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Emotive predicates and the subjunctive: a flexible mood OT account based on (non)veridicality¹

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Abstract. We address *flexible* embedded mood patterns, i.e. cases where (a) the same type of verb selects indicative in one language but prefers subjunctive in another, or (b) both moods may be allowed in a single language. We focus on emotive predicates as an illustration of our approach. Emotive predicates allow subjunctive and indicative (with preference for the former) in Italian. Such flexible patterns have not been discussed much in the literature because they are problematic for existing theories which predict the facts of one language but not the other. We propose that the correct account of embedded mood choice is sensitive to both what the embedding predicate *asserts* and what it *presupposes*. We argue that mood morphemes have definedness conditions that make them sensitive to aspects of the (non)veridicality of the embedding predicate, and implement an optimality theoretic account that captures opposing tendencies in Greek and Italian.

Keywords: emotive-factives, subjunctive, non-veridicality, optimality, Greek, Italian.

1. Emotive predicates and the subjunctive mood

This paper explores flexible mood patterns, focusing particularly on emotive-factive predicates. Across languages these predicates select both the indicative and the subjunctive. Choice of the subjunctive is observed in French and Italian.

- (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.

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Greek chooses the indicative:

- (2) O Pavlos *lipate* pu efije i Roxani.
the Paul regrets...3SG that. left.3SG the Roxani.
'Paul knows/believes that Roxanne left.'

The subjunctive is unexpected because emotive verbs are thought to be *factive*, *presuppositional* (Kiparsky and Kiparsky 1968, Karttunen 1973), and *veridical* (Giannakidou 1998, 2006, 2015). Their non-emotive cousins meaning *know* take the indicative:

- (3) 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.

The factive verb *know* selects the indicative, the mood of veridical sentences (Giannakidou *ibid.*). 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 (Marques 2004, Baunaz 2015), that they denote preference between two alternative propositions (Vilalta 2008). Related notions have been used, e.g. epistemic commitment (Smirnova 2012), and contextual commitment (Portner and Rubinstein 2013), to mention just some of the most recent approaches. Unfortunately, none of the approaches offers a satisfactory way to address the emotives 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 consider that the emotive class varies with respect to whether it takes the subjunctive or the indicative. Giannakidou (2015) offers data and references indicating three types of languages:

- Languages that require subjunctive (Spanish, Italian,² French, as above);
- Languages that allow both subjunctive and indicative ((Brazilian) Portuguese, Catalan, Turkish);
- Languages where emotives select indicative (Greek, Hungarian, Romanian, Bulgarian).

²We will discuss later in the paper a few exceptions to this generalization.

Veridicality and epistemic commitment predict indicative after emotives (therefore capture the languages in 3), while preference accounts address the 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 it is to come up with a single generalization that will be able to handle all cases. In the present paper, we take the 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 precisely one such case; Giannakidou and Mari (2015b), in a larger detailed study of many selecting verbs, show 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. We offer a two-tier theory that can to explain the three patterns observed, extending the view that mood selection, as a grammatical phenomenon, is sensitive to the property of (non)veridicality. We offer two refinements: (a) we distinguish between (non)veridicality in the assertion vs. presupposition, and (b) we allow 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. Emotive predicates are also well known for allowing negative polarity items (NPIs) to appear in their complements; see Backer (1970), Linebarger (1987); for more recent discussion Giorgi and Pianesi (1996), Giannakidou (2006):

- (4) a. Ariadne regrets that she *ever* read that book.
- b. Ariadne is glad that we got *any tickets* at all.

The NPI licensing is typically attributed to some kind of negativity. Backer (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 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 (1987), argues that the NPIs *ever* and *any tickets* are sanctioned in the emotive clause via this contrariness, and suggests that the inference

is “not merely a conversational implicature, but rather something stronger” (Giannakidou *ibid.*: 595). In this paper, we show that the contrariness of the emotives is *not* a defining element of all emotives, but what renders them nonveridical is their *gradable* nature. At the same time, they have a veridical presupposition, and this explains the observed variation in mood selection. Emotives, then, have what we call *mixed* veridicality and this category comes with flexible mood patterns. Predicates meaning *hope*, *be aware* are also mixed, as we show. In our analysis here, we cast the role of subjunctive and indicative, and their sensitivity to (non)veridicality (Giannakidou 2009) who argues that the subjunctive is a polarity item) via definedness conditions. These definedness conditions are presuppositions of the mood particles. 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.

