

Intervention effects: the case of presuppositions

This thesis is about the disruption of NPI licensing. For the first time, the hypothesis that presupposition triggers are interveners is spelled out and examined. We offer a close examination of a vast number of presupposition triggers in English, French and Italian.

The first chapter is a case study: we analyze the intervention caused by the Italian indicative in clauses embedded under epistemic predicates, and examine concurrently the French indicative, which is not a presupposition trigger, and does not intervene in such contexts. Through the lens of NPI licensing, we provide new insights in the mechanics of mood selection in the two languages: for instance, we establish that the appearance of the indicative under Italian epistemic predicates is dependent on at least three factors, i.e. the *Morphology Factor*, the *Congruence with the Speaker's Assumptions Factor*, and the *Strength of Belief Factor*. The latter prompts a revision of the semantics of epistemic predicates, whereby degrees of belief are introduced.

The second chapter probes the idea that presupposition triggers are, in general, interveners. This hypothesis is borne out (but faces a number of counterexamples that still need to be accounted for). We propose that the meaning which is relevant to the calculation of NPI licensing is one that encompasses presuppositions. The fact that some presupposition triggers do not intervene leads to posit a modular picture, in which some but not all presuppositions are available to the system that computes NPI licensing. We show that the facts about presuppositions parallel in a striking way the facts about scalar implicatures, another type of inference held responsible for another class of intervention effects.

CHAPTER 1

Indicative as an Intervener

In this chapter, we bring to the forefront the interaction between mood selection and NPI licensing. Italian provides evidence that the indicative mood is a potential disruptor; consequently, the data presented here shed light on the nuts and bolts of the sanctioning of polarity items (which is the main purpose of the thesis), but they also further our understanding of some long-standing puzzles about mood in Romance.

First, we introduce the puzzle (1.1): French and Italian differ w.r.t. the intervention. Second, we analyze the semantics of the indicative under epistemic predicates in both languages (1.2), and isolate the factor which plays the crucial part in the intervention, to wit, the *Congruence with the Speaker's Assumptions Factor* (1.3), paving the way for the hypothesis that presuppositions disrupt NPI licensing.

1.1 Intervention effects

The core puzzle concerns epistemic predicates (*think, believe, suspect, guess, consider, judge, imagine, envisage, suppose, be sure, have the impression... and hope*). In Italian, an NPI fails to be licensed by a superordinate licenser if it sits in an indicative-marked clause, complement of an epistemic predicate.

- (1) *Gianni non pensa che Maria abbia chiuso occhio sul treno.*
Gianni NEG thinks that Maria have.SUBJ closed eye on-the train
'Gianni doesn't think that Maria slept a wink on the train.'

- (2) **Gianni non pensa che Maria ha chiuso occhio sul treno.*
 Gianni NEG thinks that Maria have.IND closed eye on-the train
 ‘Gianni doesn’t think that Maria slept a wink on the train.’
- (3) *Gianni non pensa che Maria abbia/*ha la minima possibilità di vincere.*
 Gianni NEG thinks that Maria have.SUBJ/IND the slightest chance of win
 ‘Gianni doesn’t think that Maria has the slightest chance of winning.’

It is important to underline that *pensare*, along with a vast majority of epistemic predicates in Italian, is a subjunctive-licenser. The indicative under *pensare* and *non pensare* is possible, though marked (see section 1.3 for an account of the indicative under a negated epistemic verb). The contrast between (2) and (4) shows that the ungrammaticality of (2) is not due to mood alone, but to the combination of the indicative with a clausemate NPI. In order for the comparison to be fair, let’s assume that in sentences (1), (2) and (4), the conversationalists assume that Maria did sleep during her journey (the motivation for this assumption will become apparent shortly; it doesn’t affect the grammaticality (1) and (2), but impinges on the grammaticality of (4)):

- (4) *Gianni non pensa che Maria ha dormito sul treno.*
 Gianni NEG thinks that Maria have.IND slept on-the train
 ‘Gianni doesn’t think that Maria slept on the train.’

In French, the intervention effects are not reproduced and, if there is some oddness to the sentence, it is only due to the presence of the indicative, which is marked under a negated epistemic predicate.¹

¹There is one counterexample to this claim: *n*-words, which form a subset of NPIs, seem to loathe being separated from their superordinate licenser by an indicative-marked predicate.

- (5) *Pierre ne pense pas que Marie l’ait² jamais aimé.*
 Pierre NEG thinks NEG that Marie him have.SUBJ/IND ever loved

- (6) *Jean ne pense pas que Marie ait¹a fermé l' œil dans le train.*
 Jean NEG thinks NEG that Marie have.SUBJ/IND closed the eye in the train
 'Jean doesn't think that Marie slept a wink on the train.'
- (7) *Pierre ne pense pas que Marie ait¹a la moindre chance de gagner.*
 Pierre NEG thinks NEG that Marie have.SUBJ/IND the least chance of
 to-win
 'Pierre doesn't think that Marie has the slightest chance to win.'

Another fact deserves particular attention: the intervention effects are suspended in Italian (and, unsurprisingly, do not arise in French) when the embedded predicate is in the future indicative (compare (2) and (8)):

- (8) *Gianni non pensa che Maria chiuderà occhio sul treno.*
 Gianni NEG believes that Maria close.IND.FUT eye on-the train
 'Gianni doesn't believe that Maria will sleep a wink on the train.'
- (9) *Jean ne pense pas que Marie fermera l' œil dans le train.*
 Jean NEG thinks NEG that Marie close.IND.FUT the eye in the train
 'Jean doesn't think that Marie will sleep a wink on the train.'

This last fact strongly suggests that incriminating the indicative *per se* will not be sufficient, and that we will have to delve into the various features that this mood carries in order to account for the intervention effects.

'Pierre doesn't think that Mary ever loved him.'

