior, one that acknowledges uncertainty while expressing commitment. It is refreshing, we think, to recognize that and, to our eyes, surprising how seriously this possibility has been overlooked in previous literature. Scholars talk about ‘weak’ and ‘strong’ modals or attitudes, presuming monolithic characterizations of the meanings. But we have shown that uncertainty and commitment can co-exist in a lexical entry (‘mixed’ veridicality). We have shown this to be a quite general case, and for this reason we avoided using the terms ‘weak’ and ‘strong’, since they are, from this perspective, meaningless. The only meaningful application of ‘weak’ and ‘strong’ is to distinguish between what we called solipsistic and suppositional attitudes.
Our overall conclusion about the grammatical phenomenon of indicative versus subjunctive choice in embedded clauses (complements, adjuncts, relative clauses) has been that indicative is the mood not of realis, but of the (objective and subjective) veridical stance; and the subjunctive is the mood chosen when the individual anchor has a nonveridical stance towards the proposition $p$. Having a nonveridical stance toward $p$ means, that the subjunctive is chosen when the anchor cannot be committed to the proposition. When the anchor cannot be committed to the proposition, there is uncertainty in the propositional attitude meaning, and a modal base associated with it is partitioned into $p$ and $\neg p$ worlds, hence it does not entail $p$.

8.2 Mood choice, propositional attitudes, and modals

We have distinguished between two main manners in which individuals can relate to the reality. One is by entirely abstracting from it; this is what is observed with what we have called ‘solipsistic’ attitudes. Individuals are assigned thoughts and wishes which are conceived as independent of what they know of reality.

Another way to relate to the reality is by acknowledging lack of knowledge. All modal verbs, we argued, convey lack of knowledge, hence they express a nonveridical stance; they are the devices chosen when the speaker is not sure that a sentence is true. Recall: the speaker has a choice to use the simple past or present tense lacking modals, or to use a modal verb:

(1) a. It is raining.
   b. It must be raining.
   c. It may be raining.

The modal sentences do not entail that it is raining, or that the speaker knows that it is raining. The bare assertion, on the other hand, requires that the speaker follows Gricean Quality, i.e., she does not have the intention to lie or deceive, and she intends to convey that she knows, or has grounds to believe that it is raining. By uttering the sentence ‘It is raining’, the speaker wants to share her knowledge with her audience. Sharing the knowledge means that the speaker intends $p$ to be added to the common ground and become public knowledge. Upon adding $p$ to the common ground, a listener might object to it if they know otherwise, e.g. if they just came back from outside and notice that it is no longer raining. But insofar as the speaker is concerned, and given what she knows at the time of utterance, it is true that it is raining.

When the speaker has this knowledge, we say that the speaker is in a veridical state regarding the proposition It is raining. And being in a veridical state means
that the speaker has the attitude of being fully committed to the proposition *It is raining*. A veridical state is a precondition for assertion, we argued:

(2) **Veridical information state as a prerequisite for assertion**

A sentence S is assertable if and only if the speaker is in a veridical state about *p* denoted by S.

Indicative is thus the mood by default associated with a veridical state. Likewise, when the speaker asserts a negative sentence, she is committed to the truth of ¬*p*:

(3) *It is not raining.*

In this case, the speaker knows or believes that it is not raining; by asserting the sentence, therefore, we conclude that she has a veridical stance to ¬*p*, and proposes to add ¬*p* to the common ground. The unmodalized negative assertion is epistemically stronger than the assertion of a modal sentence, we will argue, in that it reveals that ¬*p* is is known by the speaker, whereas the modal sentence implies that the speaker does not know.

The shift from indicative to subjunctive reveals these two stances towards truth: the veridical, and the nonveridical stance. We have distinguished between two types of attitudes:

(4) **Two kinds** of propositional attitudes ATT

i. Solipsistic ATT: no presupposition

ii. Presuppositional ATT: ATT has a mixed lexical entry with presupposition(s) and a truth condition. ii. ATT includes attitudes and modals

(5) **Veridical** propositional attitudes

i. Solipsistic attitudes are nonveridical: they entail that *p* is true in the anchor’s *i* modal space.

ii. The modal space is a variant of Dox(*i*) and Boul(*i*).

(6) **Nonveridical** propositional attitudes and modals

ATT is nonveridical iff ATT obeys the nonveridicality Axiom.

(7) **Nonveridicality axiom**

i. For any propositional attitude or modal ATT, ATT obeys the Nonveridicality Axiom iff *i* ATT *p* presupposes that M(*i*) is nonveridical, i.e. partitioned into *p*, ¬*p* worlds.