Within this school of thought considering subjunctive sensitive to nonveridicality (Giannakidou 2009),³ the idea that presuppositional content of the predicate can drive the choice of mood is for the first time clearly formulated in Mari (2014). Mari studies implicative modals as well as the implicative verb ‘manage to’. The latter selects the subjunctive in Greek and, given the veridicality in the assertion, this choice pattern is also unexpected under current theories. Mari (2014) demonstrates that ‘manage to’ has a modal, non-veridical presupposition and argues that the presuppositional content is able to determine mood in the embedded clause. In so doing, Mari paves the way to rethink mood choice as driven by non-veridicality at either one of the levels of meaning, the assertion or the presupposition.⁴

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 sections 4 and 5 we present our analysis of emotives. We argue that they combine a veridical presupposition with a nonveridical assertion. The latter emerges via an emotive scale. The scale is then mapped onto the space of possible worlds and divides it 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 space, in effect unifying the scalar with the truth based aspects of mood choice.

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 - Farkas (1985); Villalta (2008); Quer (2009); Portner and Rubinstein (2013), and Giannakidou (2006, 2015) for recent overviews; also Smirnova (2012), Giannakidou (1998, 1999, 2006, 2009, 2015) for Greek; Marques (2004) for Brazilian and European Portuguese; Mari (2015) for Italian; Quer (2009) for Catalan and Spanish; Baunaz (2015) for French). The main selection patterns that we find in Romance languages and Greek are as follows.

³See also, outside this school of thought, Giorgi and Pianesi (1996), on parallel suggestions.

⁴Within this line of thought, Mari (2016) also reconsiders the semantics for Italian believe predicates. Cf. *infra*.

- (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: dire (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. 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: *na* is for subjunctive, *oti*, *pu* for indicative. 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. In embedded clauses the indicative particle *oti* is used. For emotives, we have the indicative complementizer *pu*:

- (7) a. Thelo na/*oti kerdisi o Janis.
 want.1sg SUBJ/IND win.NONPAST.3SG the John.
 I want John to win.
- b. O Pavlos {kseri/pistevi} oti/*pu/ *na efije i Roxani.
 ‘Paul knows/believes that Roxanne left.’
- (8) O Pavlos lipate {pu/*oti/*na} diavase afto to vivlio.
 Paul regrets that he read this book.

Pu follows emotive verbs (Varlokosta 1994, Giannakidou 2015), but also memory verbs such as *thimame* ‘remember’, and occasionally *ksero* ‘know’. Giannakidou (*ibid.*) claims that it also has expressive content. Here, we will propose that *pu* is sensitive to veridicality in the presupposition. *Na* is typically followed by the form glossed above as NONPAST, which itself is licensed - Giannakidou (2009) treats it as a temporal polarity item. NONPAST only appears with *na*, the future particle, and other nonveridical particles. It is the form that gives future orientation (Giannakidou 2009, Giannakidou and Mari 2015b).

The indicative pattern is challenging for the traditional view that the indicative implies that the sentence is ‘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 and imagined or believed truth. This motivates the notion of subjective veridicality that we discuss in the next section– and which, we will argue, underlies emotive verbs.

Verbs selecting subjunctive belong to the following classes.

(9) 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)

(10) Subjunctive verbs in Italian

- a. volitionals: *volere* (want),
- b. directives: *ordina* (order), *consiglia* (suggest)
- c. modal verbs: *necessario* (must), *possibile* (may), *bisogna* (must).
- d. permissives: *impedisce* (forbid)
- e. emotives: *essere sorpreso* (be surprised), *essere irritato* (be irritated)
- f. epistemic: *credere* (believe), *pensare* (think), *essere cosciente* (be aware), *essere convinto* (be convinced)

Note that, in Italian both emotives and epistemic predicates (but *sapere* (know)) are subjunctive selectors in Italian. We do not raise here the question of belief verbs (Mari 2016). Here we study *essere cosciente*.

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

- (11) a. *Elpizo na/oti kerdise o Janis.*
hope.1SG that.SUBJ/IND win.PAST.3SG the John.
I hope that John won.
- b. *Spero che Gianni abbia vinto.*
Hope.1SG.PRES that John have.3SG.SUBJ won.
I hope that John has won.

Equivalents of ‘hope’ are also flexible in other languages, as argued by Portner and Rubinstein (2013) and Anand and Hacquard (2013). We argue here that the different choice reflects sensitivity of the mood morphemes to the (non)veridicality of assertion and presupposition. Let us finally note that some emotives in Italian are also compatible with the indicative.