It bears saying that French *n*-words such as *jamais* are ambiguous: they can behave like NPIs (and hence require a c-commanding licenser) in formal registers, or they can have a negative force of their own, in standard speech. The indicative version of (5) only means that Pierre doesn't think that Marie *never* loved him, exhibiting the latter behavior. However, it should be noted that the subjunctive version only exhibits the former and only means that Pierre doubts Mary's love. We suspect that the two sentences belong to two different registers: the use of the subjunctive clearly pertains to a formal register, when the indicative signals a lower register; an NPI associated with the indicative will create a register clash.

Explaining the difference between French and Italian with respect to intervention effects becomes our main goal from now on. This task involves determining the semantic properties of the indicative and of the subjunctive in the two languages. Our claim is that two differences are correlated: (i) the Italian indicative under epistemic predicates causes intervention while the French indicative doesn't, and (ii) epistemic predicates are (mostly) subjunctive-governors in Italian, and (without exception) indicative-governors in French. We will argue that the intervention effect arises in Italian because of a presupposition carried by the indicative. This is not so in French, because the indicative found under an epistemic predicate can always be interpreted as weak (i.e. non presuppositional): this weak indicative is the mood that is normally selected by epistemic predicates in French.

1.2 Mood distribution

1.2.1 Commonalities I

The subjunctive mood is mainly found in embedded clauses;² its appearance is contingent on the properties of the matrix clause. In particular, the selection of mood is the expression of some requirements of the embedding predicate. We thus provide a typology of (propositional attitude) predicates, according to whether they govern the subjunctive or the indicative in the embedded clause. Overall, mood distribution is fairly parallel between French and Italian. Table 1.1 is designed to display common mood requirements across the two languages. By mood requirement, we mean the

²It is also the mood of optatives:

- (10) *Qu' il soit pendu.* (French)
 that he be.SUBJ hanged
 'May he be hanged.'

mood morphology realized on the predicate of the clause selected by a given propositional attitude verb.

<i>Indicative-governors:</i>	<i>Subjunctive-governors:</i>
<ul style="list-style-type: none"> • Factives (e.g. <i>know, find out, realize</i>) • <i>Verba dicendi</i> (e.g. <i>say, announce, declare, whisper, shout</i>) • Verbs of perception (e.g. <i>see, hear</i>) 	<ul style="list-style-type: none"> • Desideratives (e.g. <i>desire, want, order, accept</i>) • Emotive factives (e.g. <i>regret, be happy</i>) • Causatives (e.g. <i>prevent</i>)

Table 1.1: Mood Distribution in French and Italian

In French, these selectional facts are very robust, in other words, the embedding predicates are impervious to the presence of any operator taking scope over them (what we later label ‘Special Contexts’ in section 1.2.2). In all fairness, the verbs *découvrir* (*find out*) and *se souvenir* (*remember*) can embed the subjunctive in a Special Context, and *verba dicendi* can, in those same Special Contexts, embed the subjunctive when they serve as synonyms of epistemic predicates. This holds of Italian as well. Let it be said, for the sake of exhaustivity, that Italian *verba dicendi* can embed the subjunctive in Special Contexts, even when they truly denote manners of speaking.

1.2.2 Commonalities II: Special Contexts

We have already hinted at operators or syntactic configurations which influence the selectional properties of propositional attitude verbs (mainly epistemic predicates) that fall under their scope. We label the environments they create ‘Special Contexts’, whereby we mean environments in which the embedded predicate has a strong tendency to surface in the subjunctive. An epistemic predicate in French and in Italian shifts to a subjunctive-governor (as for Italian, the shift is very often invisible, as a vast majority of epistemic predicates are subjunctive-governors anyway, so we provide French examples) for example in the scope of a superordinate negation (see the Appendix for an exhaustive list of Special Contexts) :

- (11) *Jean ne pense pas que Marie soit¹est enceinte.*
 Jean NEG thinks NEG that Marie be.SUBJ/IND pregnant
 ‘Jean does not think that Marie is pregnant.’

Let’s lay down the following principle:

- (12) **Special Contexts Rule:** In a Special Context, the subjunctive mood is licensed in the embedded clause.

Importantly, the subjunctive that surfaces in Special Contexts is not mandatory, i.e. it alternates with the indicative. It therefore differs from the subjunctive which is found under intensional predicates such as *vouloir* (*want*) (see section 1.2.1), which is compulsory. Another distinguishing property of the subjunctive under scrutiny is that it can propagate down to more deeply embedded predicates (Non-Local Triggering):

- (13) a. *Jean ne pense pas que Marie soit sûre que Pierre soit/est malade.*
 Jean NEG thinks NEG that Marie be.SUBJ sure that Pierre be.SUBJ/IND
 sick
 ‘Jean doesn’t think that Marie is sure that Pierre is sick.’
- b. *Jean ne veut pas que Marie soit sûre que Pierre *soit/est malade.*
 Jean NEG wants NEG that Marie be.SUBJ sure that Pierre be.SUBJ/IND
 sick.
 ‘Jean doesn’t want Marie to be sure that Pierre is sick.’

The literature refers to the subjunctive found in Special Contexts as *Polarity subjunctive* (Quer 1998). Special Contexts are describable as involving negation to some extent. But it is hard to delineate a natural class that would encompass all and only the Special Contexts. In particular, it appears that the so-called Polarity Subjunctive is not itself an NPI, since its distribution fails to parallel the distribution of (weak) NPIs in

French: this is best exemplified by its non-occurrence in the antecedent of indicative conditionals (as opposed to counterfactual conditionals). Furthermore, the set of Special Contexts is not a subset of NPI licensers either, as the Polarity subjunctive is also found under an *irrealis* such as *'il se pourrait que...'* (*'It might be the case that...'*), which is not an NPI licenser. At this point, we leave unexplained the nature of the Polarity subjunctive, but retain that it is triggered by operators, some of which happen to be NPI licensers (this is the case of negation). More important (and conceivably more tractable) is the question of the semantic and syntactic difference(s) between the two moods (indicative and subjunctive) placed within a Special Context.

So much for commonalities, it is time to focus on differences. The most striking difference between the two languages lies in the behavior of predicates which are not listed in Table 1.1, namely epistemic predicates.

