Mixed (Non)veridicality and mood choice in complement clauses: starting with emotive verbs

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1   Emotive predicates and the subjunctive: need for two tiers

The initial puzzle in this paper is why emotive predicates in some languages, such as French and Italian, chose the subjunctive mood:

(1)   a.   Jean *regrette* que Marie ait   lu   ce livre.
           John regrets that Mary have.3SG.SUBJ read this book.
      b.   Gianni *rimpiange* che Maria abbia   letto questo libro.
           John   regrets   that Mary have.3SG.SUBJ read this   book.
           John regrets that Mary has read this book.

The appearance of subjunctive is unexpected because emotive verbs have been characterized as *factive*, *presuppositional* (Kiparksy and Kiparsky 1970, Kartunnen 1973), and *veridical* (Giannakidou 1998, 1999, 2009). Their complement is presupposed to be true. Their non-emotive cousins meaning *know* take the indicative:

(2)   a.   Jean *sait*   que Marie a   lu   ce livre.
           John knows that Mary have.3SG.SUBJ read this book.
      b.   Gianni *sa*   che Maria ha   letto questo libro.
           John   knows that Mary have.3SG.SUBJ read this   book.
           John knows that Mary has read this book.

Factive *know* selects the indicative, the mood of veridical sentences (Giannakidou 1998, 1999, 2009). If emotives are factive like *know*, why do they take the subjunctive? If both *know* and emotives are veridical, how can we explain the contrast between the two vis-à-vis the subjunctive?

The usual way mood selection in complement clauses has been handled in the literature is by proposing a generalization about the decisive property that necessitates subjunctive or indicative. Simple generalizations have been proposed: for instance, that emotive verbs are veridical (as just mentioned, see also Marques 2004, 2010, Baunaz 2015), that they denote preference between two alternative propositions (Villalta 2008). Related notions have been used, e.g. epistemic commitment (Smirnova 2012), and contextual commitment (Portner and Rubinstein 2012)— to mention just some of the most recent approaches. Unfortunately, none of the approaches offers a satisfactory way to address the emotives, and this because the treatment is monolithic, i.e. the selecting predicate is veridical or nonveridical, or has or does not have

the required property for the subjunctive. The problem becomes more acute when we take into consideration that the emotive class varies wrt whether it takes the subjective or the indicative. Giannakidou (2015) offers data and references indicating three types of languages:

1. Languages that require subjunctive (Spanish, Italian,[1] French, as above);

2. Languages that allow both subjunctive and indicative ((Brazilian) Portuguese, Catalan, Turkish);

3. Languages where emotives select indicative (Greek, Hungarian, Romanian, Bulgarian); the emotive complement may be distinguished in some other way.

Veridicality and epistemic commitment predict indicative after emotives (therefore capture the languages in 3), while preference accounts can capture the use of subjunctive in languages in group 1. The accounts are therefore at best partial, and no approach can be generalized to predict the observed variation, and the potential of dual patterns.

The variation illustrates, in the clearest way, the complexity one is confronted with when trying to establish a general pattern of mood choice across a number of languages— and how difficult, indeed almost impossible, it is to come up with a single generalization that will be able to handle all cases. In the present paper, we take this variation to suggest that a more nuanced approach is needed, one that might allow verb meanings to combine veridical with nonveridical components. This can be done if we distinguish between what a selecting verb asserts and what it presupposes. Once we make this distinction, we see that verb meanings can exhibit what we call *mixed* (non)veridicality, i.e. they can combine a nonveridical assertion with veridical presupposition and vice versa. Emotives, we argue are one such case; and it turns out that the number of predicates with mixed (non)veridicality is quite large. Upon closer scrutiny, it becomes clear that indeed many lexical entries are mixed, therefore flexible with respect to mood choice, as it indeed appears to be the case also in classes beyond the emotive one.

In the present paper, we use the emotive class as a window to rethink the fundamental issues arising with mood selection in complement clauses, and offer a two-tier theory that can to explain the three patterns we observe with emotives, as well as the general patterns of mood choice in Greek and Italian, our main languages of study. Our goal is to provide a broad semantic typology that relies on the idea that mood selection, as a grammatical phenomenon, is sensitive to the property of (non)veridicality (Giannakidou 1998, 2009, 2011, 2015)— but we refine the theory by (a) distinguishing between (non)veridicality in the assertion vs. presupposition, and (b) allowing the subjunctive/indicative morphemes to be sensitive to (non)veridicality in either level.

Before we start with the analysis, let us offer one more piece of background, necessary for framing our analysis. Emotive predicates are also well known for allowing negative polarity items (NPIs) to appear in their complements (see Baker 1970, Linebarger 1980; for more recent discussion Giorgi and Pianesi, 1996, Giannakidou 2006):

(3)   Ariadne regrets that she *ever* read that book.

(4)   Ariadne is glad that we got *any tickets* at all.

The NPI licensing is typically attributed to some kind of negativity. Baker (1970) says that emotives express a relation of *contrariness* between a fact and some mental or emotional state. He claims that "We say that we are surprised when a certain fact does not conform to our

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[1]We will discuss later in the paper a few exceptions to this generalization.

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expectations; relieved when it does not conform to our fears; disappointed when it is not in line with our hopes. Likewise, we say that a certain fact is odd or strange if it seems counter to our view of what is logical." Giannakidou 2006, following Linebarger 1980, argues that the NPIs *ever* and *any tickets* are sanctioned in the emotive clause via this contrariness inference, and suggests that the inference is "not merely a conversational implicature, but rather something stronger" (Giannakidou 2006: 595). In this paper, we show that the contrariness of the emotives is a defining element of emotion and what renders them nonveridical in the assertion. At the same time, they are veridical in the presupposition, and this explains the observed variation in mood selection.

The licensing of the subjunctive, we will argue, is akin to NPI licensing which his also sensitive to nonveridicality. In pursing this, we follow a constant line of thought that talks about *polarity subjunctive* — sometimes put informally in the late 90s, but most clearly expressed in Giannakidou 1998, 2009 who argues that the subjunctive is a polarity item, and thus unifies for the first time mood choice and NPI licensing as two grammatical phenomena sensitive to nonveridicality (see Quer 2009 for overview and earlier references). In our analysis here, we cast the role of mood expressions and their sensitivity to (non)veridicality via definedness conditions. These definedness conditions are presuppositions of the particles, and, given the possibility of mixed (non)veridicality, they explain both the strict selection patterns, as well as flexible cases where a verb is compatible with more than one mood. In contrast to the subjunctive which is akin to an NPI, the indicative is understood as a positive polarity item (PPI), requiring veridicality— in the assertion or the presupposition, and this explains why Greek possesses two indicative particles, as we see next.

We start in section 2 by presenting the core selection patterns. In section 3, we present the framework of nonveridicality for mood choice, with particular emphasis on the objective and subjective dimension of (non)veridicality. In section 4 we discuss the lexical entries of selecting verbs, establishing that there the two tiers: assertion vs. presupposition, and mixed cases of (non)veridicality. Emotives will be argued to combine a veridical presupposition with a nonveridical assertion. The latter emerges via an emotive scale. In section 5 we offer a semantic typology of verb meanings, and in 6 an optimality theoretic account of mood choice given the definedness conditions on the moods in Greek and Italian. We show that the two languages are characterized by two opposing tendencies, best captured as *Veridicality wins* (Greek), and *Nonveridicality wins* (Italian).

2   Main selection patterns in Greek, Italian, and French

Mood choice has been a central issue in semantics, both formal and descriptive, but we will not attempt a general overview here (see Farkas, 1982; Villalta, 2008; Quer 2009 for a recent overviews, also Portner and Rubinstein 2012; Smirnova, 2013; see also Giannakidou 1994,1998, 1999, 2009, 2011, 2015, for Greek; Marques 2004, 2010 for Brazilian and European Portuguese; Mari 2015 for Italian; Quer 1998, 2001, for Catalan and Spanish; Sarigul 2015 for Turkish, Baunaz 2015 for French).

The main selection patterns that we find in Romance languages and Greek are as follows.

(5)   Indicative verbs in Greek

      a.   assertives: leo (say), dhiavazo (read), isxirizome (claim)
      b.   fiction verbs: onirevome (dream), fandazome (imagine)
      c.   epistemics, non-factive: pistevo (believe), nomizo (think)
      d.   epistemic factive verbs: ksero, gnorizo (know)

(6) Indicative verbs in French

    a.   assertives: lire (say), lire (read), soutenir (claim)
    b.   fiction verbs: rêver (dream), imaginer (imagine)
    c.   epistemics, non-factive: croire (believe), penser (think)
    d.   epistemic factive verbs: savoir (know)

Italian behaves like French and Greek, with the exception of *belief* predicates, which select the subjunctive by default (Giorgi and Pianesi, 1996). We address Italian belief verbs later in the paper, after all our main details are clear (for an extended discussion, see Mari 2015). In the rest of European languages, as well as Turkish (Sarigul 2015), complements of belief and fiction verbs behave like complements of knowledge verbs: they select indicative.