- (12) Sono contento che tu sia/sei qui.
 Be.1SG.PRES happy that you be.2SG.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 a more flexible account of the verb meaning, by distinguishing the presupposition vs. the assertion, and allow for mixed cases, i.e. veridicality on one level and nonveridicality on the other. But first let’s lay out the basic framework.

3. Veridicality and Nonveridicality: objective and subjective

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

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

Here, nonveridicality is the absence of truth entailment. A factive verb such as *know* is objectively veridical: If i knows p is true (where i stands for the attitude holder), then p is also true. But i wants p , under normal circumstances, does not entail p , therefore *want* is objectively non-veridical.

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. 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.

- (14) *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:

(15) *Subjective veridicality*

A function F with a proposition p as its argument is subjectively veridical with respect to an individual anchor i and an epistemic state $M(i)$ iff:

$$\forall w[w \in M(i) \rightarrow p(w)].$$

This reflects the classical (Hintikka 1962) treatment of belief⁵. Given M , we can now identify veridicality of propositional attitudes as follows:

- (16) A propositional attitude predicate ($PA_{\langle st, \langle e, st \rangle \rangle}$) is **subjectively veridical** wrt its individual $\langle e \rangle$ argument (the *individual anchor* i) and $M(i)$ iff $\forall w[w \in M(i) : p(w)]$.

Believe and fiction *Pas* 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* as universal quantification over the entire epistemic state:

(17) *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.

Importantly, subjective veridicality is Hintikkaean belief, and does not entail objective veridicality.

A subjectively nonveridical function, on the other hand, imposes non-homogeneity on the epistemic state: there is at least one $\neg p$ world, and M is partitioned into a p -supporting and non-supporting space (where p is not true):

(18) *Subjective nonveridicality*

A function F with a proposition p as its argument is subjectively nonveridical with respect to an individual anchor i an epistemic state $M(i)$ iff:

$$\exists w' \in M(i) : \neg p(w') \wedge \exists w'' \in M(i) : p(w'').$$

⁵See for a discussion about different uses of *credere* (belief) in Italian and a rethinking of the classical entry, see (Mari 2015). Mari proposes that belief predicates articulate an epistemic and a doxastic dimensions, and that they convey that the attitude holder ‘does not know’ at the non at issue level. She also offers a new analysis for the indicative/subjunctive variation under negation.

- (19) A propositional attitude predicate ($PA_{\langle st, \langle e, st \rangle \rangle}$) is **subjectively nonveridical** wrt $M(i)$ iff $\exists w \in M(i) : \neg p(w) \wedge \exists w' \in M(i) : p(w')$.

Subjective nonveridicality thus means $M(i)$ 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.

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 (Giannakidou and Mari 2015b). From the perspective of factives, we define the factive space as objectively veridical follows, where w_0 is the actual world.

- (20) *Objectively veridical, factive space*

The singleton set of worlds $M = \{w_0\}$ is *objectively veridical* with respect to a proposition p iff $\{w_0\} \in p$.

We will use this for *know*, and simply write $w_0 \in p$. On the assumption that the future is open, one can define metaphysical modal bases as objectively *nonveridical*, assuming a branching time model with a fixed past and present and an open future. This is needed future oriented attitudes, but we cannot expand more here.

4. Presupposition vs. assertion in the factive class

Subjective veridicality indicates that the anchor i knows or believes p ; subjective nonveridicality, on the other hand, indicates that i does not know or believe p . For the indicative after belief verbs, subjective veridicality is crucial.

Following classic treatments of belief, for the evaluation of p in ' i believes that p ', it must be the case that some relevant $M(i)$ 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.⁶

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

⁶Selection of the subjunctive in Italian with belief verbs is sensitive to shifts across epistemic anchors see Quer (1998), see also discussion in Mari (2015).

- (22) $[[\text{Nicholas believes that } p]]$ is true in w with respect to $M(\text{Nicholas})$ iff:
 $\forall w' [w' \in M(\text{Nicholas}) p(w')]$

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

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, $M(i)$, stands for $M_{\text{epistemic}}(i)$).

- (23) a. O Nicholas onireftike oti efije i Ariadne.
the Nicholas dreamt.3SG that.IND left.3SG the Ariadne.
b. Nicholas ha sognato che Ariadne era andata via.
Nicholas has dreamt that Ariadne be.3SG.IMPERF.IND gone away.
Nicholas dreamt that Ariadne left.