1.2.3 Differences I: Epistemic predicates

Epistemic predicates differ crucially in their mood requirements across the two languages; we have just shown their tendency to select for the subjunctive under a certain class of operators scoping over them, but outside of these contexts, they are indicative-governors in French, and, for the most part, subjunctive-governors in Italian (this is a strong tendency, but the indicative is also possible under certain predicates, see 1.2.4.2 below). These facts hold for plain declarative sentences, i.e. sentences of the type 'X *Verb-of-Attitude-s that p*', where, crucially, no negative operator takes scope over the embedding predicate. In Special Contexts, they preferentially select for the subjunctive (and the indicative becomes marked).

- (14) *Jean pense que Marie *soit/est enceinte.* (French)
 Jean thinks that Marie be.SUBJ/IND pregnant
 'Jean thinks that Marie is pregnant.'

- (15) *Jean ne pense pas que Marie soit²est enceinte. (French)*
Jean NEG thinks NEG that Marie be.SUBJ/IND pregnant
'Jean does not think that Marie is pregnant.'

In Italian, if the common ground of the conversation is neutral with respect to Maria's pregnancy, the following judgments obtain:

- (16) *Gianni pensa che Maria sia/??è incinta. (Italian)*
Gianni thinks that Maria be.SUBJ/IND pregnant
'Gianni thinks that Maria is pregnant.'

- (17) *Gianni non pensa che Maria sia/??è incinta. (Italian)*
Gianni NEG thinks that Maria be.SUBJ/IND pregnant
'Gianni doesn't think that Maria is pregnant.'

In this thesis, we do not aim at explaining why the subjunctive is possible under all Italian epistemic predicates: more modestly, we try to understand why the indicative is also possible, and sometimes preferred.

1.2.4 Differences II: Indicative under Italian epistemic predicates

At first glance, all epistemic predicates in Italian (from *supporre* (*suppose*) to *essere sicuro* (*be sure*)) can be constructed with an embedded subjunctive, but it appears upon closer inspection that the indicative is also possible. We devote this section to describing and analyzing the conditions that *facilitate* the indicative in Italian. As it turns out, there are exactly three such factors, and as will become clear, they are very different in nature. One is related to the expression of the future (*Morphology Factor*) (1.2.4.1). Another one deals with properties that are inherent to the attitude itself (*Strength of Belief*) (1.2.4.2). The other is extrinsic to the epistemic relation between a subject and a proposition: it has to do with some relation of congruence between the

reported attitude and the assumptions of the speaker (*Congruence with the Speaker's Assumptions*) (1.2.4.4).

1.2.4.1 Expressing futurity: The Morphology Factor

There is no future subjunctive in Italian, and the present subjunctive (a fact left unnoticed so far) can only have a future meaning under a certain class of embedding predicates and given certain conditions; if the embedding predicate lacks intrinsic future orientation, then the indicative future comes out as the best choice over the subjunctive, except for *futurates*, i.e. when the event described is scheduled or very close in time.

(18) *Gianni crede che Maria venga/verrà stasera.*
Gianni believes that Maria come.SUBJ/IND.FUT tonight
'Gianni believes that Maria will come tonight.'

(19) *Gianni crede che Maria *guadagni/guadagnerà piu soldi di lui*
Gianni believes that Maria earn.SUBJ/IND.FUT more money than him
fra dieci anni.
in ten years
'Gianni believes that Mary will earn more money than him in ten years from now.'

We label the factor which is responsible for the choice of the indicative the *Morphology Factor*, as the presence of the indicative is due to a morphosyntactic deficit on the part of the subjunctive. A way of approaching this factor is by postulating a competition between the two moods: the subjunctive in Italian usually trumps the indicative under a (weak) epistemic predicate, but, since it lacks a future semantics, it has to be replaced by a mood that does have the right feature, namely the indicative, when a future meaning is to be conveyed.

- (20) **Morphology Factor:** In Italian, the indicative morphology is required on a verb v if v carries a future feature.

These facts are aptly captured in the Distributed Morphology framework (Halle and Marantz 1994). Focusing on (19), let's assume that the Vocabulary Items *-erà* and *-i* compete for the same f-morpheme (a case of suppletive allomorphy). Let's further assume that the former is not specified for mood (it requires no reference to a value for [subjunctive]):

- (21) *Vocabulary Items*
-erà \longleftrightarrow [_____ , +future, +singular, +3rd person]
-i \longleftrightarrow [_____ , +subjunctive, +singular, +3rd person]

The context is one in which the required morphosyntactic features are [+subjunctive], [+future], [+singular], [+3rd person], leading to a tie between the two Vocabulary Items.³ Now suppose that Impoverishment takes place, deleting the [+subjunctive] morphosyntactic feature from the morpheme. Now *-erà* wins, i.e. it gets inserted at Spell-Out, because it is more specified than *-i*.

- (22) *Impoverishment*
 [+subjunctive] $\rightarrow \emptyset$

This rule of Impoverishment is motivated by the rareness of the future subjunctive across European languages (Portuguese is an exception).

Given that French epistemic predicates are indicative-governors anyway, this factor applies vacuously in plain declarative sentences in French. In Special Contexts (which

³The reasons why the subjunctive is required here are given in the following subsections: two factors, the *Strength of Belief* and the *Congruence with the Speaker's Assumptions* factors conspire to favor the subjunctive in this particular context.

normally favor the subjunctive), it becomes visible: the future indicative trumps the subjunctive for the description of genuine future events:

- (23) *Pierre ne pense pas que Marie ??réussisse/réussira son examen dans dix ans.* (French)
 Pierre NEG thinks NEG that Marie pass.SUBJ/IND.FUT her exam in ten years
 'Jean doesn't think that Marie will pass her exam in ten years from now.'

1.2.4.2 Strength of belief

A striking fact about mood selection is that not all epistemic predicates are equal in Italian. This means that some can embed the indicative more easily than others, regardless of the speaker's state of mind:

- (24) *Io non conosco l' amica di Gianni, Maria. Lui crede che lei sia/??è incinta.*
 I NEG know the friend of Gianni Maria he believes that she be.SUBJ/IND pregnant
 'I don't know Gianni's friend Maria. He believes that she is pregnant.'