In Greek, we have a system of complementizer particles that signal mood: *na* is for subjunctive, *oti* for indicative. (This pattern is observed also in Balkan (Slavic) languages and Romanian, see Giannakidou 2015 for references). The subjunctive particle *na* precedes the tensed verb, but the indicative is unmarked in main clauses, i.e. past tenses (simple past, imperfective past, perfect tenses) and the present are indicative.[2] In embedded clauses the indicative particle *oti* is used:

(7)   Thelo   na/*oti   kerdisi   o Janis.
    want.1sg SUBJ/IND win.NONPAST.3SG the John.
    I want John to win.

(8)   O Pavlos kseri   oti/*na   efije i   Roxani.
    the Paul   knows.3SG that.IND/*SUBJ left. 3SG the   Roxani.
    Paul knows that Roxanne left.

Na is typically followed by the form glossed above as NONPAST, which itself is licensed and only appears with *na*, the future particle, and other nonveridical particles. It is the form that gives future orientation (see Giannakidou 2009, and Giannakidou and Mari 2015 for details), akin to prospective aspectual forms (Matthewson, 2012).

The indicative pattern is challenging for the traditional view that the indicative implies 'true in the actual world', because complements of belief, fiction, and assertive verbs are not true in this sense. Of the indicative complements, only complements of *know* are true of the actual world. But the grammar of mood selection appears to make no distinction between actual truth and imagined or believed truth. This we need to keep in mind, as it motivates the notion of subjective veridicality that we discuss in the next section– and which also, we will argue, underlies emotive verbs (Giannakidou 2013).

With emotive verbs, Greek does not use *oti* or *na*, but another particle *pu*:

(9)   O Pavlos lipate pu/*oti/*na efije i Roxani.
    the Paul is-sad.3SG that left. 3SG the Roxani.
    Paul regrets that Roxanne left.

The *pu* complement contains a past tense, it is therefore indicative in the sense an unembedded past is; but *pu* does mark the complement formally as distinct from the other indicative *oti*. *Pu* follows emotive verbs (cf. Christidis, 1981; Varlokosta, 1994, Giannakidou 2015), but also memory verbs such as *thimame* 'remember', and occasionally *ksero* 'know' . In the Greek literature, *pu* is treated as a variant of the indicative, and Giannakidou (2015) claims that it also

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[2]One cannot fail to note the parallel with the so-called direct evidential which is typically an unmarked past or present too, see e.g, Smirnova 2013 for Turkish and Bulgarian.

has expressive content. We propose here an analysis in which *pu* is sensitive to veridicality in the presupposition.

Verbs selecting subjunctive belong to the following classes.

(10)   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.   permissives: epitrepo (allow); apagorevo (forbid)

(11)   Subjunctive verbs in Italian

    a.   volitionals: volere (want),

    b.   directives: ordinare (order), consigliare (suggest)

    c.   modal verbs: è necessario (must), è posssibile (may), bisogna (must).

    d.   permissives: impedire (forbid)

Volitional licenses subjunctive mood in Greek and Italian (12).

(12)   a.   Thelo   na   kerdisi   o Janis.
           want.1SG that.SUBJ win.NONPAST.3SG the John.

     b.   Voglio   che Gianni vinca.
           Want.1SG.SUBJ that John   win.3SG.SUBJ.
           I want John to win.

A volitional component is not necessary for the subjunctive, e.g. modal verbs in both epistemic (13) (note the past tense in the embedded clause) and dynamic uses select the subjunctive.

(13)   a.   Bori/Prepi na   kerdise   o Janis.
           Can/Must that.SUBJ win.PAST.3SG the John.
           It is possible that he has won.

     b.   È   possibile che abbia   vinto.
           Be.3SG.IND possible that have.3SG.SUBJ won.
           It is possible that he has won.

(14)   a.   Ine   pithano na   kerdisi.
           is.3sg possible subj win.nonpast.3sg.
           He may win.

     b.   È   possibile che vinca.
           Be.3SG.IND possible that win.3SG.SUBJ.
           He may win.

Logically, *May/can* p does not entail p, and *must* is also nonveridical, since must p does not entail that p either (see recently lengthy discussion in Giannakidou and Mari 2015); apart from aleithic MUST, no other use of MUST validates the veridicality principle. Modals as a class are therefore nonveridical (Giannakidou 1998, 1999, Beaver and Frazee 2011, Condoravdi 2002) and select the subjunctive. [3]

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[3] As de Marneffe et al. 2012 put it: declaratives like Ariadne left convey firm 'speaker commitment', whereas qualified variants with modal verbs or embedded sentences imbue the sentence with uncertainty (deMarneffe et al. 2012: 102). Similarly, Trnavac and Taboada 2012 in their corpus study use modals as nonveridical markers too. Selection patterns we observe also with adjuncts. Nonveridical adjuncts such as *prin* (before) and *xoris* (without) select *na*, but *afu* (after) selects the indicative. The subjunctive also has modal uses itself, as a possibility modal (Giannakidou 2015; for a similar idea see Matthewson, 2010).

Empirically, it is also important to keep in mind that some verbs are flexible, and therefore compatible with both moods. *Elpizo* (hope) is one such verb in Greek and Italian.

(15)   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.

(16)   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.

Equivalents of 'hope' are also flexible in other languages (see e.g. a recent discussion of French 'hope' in Portner and Rubinstein 2012). Such cases of apparent double selection within one language have also been challenging for monolithic approaches to mood (see *a contrario* Anand and Hacquard (2013)), because they would force one to say that the verb meaning changes. We will newly propose, instead, that the different choice reflects sensitivity of the mood morphemes to the (non)veridicality of assertion and presupposition of 'hope' .

To conclude, let us finally note that some emotives in Italian are also compatible with the indicative.

(17)   Sono   contento che tu   sia/sei   qui.
            Be.1SG.PRES happy   that you be.2S.SUBJ/be.2SG.IND here.
            I am happy that you are here.

This shows again that a simple generalization, even for one verb class, is not tenable. We need to allow flexibility in the verb meaning, and this can be done if we look more closely to the presupposition vs. the assertion, and allow for mixed cases, i.e. veridicality on one level and nonveridicality on the other. Such a view offers a more nuanced perspective on both mood selection and verb meaning. But first let's lay out the framework.

3   Veridicality and Nonveridicality: objective and subjective

In this section, we present the framework of (non)veridicality for mood choice as it emerged from a number of works since the mid-90s (Giannakidou 1994, 1997, 2009, 2011, 2015; Zwarts 1995). [4] In these works, an important distinction emerges between *objective* veridicality, which has to do with actual truth, and *subjective* veridicality, which has to do with someone's belief that a proposition is true (see for recent discussion Giannakidou 2013, Giannakidou and Mari 2015). Giannakidou 1998 called this *relativized veridicality*, but here we will call it subjective. We present first the core notions, and then proceed with the more specific discussion of mood.

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[4]Montague 1969 uses 'veridicality' to characterize sentences with direct perception verbs such as *see* (see Giannakidou 2013a for a formal connection between truth and existence in relative clauses and with progressives).

The initial definition of veridicality is as a property of natural language expressions (here, *functions* F), in terms of entailment such that F is veridical if it entails the truth of its complement p:

(18)   Def 1. Objective veridicality and nonveridicality. (based on Zwarts 1995, Giannakidou 1997, 1998, 1999).
        Let F be a monadic sentential operator. The following statements hold: F is veridical just in case F$p \rightarrow p$ is logically valid; if this does not hold, F is *nonveridical*.

Functions that have veridicality and nonveridicality are propositional functions (but see Bernardi 2001 for type-flexible definitions). F is veridical iff Fp entails p, i.e. if whenever Fp is true, p is true too. F is nonveridical if Fp does not entail p, i.e. if when Fp is true, p may or may not be true. Note that nonveridical operators do not entail the falsity of p; this is a property of anti-veridical operators such as negation. Antiveridical functions are also nonveridical, since for them too the veridicality schema is not valid: *not p* does not entail p. This generalization allowed Giannakidou and Zwarts to explain why NPIs generally appear in the scope of negation and other nonveridical operators, a generalization relevant for the subjunctive mood too. Negation itself is also known to trigger subjunctive (see Quer 2009 for an overview), and this particular instance of subjunctive has been known as *polarity subjunctive*.

In definition 1, truth is defined extensionally, i.e. as truth in the actual world, and nonveridicality is the absence of truth entailment. A factive verb such as *know* can thus be understood as objectively veridical: If *i knows p* is true (where *i* stands for the attitude holder, i.e. the main clause subject), then p is also true. But *i wants p* , under normal circumstances, does not entail p, therefore *want* is objectively non-veridical.[5] Modal verbs are also nonveridical objectively since, as we said earlier, *must/may p* do not validate inference to p. The sentences under the veridical or nonveridical operator can be called veridical and nonveridical too, and as we move further, we will shed a more nuanced light to the veridicality of *know* and the other propositional attitudes. For now, we simply use them as illustrations to show that there are some expressions in language that make reference to actual truth (veridical), and others that don't (modals, volitional verbs, and generally non-assertive attitudes).