The principles that guide mood choice in our theory are the following:

(8) **Licensing condition for the subjunctive mood**

The subjunctive is licensed in the complement of a nonveridical ATT, i.e.
an ATT that obeys the Nonveridicality axiom.

(9) Licensing condition for the indicative mood

The indicative is licensed in the complement of a veridical ATT, i.e., a solipsistic or epistemic attitude.

We have also seen cases where the subjunctive itself is a modal category, akin to a possibility epistemic modal (in questions, relative clauses).

Doxastic attitudes such as those of belief have often been considered the prototypically solipsistic attitudes, and bouletic attitudes such as those of desire have been treated as the prototypically presuppositional attitudes. We have nonetheless shown that the matter is more nuanced than this. Doxastic lexical entries can be weakened with the infusion of nonveridicality presupposition of epistemic uncertainty, as was to shown to be systematically the case in Italian. Bouletics, reversely, can become solipsistic as in the case of HOPE and PROMISE. Attitudes of memory and perception can be also construed as both, in both Greek and Italian.

These fine grained distinctions have lead us to pose a system where attitudes reveal notional categories that can have different values manifested across languages. We have argued that we can spell out general tendencies, whereby Greek is a language that predominantly goes solipsistic, whereas Italian is a language that predominantly goes presuppositional. These general tendencies, however, are bypassed by contingent and probably diachronic and historical considerations, whereby contact, prototypicality effects across neighboring categories can affect mood choice. Any type of system that theoreticians might want to propose, can only be partial and capture the distributions in mood choice at a precise stage of the development of each of the languages.

8.3 What mood flexibility tells us

We observed that mood flexibility with propositional attitudes is much more rampant than previously thought, and we took that flexibility to indicate flexibility in the attitude meaning, specifically that it is possible to be construed as obeying or not obeying the Nonveridicality axiom. Mood shift does not necessitate ambiguity in the verb meaning, we argued—but indicates that some attitude verbs can be underspecified.

In this connection, we also observed potential shifts between bouletic and doxastic states with a single lexical entry. We found this to be the case in chapter 5 with verbs of persuasion and assertion. When combining with a tense other than the NONPAST, the verbs meanings were shown to shift to the doxastic state. Such models are more naturally compatible with past and present, since only facts about
the past or the present can be known or believed. The lower tense of the comple-
ment was crucial in triggering the shift in the modal base as we saw, not the mood
particles. Our account thus offered a simple explanation for what otherwise could
be thought as lexical ambiguity, and renders tense the key factor. If models of
evaluation are available for attitudes, and if doxastic/epistemic and bouletic are
the two major states, shifts between the two are not unexpected, but are in fact
consistent with the properties of the lower tense. The shifts from doxastic to de-
ontic modals are very similar and depend on tense in a very tight way. These
shifts are therefore one more reason to believe that propositional attitudes and
modal verbs are closer in their composition and logic than previously believed.

At this point here is a number of very reasonable questions. Why is it that
some attitude types have flexibility and others do not? Why are the Greek doxas-
tics construed only solipsistically, but in the same language attitudes of memory,
perception, and persuasion are construed flexibly like in Italian? Why is it that
bouletics such as WANT are rigid in mood in both Greek and Italian, but HOPE
and PROMISE words can be flexible? Why do some attitudes pose temporal re-
strictions on the arguments, and others do not? While it is impossible to give
conclusive answers to all of these questions, we offered some concrete ideas that
can help pave the way towards a more comprehensive understanding of the cog-
nitive and conceptual aspects of the meanings of the attitudes.

For instance, we suggested that WANT expressions are anti-factive. This
means that they have an objective veridicality presupposition that the complement
of WANT is not true at the time of utterance. This necessitates the future shifted
NONPAST in the complement and excludes all other tenses. On the other hand,
the implicative and ability meaning necessitate that ability and necessary means
are concurrent with action: the morphological non-past in this case therefore can-
not future shift, and will contribute the coincidence zero tense. Our approach has
been that if we achieve an adequate understanding of the semantics of the atti-
dutes, their temporal restrictions will follow. It will also follow what kinds of
states they will combine with and whether the attitudes will be flexible or not.

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lexical entry. We found this to be the case in chapter 5 with verbs of persuasion
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available for attitudes, and if doxastic/epistemic and bouletic are the two major
states, shifts between the two are not unexpected, but are in fact consistent with
8.4 Anchoring, (non)veridicality, and informativity

Recall that in Greek mood morphemes appear as subordinators. We argued that their function to give instruction about how to anchor the embedded proposition to the main clause. Anchoring will result in updating the attitude M with the complement proposition. Semantic subjectiveity is mirrored in the way the information updates will work.