Under *credere*, the subjunctive wins. This is also the case if we substitute any of the following predicates for *credere*: *pensare*, *ritenere*, *supporre*, *giudicare*, *parere*. Things change with the predicates *essere convinto*, *essere sicuro*, *essere certo*.

- (25) *Io non conosco l' amica di Gianni, Maria. Lui è convinto che lei sia/è incinta.*
 I NEG know the friend of Gianni Maria he is convinced that she be.SUBJ/IND pregnant
 'I don't know Gianni's friend Maria. He is convinced that she is pregnant.'

In (25), the two moods are acceptable, even though the subjunctive is still a tad better than the indicative. With *essere sicuro*, *essere certo*, *essersi convinto*,⁴ the situation is reversed, as the indicative is judged better than the subjunctive:

- (26) *Io non conosco l' amica di Gianni, Maria. Lui è sicuro che lei*
 I NEG know the friend of Gianni Maria he is sure that she
[?]*sia/è incinta.*
 be.SUBJ/IND pregnant
 'I don't know Gianni's friend Maria. He is sure that she is pregnant.'

The intuitive difference between those two sets of predicates lies in the strength of the belief: the subject of *è sicuro* in (26) has a conviction beyond all doubt, while nothing in (24) precludes some measure of uncertainty in the mind of the subject of *crede*. This immediately suggests that belief is gradable, and that each epistemic predicate is assigned a specific span or range of degrees of belief on some continuum. Put differently, we visualize these predicates as being ordered on a scale of epistemic strength. We might not be able to delineate this scale in a detailed manner, but there is one fact that our description should capture: there seems to exist a cutoff point dividing subjunctive-only-governors (at the bottom) and subjunctive/indicative-governors (at the top). Under that premise, the verb *credere* has a wider spectrum than the predicate *essere sicuro* in that it is fit to describe a moderate credence. But it can also be modified so as to denote a stronger confidence in the truth of the embedded proposition. In which case the indicative improves (but remains slightly suboptimal):

⁴*Essersi convinto* differs little from *essere convinto*: in *Gianni si è convinto che Maria sia/è incinta* ('Gianni has convinced himself that Maria is pregnant') the improvement of the indicative has to be ascribed to either the perfective form of the matrix predicate or to its reflexive form.

(27) *Gianni non ha nessun dubbio a proposito di Maria: lui crede che lei sia/?è incinta.*
 Gianni NEG has no doubt about Maria he believes that she be.SUBJ/IND pregnant
 ‘Gianni has no doubt about Maria: he believes that she is pregnant.’

(28) *Gianni non ne è sicuro, ma crede che Maria sia/*è incinta.*
 Gianni NEG of-it is sure but he-believes that Maria be.SUBJ/IND pregnant
 ‘Gianni is not sure about it, but he believes that Maria is pregnant.’

How can we ensure that such a scale exists? Let us use implication relations. The following sentence is contradictory, because the first conjunct asymmetrically entails the negation of the second (the reverse doesn’t hold, witness (30)):

(29) #*Piero è sicuro che Maria è incinta, ma non lo crede/ne ha l’impressione.*
 Piero is sure that Maria be.IND pregnant but NEG it he-believes/of-it he-has the impression
 #‘Piero is sure that Maria is pregnant, but he doesn’t believe it/ have that impression.’

(30) *Piero crede/ha l’impressione che Maria sia incinta, ma non ne è sicuro.*
 Piero believes/has the impression that Maria be.SUBJ pregnant but NEG of-it he-is sure
 ‘Piero believes/has the impression that that Maria is pregnant, but he isn’t sure about that.’

By the same token, we can establish that weaker predicates (*credere, pensare, avere l’impressione, supporre, ritenere...*) are not ranked among themselves, since no asymmetrical entailment obtains:

- (31) #*Piero crede che Maria sia incinta, ma non ne ha l'impressione.*
 Piero believes that Maria be.SUBJ pregnant but NEG of-it he-has the impression
 #‘Piero believes that Maria is pregnant, but he doesn’t have that impression.’
- (32) #*Piero ha l'impressione che Maria sia incinta, ma non lo crede.*
 Piero has the impression that Maria be.SUBJ pregnant but NEG it he-believes
 #‘Piero has the impression that Maria is pregnant, but he doesn’t believe it.’

Another possible diagnostic for the existence of a scale is the existence of scalar implicatures. In the Hornian system, a scalar implicature arises from the belief that the speaker adheres to the Gricean maxims of quantity and quality.

- (33) a. Some students did very well on the exam.
 b. All the students did very well on the exam.
 c. Not all the students did very well on the exam.

It is said that (33-c) is a scalar implicature that hearers of (33-a) will make: assuming that the speaker is cooperative and well informed, and given that (33-b) asymmetrically entails, and thus is more informative than, (33-a), the hearer is entitled to assume that the reason the speaker did not utter (33-b) is either because she holds it to be false, or because she lacks adequate evidence. Thence the inference in (33-c). The existence of the scalar implicature is contingent on the existence of a lexical scale relating the determiners *some* and *all*. Scalar implicatures can be defeated, because stronger elements on the scale are consistent with weaker ones.

For some pairs of epistemic predicates, the implicatures do arise, and can be defeated. This is indeed the case with *avere l'impressione* (have the impression) / *essere sicuro* (be sure) and *pensare* (think) / *essere sicuro* (be sure) (or, for that matter,

credere/essere sicuro):

- (34) a. Gianni pensa che Maria sia incinta (*'Gianni thinks that Maria is pregnant'*).
b. *Implicature*: Gianni is not sure that Maria is pregnant.
c. *Defeating the implicature*: Gianni pensa che Maria sia incinta, infatti è sicuro che è incinta (*'Gianni thinks that Maria is pregnant, in fact he is sure that she is'*).