Objective veridicality appears to be able to handle the basic mood opposition. However, we do have to explain why believe and dream verbs select the indicative in an overwhelmingly large number of languages. For this, we need the notion of *subjective* veridicality. Subjective veridicality is also on inference of truth, but it is *doxastic*, i.e. now veridicality is relativized with respect to an *individual anchor i*, and what *i* believes. In embedded clauses, the crucial anchor is the bearer of the attitude.[6]

Giannakidou defined *models of evaluation* M to describe the belief states of individual anchors. These models are sets of worlds, relative to i, corresponding to what i knows or believes. We can call those models now epistemic states, following Giannakidou 2013 (though, as we said, they can also be purely doxastic):

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[5]Desire is thus distinct from the fact, as well as from action to bring about p— as is standardly assumed in the literature, and also evidenced by the fact that we can have desires and wishes that can never be true or acted upon such as *I wish this accident never happened, I want to be tall*; see more in Giannakidou and Staraki, 2013 about the difference between volition and action. All future oriented propositional attitudes are objectively nonveridical, including the future morphemes themselves (see Giannakidou and Mari to appear for more discussion).

[6]We understand individual anchoring of truth on a par with other kinds of anchoring of propositional content, i.e. temporal anchoring, or event anchoring (e.g. Hacquard 2010). Our individual anchor i is similar to Lasersohn's (2005) *judge*.

(19)　　Def. 2. *Epistemic state of an individual anchor i*
　　　　An epistemic state M(i) is a set of worlds associated with an individual i representing worlds compatible with what i knows or believes.

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

(20)　　Def. 3. *Subjective veridicality*
　　　　A function F that takes a proposition p as its argument is subjectively veridical with respect to an individual anchor i and an epistemic state M(i) iff:
　　　　$\forall w[w \in \text{M}(i) \to w \in \lambda w'\{w' \mid p(w')\}]$.

This reflects the classical (since Hintikka 1969) treatment of belief. Believe and fiction verbs denote functions F that are subjectively, but not objectively, veridical because their main clause subject (the believer or dreamer) is in an epistemic state that fully supports p, regardless of whether p is actually true. Here we define *Support*:

(21)　　Def. 4. *Support of a proposition p in an epistemic state* M.
　　　　a.　　A non-empty epistemic state M(i) of an individual anchor i supports a proposition p iff all worlds in M(i) are p-worlds.
　　　　b.　　Epistemic states that support p are veridical.

A subjectively nonveridical function imposes non-homogeneity on the epistemic state: it imposes that there is at least one $\neg p$ world.

(22)　　Def. 5. *Subjective nonveridicality*
　　　　A function F that takes a proposition p as its argument is subjectively nonveridical with respect to an individual anchor i an epistemic state $M(i)$ iff:
　　　　$\exists w' \in \text{M}(i) : \neg p(w') \land \exists w'' \in \text{M}(i) : p(w'')$.

Subjective nonveridicality thus means that i is in a state of uncertainty with respect to p. M(i) as a whole does not support p: some worlds in M(i) support p and some others don't. This immediately suggests a link between uncertainty operators and the subjunctive selecting verbs (e.g. modals, volitionals) and subjective nonveridicality.

Subjective (non)veridicality can be extended to characterize the epistemic states themselves. A veridical epistemic state is a non-partitioned, homogenous epistemic state that supports p. A nonveridical epistemic state, on the other hand, is a space partitioned into p and $\neg p$ worlds.

(23)　　Def. 6. *(Non)Veridicality of epistemic states and Support*
　　　　An epistemic state (a non-empty set of worlds) M(i) relative to an individual anchor i is:
　　　　a.　　*Veridical* with respect to a proposition p iff all worlds in M(i) are p-worlds. In this case, M(i) *fully supports p*.
　　　　b.　　*Nonveridical* with respect to a proposition p iff at least one world in M(i) is a $\neg p$ world. In this case, M(i) *partially supports p*.
　　　　c.　　*Antiveridical* with respect to a proposition p iff all worlds in M(i) are $\neg p$ worlds. In this case, M(i) *does not support p*.

A veridical epistemic state is a non-partitioned, homogenous epistemic state, a state that fully supports p. A knowledge or belief state is veridical. A nonveridical state M(i), on the other hand, is defined as one that contains at least one $\neg p$ world. It is a non-homogenous, partitioned state, only partially supporting p. When all the worlds are $\neg p$, the state is *antiveridical*, as

with negative and counterfactual assertions and the state does not support p. Antiveridicality characterizes generally non-assertive moods such as the optative and imperative, since at the issuing of optative and imperative the speaker believes that p doesn't hold.

Returning to mood, verb meanings such as *believe,dream* which take the indicative, convey truth conditions based on veridical epistemic states that support p, and contain no $\neg p$ worlds. We show this in detail later. [7] Importantly, as we said, subjective veridicality does not entail objective veridicality. Subjective veridicality can be thought of as Hintikkean belief, and Giannakidou 1998, 1999, 2011 defines a number of epistemic states (e.g. for dreams, reported conversation) in order to account for the indicative with these verbs.

From the epistemic domain, we can move to generalize veridicality and nonveridicality to modal spaces (sets of worlds) in general, including various kinds of modal bases for modals. Notice that at this level of description, the difference between objective and subjective is reduced to the level of whether there is an individual anchor or not. For modals, for instance, in contrast to propositional attitudes, an anchor (other than the speaker) is not necessary.

(24) Def. 7. *Veridical, nonveridical modal spaces*

    a. A non-empty set of worlds M is *veridical* with respect to a proposition p iff all worlds in M are p-worlds. (Homogeneity).

    b. A non-empty set of worlds M is *non veridical* with respect to a proposition p iff at least one world in M, but not all, is a $\neg p$ world. (Non homogeneity).

    c. A non-empty set of worlds M is *antiveridical* with respect to a proposition p iff M and p are disjoint.

We will further define two objectively (non)veridical modal spaces as follows.

(25) Def. 8 *Objectively veridical, factive space*
    The singleton set of worlds M $= \{w\}$ is *objectively veridical* with respect to a proposition p iff $\{w\} \in p$.[8]

This is the case of a factive space. All objectively veridical functions F come with such factive spaces, and we will use this for *know*.

On the assumption that the future is open, we define metaphysical modal bases (Thomason, 1984; Condoravdi, 2002) as objectively *non*veridical. To define objective nonveridicality here we assume a branching time model with a fixed past and present and an open future. We use the standard $W \times T$ forward-branching structure. A three-place relation $\simeq$ on $T \times W \times W$ is defined such that (i) for all $t \in T$, $\simeq_t$ is an equivalence relation; (ii) for any $w, w' \in W$ and $t, t' \in T$, if $w' \simeq_{t'} w$ and t precedes t', then $w' \simeq_t w$ (we use the symbols $\prec$ and $\succ$ for temporal precedence and succession, respectively). In words, w and w' are historical alternatives at least up to t' and thus differ only, if at all, in what is future to t'. For any given time, a world belongs to an equivalence class comprising worlds with identical pasts but different futures. *The equivalence class of worlds determined at a given time t is the metaphysical modal base determined at that time.*

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[7]Another, related line of research uses the label 'commitment' (Farkas 1992, Giannakidou 1998, 2013). In this jargon, i knows/believes p, means that i is fully committed to p (Smirnova 2012, 2013 uses epistemic commitment as her criterion for mood choice and evidentiality). A fully committed anchor is in a veridical epistemic state which is a state that contains only worlds where the proposition is true. The term 'commitment' has also been used in a variety of other ways in the literature on mood. E.g. Portner and Rubinstein, 2012 use it as a discourse relative notion. For a complete discussion on the term and notion of commitment, see de Brabanter and Dendale, 2008.

[8]For short, we will simply write $w \in p$.

(26) $\mathrm{M}_{metaphysical}(t) = \{w \mid w_0 \simeq_t w\}$

Metaphysical modal bases are parametric to time.[9] On the assumption that the future is open, the metaphysical modal base is non-homogeneous (Giannakidou and Mari 2015; 'diverse', in Condoravdi's terms) and contains both p and $\neg p$ worlds. We thus impose, following the above works, a condition of nonveridicality on metaphysical modal bases:

(27)   Def. 9 *Objectively nonveridical metaphysical space*
         Given the utterance time t_u, $\mathrm{M}_{metaphysical}$ determined at t_u is nonveridical.

In other terms, $\mathrm{M}_{metaphysical}$ determined at t_u is such that at least one world in $\mathrm{M}(i)$, but not all, is a $\neg p$ world. All future oriented modal bases are objectively nonveridical since they are metaphysical.