Concerning the relation between propositional attitude meaning, embedding, and the common ground, we wanted to also note the following. While with solipsistic attitude, the private space replaces the common ground, with the presuppositional attitudes, the role of knowledge becomes primordial. In this respect the
truth of the prejacent becomes central given that epistemic knowledge calls into question its objective truthfulness. The speaker does not know whether \( p \) is objectively true, but by activating this presupposition, the question of whether \( p \) is objectively true becomes at issue. For this reason, with presuppositional attitudes, we have advanced the hypothesis that mood can also anchor \( p \) to the common ground, although future research will determine the mechanics of this update.

One type of indicative (Greek \textit{oti}), we argued, performs \textit{assertive} update. We called this \textit{Private Anchoring!}:

\begin{equation}
\text{(10) Indicative update: Private Anchoring!}
\end{equation}

\begin{equation*}
\text{Anchor } p \text{ to epistemic M(subject), or Dox(subject).}
\end{equation*}

The \textit{oti} proposition is a signal to add \( p \) to the local M(subject) or Dox (subject). Because it is an embedded clause, addition cannot happen to the common ground, as we said; only the propositional attitude sentence itself (\( i \ ATT p \)) gets added to the common ground. The addition of \( p \) to M or Dox, narrows down the worlds in those spaces by intersection, as expected.

\begin{equation}
\text{(11) Dox(i) + } p = \{ u' \text{ in Dox/M where } p \text{ is true}\}
\end{equation}

The update Private Assert! anchors \( p \) to the main subject’s private space, thus performing a kind of context shift, and adds \( p \) to the private space. The private spaces can expand by adding propositions, just like unembedded assertions add to the context set W(c). Embedded indicative in Italian functions in exactly the same way. \textit{Oti} is unnecessary in main clauses, where addition happens in the common ground, and this explains without any additional assumptions, the absence of \textit{oti} in main clauses. \textit{Oti} performs only private assert; it is not a lexicalization of the Assert operator.

But the indicative can also perform presuppositional anchoring. This is revealed with \textit{pu} in Greek. In this case, \( p \) is required to already be in the common ground:

\begin{equation}
\text{(12) PU-update: Presuppositional anchoring}
\end{equation}

\begin{equation*}
\text{\( p \) is already in the common ground.}
\end{equation*}

This captures the distribution of \textit{pu} with \textit{KNOW} and emotive factives. The fact that Greek lexicalizes an assertive and a non-assertive distinction in the indicative suggests quite clearly that the indicative mood is not fully isomorphic to assertion, contrary to what e.g. Farkas 2003 claims.

For subjunctive, we proposed \textit{Non-veridical anchoring}:

\begin{equation}
\text{(13) Subjunctive anchoring: Non-assertive anchoring}
\end{equation}

\begin{equation*}
\text{Do not add } p \text{ to M or the common ground.}
\end{equation*}
8.4. ANCHORING, (NON)VERIDICALITY, AND INFORMATIVITY

The subjunctive mood is a prohibition: do not add \( p \) to \( M \). Given that, as we saw in chapter 3, main clause subjunctives are non-assertions, we can generalize that the subjunctive mood is an instruction \textit{not} to add \( p \) to the common ground. If that is so, then the sensitivity to nonveridical semantics follows since it is only when the predicate presupposes non-homegenity that \( p \) cannot be added to the \( M \) or the common ground.

A comparable update is the inquisitive anchoring with embedded questions (Greek \textit{an}, ‘whether’). Inquisitive anchoring is a special case of nonveridical anchoring, we said:

\begin{enumerate}
\item[(14)] C-AN triggers AI: \textit{Inquisitive anchoring}
\end{enumerate}

\[
\text{Update } C \text{ with } ?p
\]

Inquisitive anchoring adds specifically a question to the common ground \( C \). The subjunctive does not add a question, but a question is indeed a nonveridical space. At this point, we want to offer some final thoughts on the effect of indicative versus non-indicative which, as became clear, goes beyond mere mood choice in complement clauses.

The nonveridical state emerges as the underlying state for \textit{all} non-indicative moods, including those which change the illocutionary force such as imperatives, optatives, and, of course, questions. Giannakidou 2013 characterizes nonveridical assertions \textit{inquisitive}, thus similar to questions in that they have "non-trivial inquisitive content; and they are informationally weaker than past or present positive and negative assertions." (Giannakidou 2013: 45). Hence, she concludes, from the point of view of nonveridicality, assertions do not behave as a uniform class, therefore a categorical distinction between assertion (trivial inquisitive content) and non-assertion (trivial informative content) is not desirable.\footnote{Biased questions, at the same time, convey substantial information; hence, though inquisitive, their informative content is non-trivial. This suggests that the divide between inquisitiveness and informativity does not map straightforwardly onto assertion vs. question.} More desirable, and indeed reliable, is the difference in veridicality.