Scoping a scale reverser above the strong scalar term should also give rise to an implicature, and it does:⁵

- (35) a. It is not the case that everyone has come.
b. *Implicature*: Someone has come.
c. Gianni non è sicuro che Maria sia incinta (*'Gianni is not sure that Maria is pregnant'*).
d. *Implicature*: Gianni thinks that Mary is pregnant.

We still do not have a clear view of the whole scale. Using implicatures as a diagnostic, and assuming that we are right in postulating such a scale, how about the *avere l'impressione/credere* pair? No implicature links the two, therefore no clear-cut ranking emerges:

- (36) a. Gianni ha l'impressione che Maria sia incinta (*'Gianni has the impression that Maria is pregnant'*).
b. **Implicature*: Gianni doesn't think that Maria is pregnant.

⁵A downward entailing environment acts as a scale reverser: the strongest member of the scale becomes the lowest, and this situation triggers a scalar implicature, as in (35-a). The facts are different in French, though: speakers tend not to make the scalar implicature in the French equivalent of (35-c). This absence of SI could be due to some confound: in effect, (35-c) in French is a euphemism for *'John thinks that Mary is not pregnant'*. If this effect can be ascribed to some independent reason such as some rhetorical nuance, the lack of implicature in French will not count as evidence against the existence of a scale.

- (37) a. Gianni crede che Maria sia incinta (*‘Gianni believes that Maria is pregnant’*).
 b. **Implicature*: Gianni doesn’t have the impression that Maria is pregnant.

The existence of scalar implicatures will be useful later in the course of our discussion (Chapter 2, (11)).

It looks like there is a number of scales, since we cannot find a linear order for all the epistemic predicates: *<essere sicuro, credere>*, *<essere certo, credere>*, *<essere sicuro, supporre>*... Weak predicates have a large span, from medium to high degrees of credence, while strong predicates have a very narrow span around the maximal degree of belief.

Let’s lay down the principle that accounts for the correlation between strength of belief and mood selection:

- (38) **Strength of Belief Condition:** In Italian, the indicative is possible in a clause ϕ embedded under an epistemic predicate and expressing proposition p if the subject of the attitude assigns a maximal degree of belief to p .

1.2.4.3 Probabilistic semantics for epistemic predicates

How are these observations to be semantically formalized? We have availed ourselves of the notion of degree of belief, on the grounds that the data suggest that Italian morphologically encodes what one might want to call epistemic gradualism and reflects what philosophers call *subjective probability* or *Bayesian probability*. By Bayesian probability, we mean the measurement of the belief that a subject has in an uncertain proposition; this value is a function of the amount of evidence one has.

Now, Hintikka’s classic treatment of intensional predicates such as *believe* defines them as universal quantifiers over possible worlds: we say that *‘Mary believes that p’*

means that Mary's state of mind carves out a set of possible worlds compatible with her beliefs, i.e. worlds in which p is true. There exists some function that maps an individual x and a given possible world μ to a set of possible worlds, the so-called alternatives to μ . Suppose there is a world compatible with Mary's beliefs where p is not the case: according to Hintikka and the semantic tradition, this is sufficient to say that Mary in fact does not believe that p . This is the claim that we are here led to challenge. To us, the data are more complex, as it is natural to say:

(39) Peter thinks that Meredith has come, but he is not sure about it.

Our proposal is thus to treat belief reports as subjective probability assignments. First, we avail ourselves of a probability structure. Belief reports are to be interpreted with respect to a probability structure Π , defined as a tuple $\langle D, W, g, \mu \rangle$, where D is a domain of discourse, W is the set of possible worlds, g is an interpretation function, and μ is a probability measure defined on the set of possible worlds W , and assigned by the agent. The agent assigns probability measures to subsets of W , and those measures add up to 1: for every $A \subseteq W$, and for agent x , $\sum_A \mu_x(A) = 1$. The μ function returns probabilities that one might want to call degrees of belief. Evaluating a proposition p amounts to assigning a probability measure to p , using the probability structure Π . The agent has a *essere sicuro*-type relation to p if she assigns probability 1 to the p -worlds, i.e. if she thinks with probability 1 that the actual world w lies in the set of p -worlds; if she has a *credere che*-type relation to p , then her degree of belief that w is a member of the set of p -worlds lies in the]0.5;1] interval. The following lexical entries ensue (where $\llbracket \cdot \rrbracket = g(\cdot)$):

- (40) a. $\llbracket \text{essere sicuro} \rrbracket^{c,s,w}(p) = \lambda x_e. \mu_{x,w}\{w' : w' \in p\} = 1$
b. $\llbracket \text{credere} \rrbracket^{c,s,w}(p) = \lambda x_e. 0.5 < \mu_{x,w}\{w' : w' \in p\}$

From a Bayesian point of view, assigning degrees of likelihood (the so-called “prior probabilities”) to a proposition is a matter of subjective decision, much like bets on possible outcomes based on extant evidence, and it does not involve calculating actual frequencies of favorable outcomes: in the Bayesian tradition, degrees of belief are reflected in the odds and stakes that the subject is willing to bet on the proposition at hand.

Given that our tests do not reveal any difference in strength between the so-called weak predicates (*avere l'impressione, credere, supporre, giudicare, pensare, ritenere...*) the second of the above lexical entries would fit them well. And the first would apply adequately to all strong predicates. If this dichotomy is too crude, we would probably have to specify other cutoff points on the scale of belief: but our tests so far show otherwise, and, in any event, the task of assigning precise, numerical measures is far beyond the reach of linguistic experiments.

We would like to point out that this proposal is new, but not absolutely one of its kind: some have proposed a probabilistic treatment of another kind for intensional predicates, namely *desire* verbs. The received view in the literature (Heim 1992) is that for John to want p , John must prefer worlds in which p is the case to worlds in which p is not the case; this involves a preference relation $<_{d,w}$ which holds between two propositions iff d finds the second more desirable than the first in w . The relation is extended to sets of worlds:

(41) For any $w \in W$, $X \subseteq W$, $Y \subseteq W$, $X <_{a,w} Y$ iff $w' <_{d,w} w''$ for all $w' \in X$, $w'' \in Y$.