With this background, let's go now to address more concretely the lexical entries of propositional attitudes.

4   Presupposition vs. assertion and (non)veridicality

4.1   The presupposition and assertion of attitude verbs: mixed cases

Subjective veridicality indicates that the anchor i knows or believes p to be true; subjective nonveridicality, on the other hand, indicates that i does not know or believe p.

Following classic treatments of belief, for the evaluation of p in 'i believes that p', it must be the case that some relevant $\mathrm{M}(i)$ fully supports p. Because we have third person belief, there are two potential anchors i: the speaker and the main clause subject. Their epistemic spaces need not coincide: the speaker need not believe that p is true, but for the sentence to be true the believer cannot have any $\neg p$ worlds in her belief space. The speaker may believe or even know that what believer believes is false, but subjective veridicality is satisfied with respect to the M(subject).[10]

(28)   O Nicholas pistevi   oti/*na efije   i Ariadne.
         the Nicholas believe.3SG that.IND left.3SG the Ariadne.
         Nicholas believes that Ariadne left.

(29)   ⟦Nicholas believes that p⟧ is true in w with respect to $\mathrm{M}(Nicholas)$ iff:
         $\forall w'[w' \in \mathrm{M}(Nicholas) \to w' \in \lambda w''\{w''|p(w'')\}]$

Since all worlds in the model $\mathrm{M}(Nicholas)$ being p-worlds is a truth condition for belief, the *belief* verb is subjectively veridical, and its complement is also subjectively veridical too. Because $\mathrm{M}(Nicholas)$ is a doxastic space, $\mathrm{M}(Nicholas)$ does not make reference to the actual world w, and it does not guarantee that w is p world (unlike with knowledge).

Subjective veridicality, as a notional category, covers also fiction verbs such as *dream*. In this case, we understand M to be the set of worlds compatible with the subject's dream (which we note M_{dream}) (from now on, unless otherwise stated, $\mathrm{M}(i)$, stands for $\mathrm{M}_{epistemic}(i)$).

(30)   a.   O Nicholas onireftike   oti   efije   i Ariadne.
              the Nicholas dreamt.3SG that.IND left.3SG the Ariadne.

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[9]Epistemic modal bases can also be parametric to time, in addition to the epistemic anchor, but we do not need this parameter here in connection with subjective (non)veridicality.

[10]Selection of the subjunctive in Italian with belief verbs is sensitive to shifts across epistemic anchors see Quer, 2001; Homer, 2007; Mari, 2015.

b. Nicholas ha sognato che Ariadne é andata via.
Nicholas has dreamt that Ariadne be.3SG.PRES.IND gone away.
Nicholas dreamt that Ariadne left.

(31) $[\![$Nicholas dreamt that $p]\!]^{w,M_{dream}(Nicholas)}$ is 1 iff:
$\forall w'[w' \in M_{dream}(Nicholas) \to w' \in \lambda w''\{w'' \mid p(w'')\}]$

When I dream or imagine something, the spaces are 'private' (in the sense of Giorgi and Pianesi, 1996) and do not entail anything about the real world. My dream state fully supports p, it is therefore veridical. This is something expressed also in Farkas 1985, 1992 and Giorgi and Pianesi 1996: fictional reality replaces the actual one. We can understand this as context shift; dream shifts truth evaluation from reality to the $M(i)$, where i is the dreamer. All context shifting verbs, including verbs of reported speech can be viewed on a par. It is interesting to note that indirect evidential marking also disappears in dreams and story-telling (e.g. in Turkish, Ozge Sarigul, pc.). This shows that the grammar treats fictional contexts as veridical states, and it is no surprise that they tend to select indicative. Crucially, this class, including belief, appear to have no presupposition, just the truth conditional content specified above, and which relies on veridical states.

Now let's consider emotive verbs. These do have a pressuppositional layer, but contrary to the usual wisdom, emotives do *not* have a presupposition of objective veridicality. Huddleston and Pullum 2002 are among the first to object to factivity, and call emotives *not entailing*:

(32) 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, 122).

The sentence does not entail that Oedipus inflicted a fatal wound. Egré 2008 offers similar examples:

(33) 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. Hence, the presupposition of emotive verbs is not of objective veridicality, but of subjective veridicality:

(34) Subjective veridicality presupposition of emotives
$[\![i$ V-emotive that $p]\!]^{w,M(i)}$ is defined iff:
$\forall w[w \in M(i) \to w \in \lambda w'\{w' \mid p(w')\}]$.

The presupposition of *know*, on the other hand, is objective veridicality, i.e. that the actual world $w \in p$:

(35) $[\![i$ knows that $p]\!]^{w,M(i)}$ is defined iff $w \in p$.
If defined $[\![i$ knows that $p]\!]^{w,M(i)} = 1$ iff:
$\forall w'[w' \in M(i) \to w' \in \lambda w''\{w'' \mid p(w')\}]$

This lexical entry captures the factivitiy of *know* as presupposition of objective veridicality—while at the same time distinguishing *know* from emotive verbs where the presupposition is merely belief of i that p without entailing or presupposing anything about the real world.

Interestingly, there are no epistemic attitudes that are objectively veridical in the assertion (see also Anand and Hacquard, 2013); objective veridicality can only be presupposed, and this is probably due to the fact that we are dealing with attitudinal verbs. *Know*-verbs are parallel to

belief-verbs, but differ in that *believe, dream* lack the the objective veridicality presupposition, and create assertions that are subjectively veridical.

Crucially, there are also epistemic verbs that have the factivity presupposition ($w \in p$) but combine it with nonveridicality in the assertion. This is the case of consciousness verbs such as *be aware*. Without entering into unnecessary (for the purposes of mood) philosophical 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 *Con* that returns those worlds of M(i) that are the space of consciousness of the attitude holder. As a result, the belief-space is nonveridical, partitioned between consciousness and absence-of-consciousness worlds (we will discuss in section 4.2 how this partitioning is grounded in the semantics of the verb).

(36) $[\![i \text{ is aware that } p]\!]^{w,M(i)}$ is defined iff $w \in p$.
       If defined $[\![i \text{ is aware that } p]\!]^{w,M(i)} = 1$ iff:
       $\forall w'' \in \text{Con}(M(i)(p(w'')),$ and $\exists w' \in M(i) : \neg p(w')$

Note for now (we will discuss this matter at length in section 5) that *be aware* selects the indicative in Greek and allows both subjunctive and indicative in Italian.

(37)   O Nicholas exei epignosi oti/*na i Ariadne tou leei psemata.
       the Nicholas has awareness that.IND/*SUBJ the Ariadne him says lies
       Nicholas is aware that Ariadne is lying to him.

(38)   Sono   consciente che Anna è/sia   a casa.
       Be.1SG.PRES.IND aware   that Anna be.3SG.IND.SUBJ at home.
       I am aware that Ann is home.

The entry of verbs meaning 'be aware', then, is a nice case that allows us to see two tiers of veridicality at work: a veridical presupposition like *know* but a nonveridical assertion. In one language (Greek), the indicative is chosen suggesting that the indicative is sensitive to the presupposition, and in the other (Italian) the subjunctive is chosen because of nonveridicality in the assertion, but the indicative is also possible in virtue of the veridical layer as well.

Emotives are also a mixed case of veridicality, as we show next. They have a presupposition of subjective veridicality, as we argued (see (34)), and an assertion that is nonveridical, as we now show.

4.2   The assertion of emotives and nonveridicality

In line with most of the previous literature (Giorgi and Pianesi, 1996 a.o.), we acknowledge that emotive factives convey two meaning components. One is their presupposition of subjective veridicality, i.e. they rely on the subject's i belief that p. In the assertion, however, emotive factives are nonveridical because, we will argue, they contain an emotive modal base $\mathcal{E}$, i.e. a set of worlds in which i has a sentiment/emotion. $\mathcal{E}$ is a non-nonveridical modal base, because it contains worlds that support the emotion (p-worlds) and worlds that do not ($\neg p$-worlds). Our analysis differs from previous ones in designing a new semantics for the emotive verb, and positing conflicting veridicality at the level of the assertion (the emotive component, nonveridicalitty) and of the presupposition (the veridical component). In the remaining of this section, we develop our modal semantics of the emotive component.

Key to our partition between p and $\neg p$ worlds is the idea of a *threshold* degree. No attention

has been paid in the literature to the fact that emotives are gradable predicates, but we will take this as our starting point. Gradability is diagnosed by number of tests (see Kennedy, 2007 for an overview and earlier references). First, gradable predicates are compatible with degree modifiers such as e.g. *very*; so are emotives:

(39) a. John is very tall.
      b. Gianni è molto alto.
          Gianni is very   tall.
      c. O Janis ine *poli* psilos. the John is very tall John is very tall.