Ciardelli et al. 2014 offer the following fact:

\begin{enumerate}
\item[(15)] Fact (Inquisitiveness in terms of possibilities)
\begin{enumerate}
\item \( \phi \) is inquisitive iff there are at least two possibilities for \( \phi \).
\item \( \phi \) is an assertion iff there is exactly one possibility for \( \phi \).
\end{enumerate}
\end{enumerate}

By Fact (15), and given that the two possibilities for \( \phi \) are \( \phi \) and \( \neg\phi \), inquisitiveness becomes synonymous to nonveridicality (Giannakidou 2013):

\begin{enumerate}
\item[(16)] Veridical and nonveridical modal spaces, homogeneity (Giannakidou and Mari, 2018b)
\end{enumerate}
a. A modal space $M$ is *veridical* with respect to a proposition $p$ iff it is positively homogenous: $\forall w'(w' \in M \rightarrow p(w'))$

b. A modal space $M$ is *nonveridical* with respect to a proposition $p$ iff it is non-homogenous: $\exists w', w'' \in M (w' \neq w'' \land (p(w') \land \neg p(w''))$

c. A modal space $M$ is *antiveridical* with respect to a proposition $p$ iff it is negatively homogenous: $\forall w'(w' \in M \rightarrow \neg p(w'))$

Inquisitive and nonveridical sentences convey nonveridical epistemic states, i.e. states with polar partitioning into $p$ and $\neg p$ worlds. So, inquisitive and nonveridical sentences boil down to the same thing. This is, we think, an important link to establish. A question, we argued, is like a possibility modal and conveys nonveridical equilibrium; a biased question is like a MUST modal and conveys bias. Veridicality and non-veridicality thus transcend the illocutionary force divide (assertion vs. question). Likewise, imperatives can be thought of as denoting nonveridical spaces, and they certainly have a nonveridicality presupposition. But, contrary to how most researchers think about it, non-assertion is not the cause of nonveridicality; it is its effect. A non-homogenous state what all non-assertions have in common.

In questions, there is nonveridical equilibrium, true uncertainty as to where the actual world is, i.e. in the positive or the negative space. The equilibrium is disrupted when the question is manipulated by material that creates bias. Universal modals are also manipulators of the nonveridical equilibrium, as we showed, and create bias towards $\phi$. What is common in all nonveridical/inquisitive states is that the epistemic agent has a choice about where to place the actual world: in the positive or in the negative space.\(^2\)

The final lesson from our work, thus, has to do with the division of labor between informativity and (non)veridicality. Roughly, the proposed distinction in Ciardelli et al. is the following:

\[(17) \quad \text{Inquisitiveness and Informativity}\]

a. A question $\text{?}\phi$ has trivial informative content.

b. An assertion $\text{Assert}\phi$ has trivial inquisitive content.

Our discussion has shown that nonveridical assertions are inquisitive, they thus have non-trivial inquisitive content; and they are informationally weaker than past or present positive and negative assertions. Hence informativity correlates directly with (non)veridicality and not with illocutionary force. Other moods can also be understood in this way, e.g. the conditional mood, which we didn’t discuss here.

\(^2\)Disjunctions, Giannakidou 2013 notes, come with partitioned spaces too. The partition can be the expected polar one (*it rained or it didn’t rain*), but it doesn’t have to be; it can also be a choice between two positive choices, $p$ and $q$. 
because Greek and Italian do not have it. The misnomers used in the literature, however, such as indicative vs. subjunctive conditionals, can now be understood in the light of the theory we developed here. The notion of veridicality and commitment has been applied to the conditional protasis in recent work by Liu (2018).

In the end, what seems to matter is whether a sentence presents the epistemic agent, i.e., the individual anchor, with one or more possibilities about the world, i.e. whether it reflects a homogenous or non-homogenous stance. Superficially, this appears to correspond to the contrast between assertion vs. non-assertion. However, nonveridical assertions (which are ‘inquisitive’) show us that the contrast is just that: superficial. The more fundamental distinction is between a partitioned or not modal space: this matters for a number of phenomena such as propositional attitudes, modality, mood choice— as well as negative polarity items, free choice items and similar phenomena as has been shown in earlier literature. In more recent literature, the nonveridical stance has been shown to be key to deriving presuppositions of evaluative adverbs (Liu 2012) as well as intensifying adverbs such as totally (Beltrama 2018).

It seems, thus, unavoidable to conclude that nonveridical partitioning vs. homogeneity (veridicality, commitment) is telling us something very essential about the logic of human language.
Chapter 9

References


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