Heim defines a function Sim_w from propositions to propositions, which, for each world w , maps p to the set of p -worlds maximally similar to w :

$$(42) \quad Sim_w(p) = \{w' \in W \mid w' \in p \text{ and } w' \text{ resembles } w \text{ no less than any other world in } p\}$$

She thus proposes that for an individual d to want p in w means that for every world w' in $Dox_d(w)$, every p -world maximally similar to w' is more desirable to d in w than any $\neg p$ -world maximally similar to w' (where δ refers to individual d and ϕ expresses proposition p):

$$(43) \quad \llbracket \delta \text{ wants } \phi \rrbracket = 1 \text{ in } w \text{ iff for every } w' \in Dox_d(w), Sim_{w'}(p) >_{d,w} Sim_{w'}(\neg p)$$

Levinson (2003) argues that distinguishing between desirable and non desirable worlds is not sufficient. For example, suppose that John is unsure whether he should buy an insurance for his house. Granted, it is preferable to be an insurance subscriber, in case the house is ruined by, say, a fire. But the expenditure might also prove useless if no misfortune ever strikes: in that situation, one might say that John would actually be better off without an insurance. Heim's analysis wrongly predicts that John doesn't want to buy insurance, because, in comparing possible scenarios, he entertains the idea that this might lead to an undesirable waste of money. Consequently, Levinson proposes to introduce an evaluation function and a probability function. In an insurance scenario, there are two variables (giving rise to four possible outcomes): (i) either j buys an insurance for his house or not, and (ii) either j 's house is damaged or not. Saying that j wants p ' (where $p = \text{buy insurance}$) doesn't mean that j thinks that p will improve his situation in every course of events. Rather, it means that the *subjective expectation of the desirability* is higher if p is true than if p is false. The task of modeling desirability is performed by an evaluation function g from sets of possible worlds to real numbers (e.g. $g(W_3) = -50$, for W_3 a set of possible worlds in which the insurance is bought and the house is intact; $g(W_2) = -100000$ for W_2 a set of possible worlds in which j 's house is uninsured and ruined). Each outcome is assigned an absolute probability by j , hence

the introduction of the probability function P :

- (44) $P_{d,w}(W) = \pi$ iff the individual d in w assigns probability π to the possibility that the actual world is in W .

This yields the following:

- (45) $[[\delta \text{ wants } \phi]]^{w,g} = 1$ iff for every $w' \in \text{Dox}_d(w)$, $\text{SubjExp}_{d,w}(g(\text{Sim}_{w'}(p))) > \text{SubjExp}_{d,w}(g(\text{Sim}_{w'}(\neg p)))$, where $\text{SubjExp}(g(x_i)) = \sum_i g(x_i) \cdot P_{d,w}(x_i)$

Noticeably, when an agent evaluates buletic alternatives, she actually calculates the good as well as the bad effects attached to each option, weighed by the odds for each option: what is crucial for us is not so much the evaluation function g as the introduction of degrees of likelihood into the semantics of desiderative verbs. This analysis corroborates the lesson drawn from the Italian data, i.e. probability functions are indeed an ingredient of the meaning of propositional attitude verbs.

1.2.4.4 Congruence with the speaker's assumptions

Sentence (24) repeated as (46) below provides what one might call a pure case of a subjunctive embedded under an epistemic predicate. Here the speaker entertains no particular beliefs towards the truth of the reported attitude; this way one ensures that the speaker remains neutral *vis-à-vis* the attitude (the importance of that condition will be appreciated shortly).

- (46) *Io non conosco l' amica di Gianni, Maria. Lui crede che lei*
 I NEG know the friend of Gianni Maria he believes that she
sia/??è incinta.
 be.SUBJ/IND pregnant
 'I don't know Gianni's friend Maria. He believes that she is pregnant.'

The grammatical judgment is clearly different when the context shows that the speaker agrees with the reported belief:

- (47) *Sono contento che finalmente io e lui siamo d'accordo: Gianni crede*
 I-am glad that finally I and he be.SUBJ agreed Gianni believes
che Maria ?sia/è incinta.
 that Maria be.SUBJ/IND pregnant

'I'm glad that he and me finally agree: Gianni believes that Maria is pregnant.'

Strikingly, while the subjunctive is normally preferred under *credere* (witness (46)), it becomes equally or even slightly less appropriate than the indicative in case of explicit subject-speaker agreement. Conversely, if the speaker explicitly rejects the subject's attitude, the subjunctive wins:

- (48) *Gianni deve essere impazzito! Crede che Maria sia/??è incinta.*
 Gianni must be crazy he-believes that Maria be.SUBJ/IND pregnant
'Gianni must have lost his mind! He believes that Mary is pregnant.'

It is important to verify that the selection of the indicative is a speaker-oriented phenomenon:

- (49) *So che noi due non siamo d'accordo. Io sono sicuro che Maria*
 I-know that us two NEG be.IND agreed I am sure that Maria
è incinta, mentre tu pensi che non lo sia. Anche Gianni
 be.IND pregnant while you think that NEG it she-be.SUBJ also Gianni
crede che Maria ?sia/è incinta.
 believes that Maria be.SUBJ/IND pregnant

'I know that the two of us do not agree. I'm sure that Maria is pregnant, while you do not think so. Gianni too believes that Maria is pregnant.'

- (50) *So che noi due non siamo d'accordo. Io penso che Maria non sia incinta, mentre tu sei sicuro che è incinta. Anche Gianni crede che Maria sia/??è incinta.*
 I-know that us two NEG be.IND agreed I think that Maria NEG be.SUBJ pregnant while you are sure that she-be.IND pregnant also Gianni believes that Maria be.SUBJ/IND pregnant
'I know that the two of us do not agree. I think that Maria is not pregnant, while you are sure she is. Gianni too believes that Maria is pregnant.'