(40) a. John is very irritated/happy that Mary came.
      b. Gianni è molto irritato/contento che venga   anche Maria.
          Gianni is very   irritated/happy   that come.subj.3sg also   Mary.
      c. O Janis ine *poli* thimomenos pou irthe i Maria. the John is very irritated that came the Maria Joh is very irritated/angry that Maru came.

Second, gradable predicates and emotives can be used in comparative sentences:

(41) a. John is taller than Mary.
      b. Gianni è più   alto di   Maria.
          Gianni is more tall than Mary.
      c. o Janis ine psiloteros apo ti Maria. the John is taller from the Maria John is taller than Mary.

(42) a. I am more/less irritated than you.
      b. Sono   più/meno irritato di   te.
          Be.1sg.pres more/less irritated than you.
      c. Ime pio/ligotero thimomeni apo sena. am more/less irritated from you.acc. I am more/less irritated than you.

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 (see especially Schwarzschild, 2008) between the positive extend of the scale and the negative extend. 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. (There are nuances, of course, that we gloss over here, but we don't think they play a role for our discussion of emotives). The important insight from the gradability literature that we want to transfer onto the analysis of emotives is that the scale contains a positive and a negative extent.

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 (43):

(43) $\lambda P.\lambda x.\lambda d.P(x) \geqslant d$

Variables x and d take their value in the sets $\mathcal{I}$ and $\mathcal{D}$. Note that d is the threshold. Two equivalence classes are determined: one above d in which the individual has the sentiment, and one in which the individual does not have the sentiment (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.

(44) $\mathcal{H}(\mathcal{D})(\mathcal{I}) = W$

The modal base that we obtain via this mapping is nonhomogeneous. The worlds in the modal

base are partitioned into those in which the attitude holder i has the emotion and those in which she does not. This partition is driven by the threshold d. In the worlds in the positive extent, i has the emotion; in the worlds in the negative extension, i does not have it. 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 $\leqslant_{\mathcal{S}_i}$. Viewing $\leqslant_{\mathcal{S}_i}$ as the singleton set p, we see that just like with the scale, 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 sentiment and p is true. The other one is the set of worlds in which the attitude holder does not has the sentiment and p is false.

Degree scales   World ordering
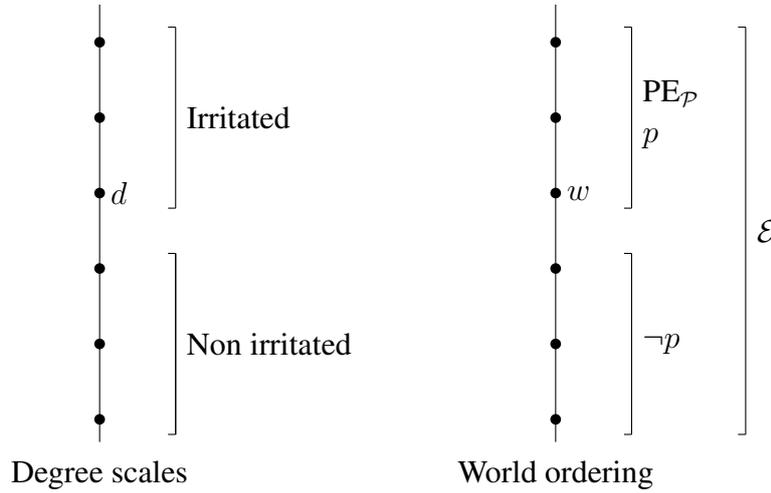
This partitioning allows us to define *Positive-Extent-worlds* (PE) for p:

(45) $\mathrm{PE}_{\mathcal{P}} = \{w' \in \mathcal{E}_{\mathcal{P}} : w'$ where the propositions in $\mathcal{P}$ are true $\}$

Here, the set $\mathcal{P}$ is the singleton set $\{p\}$. So $\mathrm{PE}_{\mathcal{P}}$ contains all the worlds in which p is true. In $\mathrm{PE}_{\mathcal{P}}$ i has sentiment $\mathcal{S}$. But not all worlds in $\mathcal{E}$ are PE worlds for p, $\mathcal{E}$ only partially supports p. $\mathrm{PE}_{\mathcal{P}}$ is a subset of $\mathcal{E}$ (the emotive space). The complement of $\mathrm{PE}_{\mathcal{P}}$ contains $\neg p$ worlds, and i has an emotion towards p in these worlds. The semantics we propose here may remind the reader of the Best ordering used for modals (Portner 2009, Giannakidou and Mari 2013, 2015), but it is different in that our ordering source merely contains p.

The gradability of the emotive predicate triggers a modal space $\mathcal{E}$, and partitions it into p and $\neg p$ worlds. The emotive space is thus a nonveridical space. Now that we have designed the semantics for the emotive component, let us put it together with the presuppositional content, and provide our lexical entry for emotive-factives.

(46) $[\![i\text{V-emotive}p]\!]^{w,M(i)}$
        a.   is defined iff $\forall w'[w' \in M(i) \to w' \in \lambda\{w'' \mid p(w'')\}]$ (subjective veridicality)
        b.   If defined, $[\![i\text{V-emotive}p]\!]^{w,M(i)} = 1$ iff $\forall w'' \in \mathrm{PE}_{\mathcal{P}}(\mathcal{E})(p(w''))$.

$\mathcal{E}$, as we said is a nonveridical space since it contains the supporting worlds, but also non-supporting worlds. This lexical entry indicates that $M(i)$ is relevant for the presupposition of emotives, but in the assertion they work like modals, in triggering the modal base of emotion.

Regarding gradability, we can see that the epistemic *be aware* is also a gradable predicate.

(47)   È molto/poco cosciente che tu   sia stanco.
        Is very/little   aware   that you are tired.
        'He is very/little aware that you are tired.'

(48)   Maria é più   cosciente di   Gianni dell'accaduto.
        Maria is more concuous than Gianni of-the-happened.
        'Maria is more aware of Gianni of what has happened.'

In Greek, however, in contrast to Italian, it selects indicative, as mentioned earlier too:

(49)   O   Janis exei (elaxisti) epignosi   oti   vriskomaste se megalo kindino.
        the John has little   awareness that find.1pl   in great   danger.
        John has little awareness that we are in big danger.

Since the gradable consciousness predicate can be a subjunctive selector, gradability per se is not the key in determining mood (*pace* what seems to be argued in Villalta 2008).[11]

   Instead, gradability provides the necessary structure for nonveridicality, and this in turn triggers the subjunctive. Crucially, gradability is useful *not* not because of establishing preference (as, e.g. in Villalta 2008, Rubinstein 2012), but because it offers a threshold for p and $\neg p$ worlds that mirrors the positive and negative extent of the scale. Consciousness is also gradable, but the consciousness worlds are not 'preferred' to non-conciousness worlds. Gradability thus appears to be a means to trigger a nonveridical world space.

   We have not included modal verbs in the discussion because they are not propositional attitudes. Modals do encode nonveridicality in the presupposition since they all require non-homogenous modal bases (Giannakidou 1998, Condoravdi 2002, Beaver and Frazee, to appear). In the assertion, they are also nonveridical— modals are therefore clean cases of unmixed nonveridicality, and select the subjunctive in all the languages we studied.

   Given the list of attitudes above, it becomes clear that we can no longer talk about 'veridical' or 'nonveridical' verbs– a mixed verb is both, allowing also both moods. At the same time, we now have a precise understanding of both factivity (as presupposition of objective veridicality), and presuppositionality (as definedness condition in lexical entries that makes reference to either actual or believed truth.). We proceed now to put all this together in a semantic typology. We are also ready to consider volitional predicates.

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[11]In contrast, *know* is only compatible with manner adverbials and, to compare *knowledge* of attitude holders, one can only use the manner-dimension but not intensity.

(50)   Sa   molto bene quello che è successo.
        Know.3sg.pres very   well what   that is happened.
        'He knows very well what has happened.'

(51)   Sa meglio di te, quello che è successo.
        Know.3sg.pres better than you, what that is happened.
        He knows better than you what has happened.

We also observe that an adverb like *partially* acts along the intensity dimension of the first, and on an extensional dimension with the second (see Kennedy and McNally 2007, Baglini, 2015 for discussion of this distinction).

(52)   a.   È parzialmente cosciente che sia   vero.
              Is partially   aware   that be.3sg.subj true.
              'He is partially aware that this is true.'
        b.   Sa   parzialmente che è   vero.
              Know.3sg.pres partially   that be.3sg.ind true.
              'He partially knows that it is true.'

(52)-a. describes a degree of consciousness about a fact being true. (52)-b. describes a situation in which only part of the facts is known.

5 A two-tier semantic typology of (non)veridicality

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 end up positing 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.

In this section, we will summarize what we just presented in the form of a semantic typology based in nonveridicality. A number of important predictions will emerge, both about the verb meanings as well as the sensitivity of the mood morphemes. After we finish the basic typology, we will discuss the volitional verbs and place them within our system. In the next section, we address more specifically the question of licensing of subjunctive and indicative within an optimality theoretic frame.