- (24) $[[\text{Nicholas dreamt that } p]]^{w, M_{\text{dream}}(\text{Nicholas})}$ is 1 iff:
 $\forall w' [w' \in M_{\text{dream}}(\text{Nicholas}) p(w')]$

When I dream or imagine something, the spaces are 'private' (Giorgi and Pianesi 1996) and do not entail anything about the real world.⁷ My dream state fully supports p , it is therefore veridical. We can understand all context shifting verbs, including verbs of reported speech, to be likewise subjectively veridical (Giannakidou 1998,1999), hence it is no surprise that they select indicative.

The belief and dream class, in the languages that select the indicative, appear to have no presupposition. Note that this is not the case for Italian belief that opts for subjunctive (Mari 2016). Now let's consider emotive verbs. These do have a presuppositional layer, but contrary to the usual wisdom, emotives do *not* have a presupposition of objective veridicality, but of subjective veridicality (Egré 2008).

- (25) Falsely believing that he had inflicted a fatal wound, Oedipus regretted killing the stranger on the road to Thebes (Klein 1975).

This shows that one can have an emotive attitude towards something that one *believes* to be a fact, but may actually *not* be a fact. Hence, the presupposition of emotive verbs is not of objective veridicality, but of subjective veridicality:

⁷Note that 'privacy' is a subjunctive trigger for Giorgi and Pianesi (1996) and it is specifically and only used for *credere* (believe).

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

The presupposition of *know*, on the other hand, is objective veridicality:

- (27) $[[i \text{ knows that } p]]^{w_0, M(i)}$ is defined iff $w_0 \in p$.
 If defined $[[i \text{ knows that } p]]^{w, M(i)} = 1$ iff:
 $\forall w' [w' \in M(i) p(w')]$

This lexical entry captures the factivity 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. *Know* is veridical in both the presupposition and the assertion.⁸

Emotives are a mixed case: they have a presupposition of subjective veridicality (see 26), and an assertion that is nonveridical, as we now show.

5. Emotives and nonveridicality

Because of NPI-licensing and Baker's earlier observations, it has often been claimed that emotives carry and implicature (Linebarger 1987) or something 'stronger' Giannakidou (2006). We give below Giannakidou's version of the presupposition Giannakidou (2015): *i* is surprised that *p* is defined if only if: *i* believed that $\neg p$, at a time $t' \prec t_u$ (where t_u is the utterance time). A similar idea is also found in Giorgi and Pianesi (1996), where a counterfactual presupposition is advocated. From this perspective, the emotive verb is again mixed: nonveridical in the presupposition, while being veridical in the assertion. We can therefore parametrize languages such that the Greek-type allows the subjunctive only with logically (i.e. in the assertion) nonveridical verbs. Italian subjunctive, on the other hand, is an NPI triggered by negation at the non-assertion (e.g. like *any* in *I am surprised he has any friends*).

The negative presupposition account, however, faces a challenge with the following example. Observe the continuation 'and she always knew that' in 5.

- (28) Arianna è contenta/felice/triste/irritata/... che Nicolas abbia partecipato alla
 Arianna is happy/glad/sad/irritated/... that Nicholas has.3SG.SUBJ participate to-the
 maratona, e ha sempre saputo che lo avrebbe fatto.
 marathon, and has always known that that have.3SG.COND done.

⁸*Know* is considered to be like *believe* in the assertion, with a veridical presupposition.

Arianna is happy that Nicholas participate in the marathon, and she always knew that he would do it.

(28) clearly does not convey that the speaker has an expectation or belief that $\neg p$; and there is a contrast with *surprise* (*I am surprised that John participated in the marathon, and I always knew that he would do it*), thus preventing a general characterization of the emotive class in terms of a negative presupposition. At best, it appears to be an implicature, highly sensitive to the lexical choice of the verb. We propose that emotives have a presupposition of subjective veridicality, as we just suggested, but their assertion is nonveridical because of their **scalar, gradable nature**.

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 (Kennedy 2007, Giannakidou and Mari 2015a).

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* (Kennedy 2007) 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 5:

$$(29) \quad \lambda P. \lambda x. \lambda d. P(x) \geq d$$

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.

$$(30) \quad \mathcal{H}(\mathcal{D})(\mathcal{I}) = W$$

The modal base that we obtain via this mapping is non-homogeneous.^{9,10} 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} . Viewing \leq_{s_i} as the

⁹Klecha (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 ,

¹⁰On emotivity and non-veridicality, see also Beltrama (2015).

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.