As the contrast between (49) and (50) indicates, agreement with some salient individual's beliefs is not sufficient to license the indicative. The following example confirms this fact:

- (51) (*Context: The speaker thinks that Maria is not pregnant, but many, including Gianni, disagree.*)
Gianni condivide l' opinione generale che Maria sia/??è incinta.
 Gianni shares the opinion general that Maria be.SUBJ/IND pregnant
'Gianni shares the general opinion that Maria is pregnant.'

We are now in a position (i) to state a generalization as a sufficient condition for the use of the indicative, and (ii) to make a prediction:

- (52) **Congruence Condition** (to be revised): In Italian, the indicative is possible in a clause ϕ embedded under an epistemic predicate and expressing proposition p , if the speaker believes that p .

And the prediction is the following: with a first person subject of the attitude, the indicative should improve dramatically. This in fact is not true, for the subjunctive remains, by far, the preferred option.

- (53) *Credo che Maria sia/??è incinta.*
 I-believe that Maria be.SUBJ/IND pregnant

'I believe that Maria is pregnant.'

This result invalidates our *Congruence Condition*. Does this mean it has to be jettisoned entirely? In the next section, we show that the condition must be strengthened so as to take into account the strength of the belief. We also show that the agreement with the speaker has to be presupposed.

1.2.4.5 Presuppositional indicative in Italian

Factoring in the strength of the belief, we can take a fresh look at the puzzle posed by sentence (53) above: *credere* is a weak scalar term which triggers the SI *'I am not sure that she is pregnant'*. Importantly, the indicative improves greatly under *credo* if we remove the implicature:

- (54) *Credo con certezza/senza alcun dubbio che Maria ?sia/è*
I-believe with certainty/without any doubt that Maria be.SUBJ/IND
incinta.
pregnant
'I believe with certainty/without any doubt that Maria is pregnant.'

In (54), the indicative is judged slightly better than the subjunctive (which, incidentally, remains acceptable): we can thus infer that the use of the indicative in (53) is simply not grounded, despite the fact that the *Congruence Condition* is satisfied. A natural move would be to give precedence to the *Strength of Belief Condition*, since this condition appears to be frustrated in the case at hand: in other words, the idea would be to impose the *Strength of Belief Condition* as a necessary condition. But we know from (47) that the same verb *credere* can be turned into an indicative-licenser by the sole virtue of the *Congruence Condition*, suggesting that the two factors are in fact

independent:⁶ it suffices that either the *Congruence Condition* or the *Strength of Belief Condition* be satisfied for the indicative to be possible.

We therefore propose that the culprit is the *Congruence Condition*, which should incorporate an explicit reference to strength:

- (57) **Congruence Condition** (to be revised): In Italian, the indicative is possible in a clause ϕ embedded under an epistemic predicate and expressing proposition p if the speaker assigns a maximal degree of belief to p .

The reader can check that in sentence (49), designed to verify speaker-orientedness, the context made it explicit that the speaker was certain about the object of her belief; in (47), the speaker doesn't explicitly say that her degree of belief is maximal, but by making use of the term *agree*, she conveys that she is strongly opinionated (and no implicature arises that would undermine this confidence).

Also consonant with our conditions is the ungrammaticality of (58), where neither factor can rescue the indicative:

⁶The independence of the two factors is evidenced by (55), in which the speaker disagrees (*Congruence Condition* not met) with a strongly opinionated subject (*Strength of Belief Condition* met) and yet the indicative is licensed:

- (55) (Context: We all know that Maria is not pregnant.)
Gianni è sicuro che Maria è incinta. Che pazzo!
Gianni is sure that Maria is pregnant what fool
'Gianni is sure that Maria is pregnant. What a fool!'

And (56) makes the same point, except with symmetrical conditions:

- (56) *Sono sicuro che Maria è incinta; anche Gianni crede che Maria è incinta.*
I-am sure that Maria is pregnant also Gianni believes that Maria is pregnant
'I am sure that Maria is pregnant; Gianni too believes that Maria is pregnant.'

- (58) **Non credo che Maria è incinta.*
 NEG I-believe that Maria be.IND pregnant
 ‘I do not think that Maria is pregnant.’

Finally, when both factors conspire, the subjunctive is significantly degraded, and the indicative is optimal:

- (59) *Sono sicuro che Maria ??sia/è incinta.*
 I-am sure that Maria be.SUBJ/IND pregnant
 ‘I am sure that Maria is pregnant.’

We are now in a position to provide the following disjunctive rule for the indicative under epistemic verbs:

- (60) **Principle I:** In Italian, the indicative is possible under an epistemic predicate iff SB or CC or MF is satisfied (where *SB* stands for the *Strength of Belief Condition*, *CC* stands for the *Congruence Condition*, and *MF* stands for the *Morphology Factor*).

We verify that the rule predicts the grammatical judgments:

- (61) a. *Credo che Maria sia/??è incinta* (53): neither CC nor SB is satisfied (MF is irrelevant), therefore (60) rules out the indicative.
 b. **Non credo che Maria è incinta* (58): neither CC nor SB is satisfied, because of the implicature triggered by the weak predicate (MF is irrelevant), therefore (60) rules out the indicative.
 c. *Sono sicuro che Maria ??sia/è incinta* (59): both CC and SB are satisfied (MF is irrelevant), therefore (60) rules in the indicative.
 d. ... *Gianni è sicuro che Maria è incinta* (55): SB is satisfied, but CC is not (MF is irrelevant): (60) rules in the indicative.
 e. ... *anche Gianni crede che Maria è incinta* (56): CC is satisfied, but SB is not (MF is irrelevant): (60) rules in the indicative.

Now that we have laid down the two conditions, the reader might smell the whiff of simplification: after all, we seem to have grounds for venturing the following disjunctive condition:

- (62) **Generalized Strength Condition** (tentative): In Italian, the indicative is possible in a clause ϕ embedded under an epistemic predicate and expressing proposition p , if the speaker or the subject of the attitude assigns a maximal degree of belief to p .

This would be highly premature, though. Conflating the two conditions will obscure their essential difference: the *Strength of Belief Condition* deals with the assertive content of a sentence, when the fulfillment of the *Congruence Condition* amounts to satisfying a presupposition.