5.1 The typology of propositional attitudes

Our primary goal is to provide a methodology for crosslingustic research, by establishing a first set of predictions. Here at the basic parameters, recalling the definitions from section 3.

(53) *Veridicality*

    a.   Objectively veridical spaces (for short OV - Objective Veridicality).
        The set of worlds $M = \{w\}$ is *objectively veridical* with respect to a proposition p iff $w \in p$. (= Def. 8)

    b.   Subjectively veridical spaces (for short SV - Subjective Veridicality). An epistemic state (a set of worlds) $M(i)$ relative to an individual anchor i is *veridical* with respect to a proposition p iff all worlds in $M(i)$ are p-worlds. (= Def. 6a)

(54) *Non-Veridicality*

    a.   Objective nonveridical spaces (for short ONV - Objective Nonveridicality): Given the utterance time t_u, $M_{metaphysical}$ determined at t_u is nonveridical with respect to a proposition p (= Def. 9). (At least one world in $M_{metaphysical}$, but not all, is a $\neg p$ world.)

    b.   Subjectively nonveridical spaces (for short SNV - Subjective Nonveridicality): An epistemic state (a set of worlds) $M(i)$ relative to an individual anchor i is *nonveridical* with respect to a proposition p iff at least one world in $M(i)$, but not all, is a $\neg p$ world. (= Def. 6b)

Based on these distinctions, we obtain the following schema. We allow crucially the option of no presupposition. We use the English words in the table (and in the rest of the paper) as labels for the verb meanings in the three languages we are considering, Greek, Italian, and English. Here we summarize the behavior we observed so far of 'mental' attitudes, which include epistemic attitudes but also dream verbs and emotives. As observed, there are no epistemic attitudes that assert objective veridicality.

The simplest class appears to be the class that includes *believe/dream, say*. The class of saying verbs, as shown, is placed with believe/dream, because they select the indicative, and just like *believe/dream* verbs, they are context shifters and do not appear to carry any presuppositions. This class can safely be recognized as the class of subjectively nonveridical verbs, and

		Presupposition		
		OV	SV	No pres.
	OV	*	*	*
Assertion	SV	know		believe/ dream / say
	SNV	be aware	emotives	

Table 1: (Non)veridicality of mental attitudes

we saw that this class is a typically indicative selector.[12] We do not consider here the class of communicative attitudes, discussed in Anand and Hacquard (2014).

Another important grouping is the one between verb *be aware, know*. These have an objectively veridical presupposition, they are the true 'factives'. Hence, in our system, we have a clear distinction between factivity, i.e. having a presupposition of objective veridicality, and subjective veridicality, which has nothing to do with the real world, but imposes homogeneity in the subject's space.

The emotive class is not factive in this system. These verbs are presuppositional, but they have a presupposition of subjective veridicality, not objective. In other worlds, our system distinguishes concretely between presuppositional and non-presuppostional verbs (the subjectively nonveridical), and allows a presuppositional verb to be non-factive. Most previous accounts collapse factivity and presuppositionality. We don't, and this seems cleaner because presuppositional can also mean having nonveridicality presupposition, as we see next with *want, hope*. Finally, *be aware* and emotives are similar in that they combine a veridicality presupposition with a nonveridical assertions.

In our system, presuppositional verbs are those that have a veridicality or nonveridicality presupposition, and as it turns out they are quite numerous. Our system is the only one that allows variation in the level of representation for nonveridicality. Anand and Hacquard also recognize what can be seen as multiple layers, but only in some cases, not systematically. One case they treat is *hope*, for which they argue that it combines an epistemic and a preference layer— and the preference explains the subjunctive. We proceed immediately to see how *hope* and *want* are treated in our system. As it became clear earlier in the discussion of *be aware*, preference cannot be the key to the subjunctive.

5.2   To want and to hope

Want and *hope* are very interesting cases. *Want* uniformly selects the subjunctive in the languages we know, but *hope* can appear with either mood. The two lexical entries differ in a number of ways. First, as acknowledged in Portner and Rubinstein (2012) and Anand and Hacquard (2013), unlike *want*, *hope* has an epistemic layer. Portner and Rubinstein say that with *hope* the attitude holder must be *cognizant* whereas with *want* she is not. Anand and Hacquard argue that *hope* has an uncertainty component that, which in our framework means that they have a nonveridical epistemic space. An important related difference between *hope* and *want* is that *hope*, can be past, or future oriented, whereas *want* is only future oriented (Farkas 1992, Laca 2008). This holds for all three languages:

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[12]When different perspectives are compared and the speaker disagrees with the attitude holder, we may have subjunctive in Italian with saying verbs (see Mari, 2015; see also discussion in Quer, 2001 about how negation affects the subjective nonveridial class generally; for Italian see also Homer, 2007); but not in Greek.

(55) a. Spero/#Voglio   che sia   stato malato.
          Hope.1SG/Want.1SG that be.3SG.SUBJ been sick.
          I hope/want that he has been sick.

      b. Spero/#Voglio   che sia   malato.
          Hope.1SG/Want.1SG that be.3SG.SUBJ sick.
          I hope/want that he is seeing her.

      c. Spero/Voglio   che venga.
          Hope.1SG/Want.1SG that come.3SG.SUBJ.
          I hope/want that he comes.

(56) a. Elpizo/#thelo   na tis arese   to fagito.
          Hope.1SG/Want.1SG that her like.past.3sg the food.
          I hope/#want that she liked the food.

      b. Elpizo/thelo   na tis aresi   to fagito.
          Hope.1SG/Want.1SG that her like.Nonpast.3sg the food.
          I hope/#want that she liked the food.

We take this to mean that *hope* has a nonveridical epistemic presupposition, but *want* has a non-veridical metaphysical M, just like all future oriented elements (Condoravdi 2002, Kaufmann 2005, Giannakidou and Mari 2013, 2015). In addition, there is a preference component, which we express, (*pace* Anand and Hacquard, 2013, going back to Heim 1992, Giannakidou 1998, 1999) as a standard Hintikka space which is veridical: all the worlds are p. [13]

(57) $[\![i \operatorname{hope} p]\!]^{i,M_{epistemic}(i),M_{hope}(i)}$ is defined iff

      a. $\exists w' \in M_{epistemic}(i) \neg p(w') \wedge \exists w'' \in M_{epistemic}(i) p(w'')$ (SNV).
          If defined,

      b. $[\![i \operatorname{hope} p]\!]^{i,M_{epistemic}(i),M_{hope}(i)} = 1$ iff
          $\forall w''' \in M_{hope}(i) p(w'''')$.

(58) $[\![i \operatorname{want} p]\!]^{i,M_{metaphysical}(i),M_{want}(i)}$ is defined iff

      a. $\exists w' \in M_{metaphyisical}(i) \neg p(w') \wedge \exists w'' \in M_{metaphyisical}(i) p(w'')$ (ONV).
          If defined,

      b. $[\![i \operatorname{want} p]\!]^{i,M_{metaphysical}(i),M_{want}(i)} = 1$ iff
          $\forall w''' \in M_{want}(i) p(w'''')$.

We see that *hope, want* are both presuppositional: subjective nonveridicality is presupposed with *hope*, objective (metaphysical) nonveridicality with *want*. In the truth condition, both verbs have veridical M(i) respectively. Hence, at the assertion level they receive a uniform treatment. Our analysis here of *want* differs substantially from earlier accounts (Farkas 1992; Heim 1992; Giannakidou 1998, 2009), where *want* was simply nonveridical.

Importantly, *hope* is compatible with both the subjunctive and indicative, whereas *want* selects the subjunctive in all languages. This seems to suggest that objective nonveridicality is the strongest parameter determining subjunctive. The same can be said about objective veridicality which triggers uniformly the subjunctive. In other words, objective veridicality and nonveridicality reveal the most basic mood opposition.

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[13]Anand and Hacquard explain that epistemic attitude can embed epistemic modals because these are anaphoric to the epistemic state introduced by the epistemic attitude. Desire verbs cannot embed epistemic modals because they do not provide such state that these modals are anaphoric too. In our view, desire verbs prototypically embed circumstantial possibility modals in virtue of future orientation. We do not discuss here the embedding of modals, which we leave for future research.

As we shall see, when the predicate is both objectively veridical (in the presupposition) and subjectively nonveridical (in the assertion), the subjunctive can be selected, as in Italian. Factivity, thus, is not a parameter per se, determining mood, but multiple dimensions of the predicate must be considered (see also Giorgi and Pianesi (1996:219) for a first suggestion in this direction). Objective nonveridicality, however, appears indeed to be the decisive parameter for subjunctive, as is shown clearly by *want*.