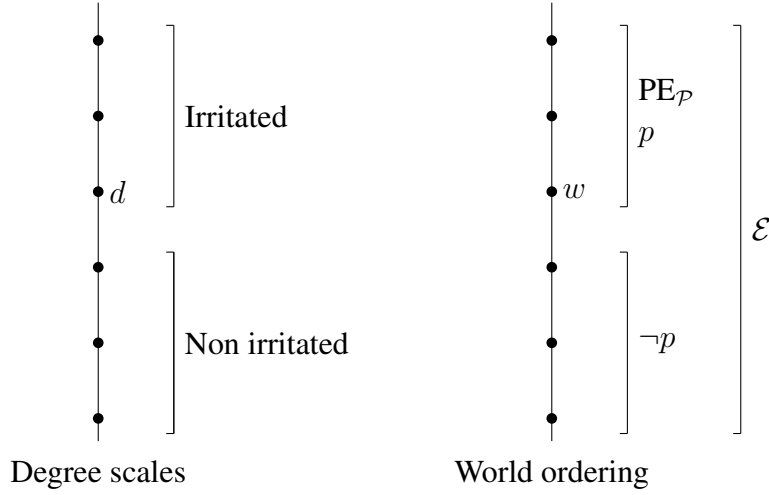


Figure 1: The non-veridical space of emotivity

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

$$(31) \quad \text{PE}_{\mathcal{P}} = \{w' \in \mathcal{E}_{\mathcal{P}} : w' \text{ where the propositions in } \mathcal{P} \text{ are true } \}$$

Here, the set \mathcal{P} is the singleton set $\{p\}$. So $\text{PE}_{\mathcal{P}}$ 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, Giannakidou and Mari 2015b), but our ordering source merely contains p .

Hence, 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 the semantics for the emotive component, let us put it together with the presupposition, and provide our lexical entry for emotives.

$$(32) \quad [[i \text{ V-emotive } p]]^{w, M(i)}$$

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

\mathcal{E} is a nonveridical space containing supporting worlds, but also non-supporting worlds: i.e. $\exists w' \in \text{PE}_{\mathcal{P}} : \neg p(w')$. 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. Let us go back to the predicates of awareness now.

In Greek, in contrast to Italian, awareness verbs select indicative, aligning with belief and imagination verbs. We assume that M_{con} is a type of belief space.

(33) Awareness in Greek

$[[i \text{ exi-epignosi that } p]]^{w_0, M(i)}$ is defined iff $w_0 \in p$.

If defined $[[i \text{ exi-epignosi that } p]]^{w, M(i)} = 1$ iff:

$\forall w'' \in M_{con}(i)(p(w''))$

(34) 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.

Importantly, epistemic *be aware* can also be understood as gradable, and that would explain why it selects the subjunctive in Italian:

(35) È molto/poco cosciente che tu sia stanco.

He is very/little aware that you are tired.

(36) Maria è più cosciente di Gianni dell'accaduto.

Maria is more aware of Gianni of what has happened.'

Importantly, epistemic *be aware* can also be understood as gradable, and that would explain why it selects the subjunctive in Italian. The space for *essere cosciente* now is M_{con} , just like in Greek, but this space is conceptualized as gradable, and thus partitioned into positive extent (PE) and negative extent, just like with emotives.

(37) Awareness in Italian.

$[[i \text{ è cosciente that } p]]^{w_0, M(i)}$ is defined iff $w_0 \in p$.

If defined $[[i \text{ è cosciente that } p]]^{w, M(i)} = 1$ iff:

$\forall w'' \in \text{PE}_{\mathcal{P}}(M_{con})(i)(p(w''))$

(38) Sono cosciente che Anna /sia a casa.

Be.1SG.PRES.IND aware that Anna be.3SG.IND.SUBJ at home.

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’ (M_{con}) is conceptualized a partitioned one, including worlds of awareness and worlds of non-awareness Awareness worlds (the Positive Extent PE_p) are p worlds. We see that awareness is lexicalized along the pattern of emotivity. Moreover, the same verb category ‘be aware’ lexicalizes differently in Greek and Italian justifying different moods (in our implementation M_{con} is not partitioned in Greek and partitioned in Italian). Since the consciousness predicate can be a subjunctive selector, gradability per se is not the key in determining mood; *pace* Villalta (2008), but 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).

To the question why is it that Greek lexicalizes ‘be aware’ as a belief verb and Italian lexicalizes it as an emotive, we answer that this is due to a prototypicality effect. Note that in Italian belief verbs do not behave like in Greek, and are subjunctive selectors. There is thus no prototypical indicative belief verb that sets the standard for indicative selecting predicates, in Italian. Rather, belief verbs in Italian set the standard for subjunctive along with emotive predicates. Languages thus seem to choose among possible lexicalizations those that better align with the general pattern set by prototypical cases.