			Presupposition			
		OV	SV	No pres.	ONV	SNV
Assertion	OV	*	*	*	*	*
	ONV	*	*	*	*	*
	SV	know	believe/ dream		want	hope
	SNV	be aware	emotives			

Table 2: (Non)veridicality of mental attitudes and preference expressing predicates

With this characterization of the semantics of the predicates, we now turn to discuss more in depth the question of the licensing of mood in Greek and Italian.

6   Mood morphemes: conditions on their licensing

We have just offered detail characterizations of the verbal meanings, and at this point the question arises: what exactly is the role of the mood particles themselves? The carriers of veridicality and nonveridicality are the presuppositional and assertive components of the verb meanings, and the mood particles do not seem to contribute much. Giannakidou 2015 in fact argues that mood selection is purely featural agreement, e.g. a kind of (non)veridical concord, on a par with other kind of concord in grammar such as modal or negative concord.

In this paper, as we announced at the beginning, we will treat mood choice in complement clauses as polarity licensing. The specific way this is going to be implemented is as follows. We assume that the sensitivity of mood morphemes reveals definedness conditions— which, when not met, produce fatal interpretative clash and failure, i.e. if we tried to use *na* after a verb of belief or dream, or *oti* after a verb of desire. A basic opposition in polarity is between positive polarity items (PPIs) and negative polarity items (NPIs). NPIs are sensitive to novneridicality (negation and downward entailment included) and need to be in the scope of nonveridical operators; PPIs, on the other hand, are attracted by veridicality, and want to avoid nonveridical contexts. We are going to say that the subjunctive is like an NPI and the indicative like a PPI.

The default in each language is determined by a system of ordered constraints. Objective Veridicality, Subjective Veridicality, Objective Nonveridicality and Subjective Nonveridicality are considered to be constraints. These are differently ranked in each language, thus predicting different mood selection patterns. To determine these patterns, we thus need (i) to determine the definidness conditions for mood and mood particles, and (ii) the ranking of the rules.

We consider in turn the Italian and the Greek systems. We see that the two systems are regulated by two meta-principles— *Veridicality wins, or Nonveridicality wins*. These determine differing defaults: subjunctive in Italian, indicative in Greek.

6.1 Nonveridicality and the Italian system

We first define the definidness conditions of IND(icative) and SUBJ(unictive) in Italian in embedded sentences.

(59)   Definedness conditions of indicative, subjunctive in embedded sentences

    a.   IND is defined in the scope of a predicate that is veridical either in the assertion or in the presupposition.

    b.   SUBJ is defined in the scope of a predicate that is nonveridical either in the assertion or in the presupposition.

We immediately see that one and the same predicate can both license the indicative and the subjunctive if it is both veridical and nonverdical, given the assertion and the presupposition. It is thus necessary to determine a system of preferences that determine the optimal choices for the language.

We develop our account in an Optimality Theoretical Framework (Hendriks and de Hoop, 2001; de Swart, Legendre, Putnam and Zaroukian, 2015) and treat Objective and Subjective (Non)veridicality as constraints, that can have relative ranking in different languages. The relevant ranking in Italian is in (60).

(60)   Italian Ranking of Constraints: *Nonveridicality wins*
        Nonveridicality > Veridicality

As we said, in all languages the objective nonveridicality is the strongest dimension that dominates all the others: whenever there is nonveridicality at any level of meaning, subjunctive will be used. The indicative is also possible whenever there is veridicality either in the presupposition or in the assertion, objective or subjective. This is what we observe, for instance with *be aware*, or *hope*. The only clearly indicative selecting predicate is *know*, which is objectively veridical in the presupposition and subjectively veridical in the assertion.

Given that nonveridicality is ranked higher and given the definedeness conditions for SUB and IND in Italian, we obtain the following system of preferences .

Mood	Presupposition/Assertion					
	OV / SV Know	OV/ SNV Be aware	Empty / SV Dream	SV / SNV Be irritated	ONV / SV Want	SNV / SV Hope
SUBJ	!	☞	!	☞		
IND					!	

Optimality and mood selection in Italian.

We use Optimality Tableaux, and, as standard, '!' stands for Fatal Constraint Violation. '*' stands for constraint violation. 'Pointing hand' stands for optimal candidate. We see that when both the subjunctive and the indicative are both possible, the subjunctive is the optimal form. However, in Italian, when two forms compete and one of them is optimal, the suboptimal one is not blocked. When one of the two moods is blocked as fatally violating the constraint, the competing one is mandatory. Let us walk through the facts.

1. *Know*. Objective veridicality / subjective veridicality : indicative mandatory.

(61)   So   che é   andato al   supermercato.
           Know.1SG.PRES that be.3SG.IND went   to-the supermarket.
           I know that he went to the supermarket.

2. *Be aware*. Objective veridicality / subjective nonveridicality : subjunctive optimal, indicative possible.

(62)   Sono   cosciente che sia/é   andato al   supermercato.
           Be.1SG.PRES conscious that be.3SG.SUBJ/IND went   to-the supermarket.
           I know that he went to the supermarket.

3. *Dream*. Empty / subjective veridicality: indicative is selected.

(63)   Ho   sognato che é   andato al   supermercato.
           Have.1SG.PRES dreamt that be.3SG.IND went   to-the supermarket.
           I remember that he went to the sueprmarket.

4. *Be irritated*. Subjective veridicality / subjective nonveridicality: subjunctive is optimal, indicative is possible.

(64)   Sono   irritato che venga.
           Be.1SG.PRES irritated that come.3SG.SUBJ
           I am irritated that he comes.

Indicative is marginal, but attested.

(65)   Sono   contento che venga.
           Be.1SG.PRES happy   that come.3SG.SUBJ
           I am irritated that he comes.

5. *Want*. Objective nonveridicality: subjunctive is selected.

(66)   Voglio   che venga/*viene   anche lui.
           Want.1SH.PRES that come.3SG.SUBJ/IND also   he.
           I want that he comes as well.

6. *Hope*. Epistemic nonveridicality / subjective veridicality: subjunctive optimal, indicative possible.

(67)   Spero   che venga/verrà.
           Hope.1SG.PRES that come.3SG.SUBJ/IND
           I hope that he will come.

The following table summarizes the facts. We write in the exponents the mood that is selected/licensed. '>' indicates preference.

    We have not discussed here the case of *credere* 'believe' in Italian, which is a challenge for theories holding that subjunctive is triggered by preferences (see Anand and Hacquard, 2013). While, as we noted, know-belief verbs behave on a par and select the indicative across a number of languages (e.g. Farkas, 1982; Giannakidou, 2015), Italian is a notable exception to this generalization (see Giorgi and Pianesi, 1996; Homer, 2007). According to our view, there must be some nonveridical space. Indeed Homer argues that *believe* (*credere*) can be

		Presupposition				
		OV	SV	No pres.	ONV	SNV
	OV	*	*	*	*	*
	ONV	*	*	*	*	*
Assertion	SV	know^{IND}		dream^{IND}	want^{SUBJ}	$\text{hope}^{SUBJ>IND}$
	SNV	$\text{be aware}^{SUBJ>IND}$	$\text{be irritated}^{SUBJ>IND}$			

Table 3: Mood selection in Italian

weak in Italian, thus suggesting, in our terms, that the doxastic space is nonveridical, i.e. akin to the modal base of epistemic MUST (Giannakidou and Mari 2015). *Credere*, also notably, allows the indicative— and Homer argues that this happens when *credere* conveys certainity, which in our terms means that the doxastic space is homogeneous. Mari (2015) argues, based on new evidence, that the subjunctive and indicative *credere* have very different interpretations and that when *credere* takes the subjunctive it conveys epistemic uncertainty, similar to MUST (see Mari, 2015 for extended discussion). No matter where nonveridicality is located, in the doxastic or the epistemic space, one thing appears to be certain: it is *not* preference that drives the choice of the subjunctive with belief verbs.

6.2 Veridicality and the Greek mood particle system

Let us now turn to Greek and spell out the presuppositions of the three mood particles *oti* (indicative), *na* (subjunctive), and *pu* (indicative).

(68) Definedness conditions of indicative and subjunctive in embedded sentences
    a. *oti*-IND is defined only in the scope of a verb that is objectively veridical in the presupposition or a verb that is subjectively veridical in the assertion.
    b. *na*-SUBJ is defined only in the scope of a predicate that is objectively or subjectively nonveridical in the presupposition.
    c. *pu*-IND is defined only in the scope of a verb that is subjectively veridical in the presupposition.

In Greek, the constraints are ranked in the reverse order, with respect to Italian, and we obtain (69). We nonetheless see that objective nonveridicality is the strongest constraints that wins over veridicality.

(69) Greek Ranking of Constraints: *Veridicality wins*
    Objective Nonveridicality > Veridicality > Nonveridicality.

Note that with *hope*, both *na* and *oti* are defined, and thus there is a choice and none is optimal over the other. Let us go through the facts.
1. *Know*. Objective veridicality / subjective veridicality : *oti*-indicative mandatory.