We consider, finally, the role of the mood particles. As we said at the beginning, and following our more expanded account in Giannakidou and Mari (2015b), we take it that the mood morphemes are polarity like elements that have definedness conditions that make reference to (non)veridicality, like all polarity items.

6. An OT analysis

To capture cross-linguistic and intra-linguistic variation we use an optimality theoretic system (Hendriks and de Hoop 2001, de Swart 2010).¹¹ We provide definedness conditions for the subjunctive and the indicative in Italian and Greek. Recall that *PA* stands for ‘Propositional Attitude’ verbs.

- (39) a. **Ind/Veridicality (Ind/+Ver):** Indicative is defined only in the immediate scope of a *PA* that is veridical (i.e. in the assertion or the presupposition).
 b. **Subj/NonVeridicality (Subj/-Ver):** Subjunctive is defined only in the scope of a *PA* that is nonveridical (i.e. in the assertion or in the presupposition).

¹¹Farkas (2013) also proposes an OT based analysis of flexible mood patterns. Farkas proposes that +assertion triggers the indicative and -assertion triggers the subjunctive. We do not use \pm assertion here, which seems to stumble over mood choice in questions. Our theory is limited to embedded mood patterns. For further discussion, see Giannakidou and Mari (2015c).

So a PA has two dimension of meaning and can be both veridical and non-veridical (emotives, Italian *consciente*). To these constraints, we add a presupposition constraint for Greek *pu*, and a factivity constraint on the Greek subjunctive particle *na*.

- (40) a. *pu*/PRESUP:+Ver: If *pu*-IND appears, then PA has a veridical presupposition.
 b. ***SubjFactive**: If *na*-SUBJ appears, then PA is nonfactive.

Italian and Greek also pattern differently with regard to ranking. Greek favors veridicality; Italian is more tolerant, and although subjunctive is strongly preferred, the indicative is not entirely blocked. Hence we treat the Italian constraints as standing in free variation in an OT framework, but the Greek constraints are ranked:

- (41) a. Unranked in Italian: {Ind/Veridicality, Subj/NonVeridicality}
 b. Greek ranking: {*pu*/PRESUP:+Ver, *SubjFactive } > { Ind/Veridicality, Subj/NonVeridicality }

We consider the non-blocking preference for the subjunctive as a supplementary felicity constraint which does not affect grammaticality, and hypothesize that Italian is moving from a non-veridicality-wins type of language to a more neutral one. (Ultimately, Italian is on a path of becoming an indicative preferring language like French in the Romance group).

Back to emotives. In Italian, both the indicative and the subjunctive violate a constraint. Since there is no ranking, both variants are licensed in Italian.

<i>rimpiagnere</i> [PRESUPP:+Ver, ASSERTION:-Ver] [<i>CP</i> ... MOOD:...]]	Ind/+Ver	∴	Subj/-Ver
⇒ MOOD:Ind		∴	
⇒ MOOD:Subj		∴	

In Italian, the subjunctive is preferred in virtue of a non-blocking preference, which, as we just said, we consider a felicity condition.

With Greek emotives-factives, *pu* is the winner because it is the designated form for PRESUPP:+Ver. The subjunctive is blocked by the factivity constraint (12b). ('pr' stands for 'presupposition'; 'as' for assertion).

<i>lipame</i> [pr:+Ver, as:-Ver] [<i>CP</i> .. MOOD:...]]	<i>pu</i> /PR:+Ver	∴	*SubjFactive	Ind/+Ver	∴	Subj/-Ver
a. MOOD:Ind <i>oti</i>		∴	*!		∴	
b. MOOD:Subj		∴	*!		∴	
c. ⇒ MOOD:Ind <i>pu</i>		∴			∴	

Regarding *pu*, it is indeed quite remarkable that a language has a form sensitive to presupposition only. *Pu* appears to be like a positive polarity item '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 Konjunktiv that it contributes itself conventional implicature (Potts 2005) and about *pu* itself that it has expressive content (Giannakidou 2015).

Overall, this system predicts the correct patterns of variation across languages depending on the definedness condition of moods, the two tier semantics of verbs, and whether the constraints are ranked or not. As far we can tell, our system fares better than any of the other accounts of mood currently available. Space prevents us from elaborating further, which is something we want to do in future work.

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