(70) O Pavlos kseri   oti/*na   efije i   Roxani.
    the Paul   knows.3SG that.IND/*SUBJ left. 3SG the   Roxani.
    Paul knows that Roxanne left.

2. *Be aware*. Objective veridicality / subjective nonveridicality : *oti*-indicative is selected.

(71) O Nicholas exei epignosi oti/*na i Ariadne tou leei psemata.

Mood	Presupposition/Assertion					
	OV / SV Know	OV/ SNV Be aware	empty / SV Dream / Believe	SV / SNV Be irritated	ONV / SV Want	SNV/ SV Hope
Na-SUBJ	!	!	!	!		
Oti-IND				!	!	
Pu-IND	!	!	!		!	!

Optimality and mood selection in Greek.

the Nicholas has awareness that.IND/*SUBJ the Ariadne him says lies.
Nicholas is aware that Ariadne is lying to him.

3. *Dream/believe*. Empty / subjective veridicality: oti-indicative is selected.

(72)   O   Nicholas onireftike/ nomize   oti/*na   efije   i   Ariadne.
the Nicholas dreamt.3SG /thought.3SG IND/*SUBJ left.3SG the Ariadne.
Nicholas dreamt that Ariadne left.

4. *Regrets*. Subjective veridicality / subjective nonveridicality: pu-indicative is selected, the other options are blocked.

(73)   O   Nicholas lipate pu/*oti/*na efije   i   Ariadne.
the Nicholas regrets that   left.3SG the Ariadne.
Nicholas regrets that Ariadne left.

5. *Want*. Objective nonveridicality: na-subjunctive is mandatory, the other options are blocked.

(74)   Thelo na/*oti kerdisi o Janis.
want.1sg SUBJ/IND win.NONPAST.3SG the John.
I want John to win.

6. *Hope*. Epistemic nonveridicality / subjective veridicality: no optimal candidate.

(75)   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.   Elpizo   oti   kerdise o   Janis.
hope.1SG that.IND won.3SG the John.
I hope that John won.

The following table summarizes the facts. '/' indicates that there is no preference.

We end up with a flexible system that acknowledges sensitivity of mood particles to the (non)veridicality of assertion or the presupposition, while at the same time acknowledging general tendencies in the grammars of Greek and Italian that favor the indicative or the subjunctive as defaults. This system predicts a number of otherwise recalcitrant facts, and handles possible multiple mood choices as an expected, and not a strange, pattern— a result that does appeal to intuition. Remember that, in all previous accounts, multiple moods were a problem, and handling them requires positing ambiguity for the selecting verbs.

		Presupposition		No pres.	ONV	SNV
		OV	SV			
Assertion	OV	*	*	*	*	*
	ONV	*	*	*	*	*
	SV	know^{IND}		dream^{IND}	want^{SUBJ}	hope$^{SUBJ/IND}$
	SNV	be aware^{IND}	be irritated^{IND}			

Table 4: Mood selection in Greek

We would like to close with some comments on our analysis that *pu* is sensitive to the presupposition of subjective veridicality, and some more general implications of this analysis for grammatical architecture and the theory of NPIs. Regarding *pu*, it is indeed quite remarkable that a language has a form sensitive to presupposition. *Pu* appears to be like a real PPI: it ignores the nonveridicality of the assertion, and gets licensed by the veridicality of the presupposition. The fact that it is triggered by a property of non-assertion is in line with observations in the literature, for instance about the German Konjuktiv that it contributes itself conventional implicature (Potts 2005) and about *pu* itself that it has expressive content (Giannakidou 2015).

As further evidence that *pu* is sensitive to the veridicality in the presupposition, consider *remember*. We see that, with first person, the negated sentence is odd with *pu* (76):

(76)   #Dhen thimame pu se gnorisa sto Parisi.
         not remember.1sg that you.acc met.1sg in-the Paris
         'I don't remember that I met you in Paris.'

(77)   Dhen thimate pu se gnorisa sto Parisi.
         not remember.3sg that you.acc met.1sg in-the Paris
         She doesn't remember that I met you in Paris.

Why is 1st person *pu* bad? In (78) is the lexical entry we assume for *thimame* (*remember*). We take it that it has a presupposition of subjective veridicality that relies on knowledge or belief of i, just like the emotive, and $\mathbf{M}_{Memory}$ is the Memory space, that it to say, the set of propositions that are remembered by i.

(78) $[\![i \text{ remember } p]\!]^{w,M_{epistemic}(i),M_{Memory}(i)}$ is defined if and only if:
   a. $\forall w'[w' \in \mathbf{M}_{epistemic}(i) : p(w')]$
   b.   If defined, $[\![i \text{ remember } p]\!]^{w,M_{epistemic}(i),M_{Memory}(i)} = 1$ iff
         $\forall w'' \in \mathbf{M}_{Memory}(i)(p(w''))$.

When *pu* is used, and we negate *remember* in the first person, the presupposition clashes with the assertion: the same individual i is required to both know/believe p and not remember p:

(79) $[\![i \text{ do not remember } p]\!]^{w,M_{epistemic}(speaker),M_{Memory}(speaker)}$ is defined if and only if:
   a. $\forall w'[w' \in \mathbf{M}_{epistemic}(speaker) : p(w')]$
   b.   If defined, $[\![i \text{ do not remember } p]\!]^{w,M_{epistemic}(speaker),M_{Memory}(speaker)} = 1$ iff
         $\forall w'' \in \mathbf{M}_{Memory}(speaker)(\neg p(w''))$.

(76) is odd because i cannot believe p and assert that she does not remember p. In the case of 3rd person, which is OK, the veridicality is satisfied with respect to the speaker, and then the sentence asserts that the subject doesn't remember:

(80) $[\![i \text{ does not remember } p]\!]^{w, M_{epistemic}(speaker), M_{Memory}(third-person)}$ is defined if and only if:

    a. $\forall w'[w' \in \mathbf{M}_{epistemic}(speaker) : p(w')]$

    b.   If defined, $[\![i \text{ does not remember } p]\!]^{w, M_{epistemic}(speaker), M_{Memory}(third-person)} = 1$ iff $\forall w'' \in \mathbf{M}_{Memory}(third - person)(\neg p(w''))$.

We will call *pu* a *presuppositional indicative*. A welcome result of our analysis is that the presuppositional indicative is also used in relative clauses– *pu* is typically the marker *that* as in *to vivlio pu diavasa*, *the book that I read*. It is a well known observation that the relative clause contains a presuppositional "definiteness" layer (e.g. Roussou, 2007). If *pu* is presuppositional, then it is not a surprise for our analysis that we find *pu* in these two contexts.

Finally, regarding the nature of mood licensing, our definedness conditions are *not* scope conditions, like those typically used with NPIs and PPIs. Giannakidou 1998 and earlier literature tend to identify polarity sensitivity with scope, but what we observe with mood calls for a broadening of what licensing is. Since the lexical entries of verbs may contain both veridicality and nonveridicality, it becomes impossible to formulate conditions that would say e.g. "the subjective must be in the scope of a nonveridical operator", or "the indicative must be in the scope of a veridical operator". In mixed cases both hold, but not all mixed cases allow both moods. Our reinterpretation of mood licensing acknowledges a presuppositional contribution to all mood particles, and it says that mood choice is (non)veridicality matching between the verb upstairs and the mood downstairs (see also Giannakidou 2015 on this). This view of mood sets the basis for a grammar of matching, wherein other apparently concord phenomena can be understood such as modal and negative concord.

7   Conclusions

In this paper, we used the problem of emotives as a pretext in order to rethink some of the fundamental issues arising with mood selection in complement clauses. We argued that mood morphemes are polarity items, sensitive to the veridicality or nonveridicality of the higher verb. We therefore unified the grammar of mood selection with that of polarity phenomena, an implied goal in many accounts of mood in the past three decades.

Crucially, we distinguished two levels of semantic representation where veridicality applies— (non)veridicality in the assertion vs. presupposition— while allowing the subjunctive/indicative morphemes to be sensitive to (non)veridicality in either level. Our two-tier theory allows for a number of mixed veridicality predicates thus explaining multiple mood patterns within a language, as well as variation across languages. Fluid, flexible mood patterns become thus quite expected in our system, in contrast to almost all previous accounts of mood that gave unidimensional semantics for the attitude predicates, therefore predicting rigid mood patterns, or lexical ambiguity for the selecting verbs. Overall, the emerging picture of the various verbs and selection patterns we discussed appeared to necessitate an OT semantic framework for mood selection.

Our goal was to provide a broad semantic typology based on the idea that mood selection, as a grammatical phenomenon, is sensitive to the property of (non)veridicality (like polarity item licensing). At the same time, we showed that lexical meanings are not monolithically veridical or nonveridical, and it also became apparent that, despite what much literature takes for granted, the subjunctive is not sensitive to preference, but to gradability— because, we argued, gradability creates the nonveridical modal space necessary for the subjunctive.

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