This is what we set about showing. Our claim is that this indicative is possible if the speaker holds the embedded proposition p to be true. Let's be more specific: the presence of the indicative under a weak epistemic predicate will *trigger the inference* that the speaker holds p to be true. But what kind of inference is it? Is it a conversational implicature or a presupposition? If it is a conversational implicature, we expect it to be defeasible. But this is not the case, as (63) below indicates:

- (63) **Gianni crede che Maria è incinta, ma io non lo credo.*
Gianni believes that Maria be.IND pregnant but I NEG it believe
'Gianni believes that Maria is pregnant, but I don't believe it.'

We can successfully run presupposition-specific tests (using the weak predicate *credere*, thus controlling for the strength factor):

- (64) a. *Gianni non crede che Maria è incinta.*
Gianni NEG believes that Maria be.IND pregnant
'Gianni doesn't believe that Maria is pregnant.'

b. *Inference*: The speaker holds true that Maria is pregnant.

- (65) #*Gianni non crede che Maria è incinta, e infatti nemmeno io lo*
Gianni NEG believes that Maria be.IND pregnant and in-fact neither I it
credo.
believe

'Gianni doesn't believe that Maria is pregnant, and neither do I, as a matter of fact.'

- (66) a. *Se Gianni crede che Maria è incinta, non lo mostra.*
if Gianni believes that Maria be.IND pregnant NEG it he-shows
'If Gianni believes that Maria is pregnant, he doesn't show it.'

b. *Inference*: The speaker holds true that Maria is pregnant.

- (67) a. *Gianni crede che Maria è incinta?*
Gianni believes that Maria be.IND pregnant
'Does Gianni believe that Maria is pregnant?'

b. *Inference*: The speaker holds true that Maria is pregnant.

And last, we run the *no*-test. A few words of clarification are in order. Chemla (2007) provides experimental evidence that presuppositions yield universal inferences when triggered from the scope of *no* (*none*) (supporting Heim 1983 over Beaver 1994). Experimental data support the view that (68-a), where the presupposition trigger (*know*) is in the nuclear scope of the quantifier *no*, yields the universal presupposition given in (68-b), not the one in (68-c) (every individual satisfying the restrictor of the quantifier *no* should also satisfy the presupposition triggered in its nuclear scope):⁷

- (68) a. None of these 10 students knows that he is lucky.

⁷The *no*-test is better than negation as a tool for distinguishing presuppositions and scalar implicatures: Chemla (2007) shows that it is not true that presuppositions escape negation while scalar implicatures do not: whatever is a scalar implicature of sentence *S* is an entailment of the negation of *S*. For example, '*Some students are happy*' implicates '*Not all students are happy*', and '*It is not the case that some students are happy*' also implicates (in fact, entails) '*Not all students are happy*'.

- b. *Presupposition*: Each of these 10 students is lucky.
- c. **Presupposition*: Some of these 10 students are lucky.

And it turns out that the Italian indicative triggers a presupposition in the nuclear scope of the quantifier *no* as well: the embedded indicative in Italian (69-a) gives rise to the presupposition under (69-b), while no such presupposition arises from the subjunctive version of (69-a):

- (69) a. *Nessuno di questi dieci studenti pensa che il professore lo odia.*
 none of these ten students thinks that the teacher him hate.IND
 'None of these ten students thinks that the teacher hates him.'
- b. *Inference*: The speaker holds true that each of these ten students is hated by the teacher.

The difference between the *Congruence Condition* and the *Strength of Belief Condition* can be made explicit. Concerning the *Congruence Condition*, it is the occurrence of the indicative that triggers the inference that the embedded proposition is held true by the speaker. In other words, the presence of the indicative under a predicate of *weak* belief is a *sufficient condition* for the inference in question. As for the *Strength of Belief Condition*, the mechanism is of a different kind: the indicative is *licensed* by the assertive component of the sentence (provided no counteracting implicature comes into play), and does not trigger any inference.

In light of the facts above, we can rephrase our *Congruence Condition*:

- (70) **Congruence Condition** (final): In Italian, the indicative is possible in a clause ϕ embedded under an epistemic predicate and expressing proposition *p*, if it is presupposed that the speaker assigns a maximal degree of belief to *p*.

1.2.5 Differences III: The French weak indicative

The intervention data suggest that the indicative in the two languages has different properties. We can view the French indicative under an epistemic predicate combined with an NPI licenser as being *weak* (owing to its transparency to NPI licensing), and the Italian indicative, which appears to be responsible for intervention effects, as being *strong*. Why is the French indicative *weak*, in the sense just introduced? Our answer will be that the indicative found under an epistemic predicate in a Special Context is essentially the same as the indicative found under an epistemic predicate in a normal context.

At first glance, French seems to be morphologically blind to strength of belief (unlike the Italian indicative): all epistemic predicates, as well as *espérer* (*hope*), are strict indicative-governors in normal contexts (i.e. the set that is the complement of the set of Special Contexts). But scratching below the surface, we observe that the nominal and infinitival forms of *weak* epistemic predicates *can* embed the subjunctive in French. Nominals and infinitives do not seem to form a natural class with our Special Contexts, so we propose that they provide evidence that French epistemic predicates have the intrinsic capacity of governing the subjunctive, irrespective of the environment, just like their Italian counterparts:⁸

- (71) *La pensée que Marie soit/est enceinte leur est venue ce matin.*
the thought that Marie be.SUBJ/IND pregnant to-them is come this morning
'The thought that Marie is pregnant occurred to them this morning.'

Note that nominals usually exhibit the same mood requirements as the corresponding verbs (so the noun *désir* (*desire*) will obligatorily embed the subjunctive, and the noun

⁸In the following example, we take great caution to form sentences that contain no emotive or negative items, as those might be responsible for the occurrence of the subjunctive (see the Appendix for a complete list of examples).

affirmation (assertion) will obligatorily embed the indicative).

Now, several remarks are in order. First and foremost, French nominals do not take CP complements very easily, and that explains the scarcity of the data. Secondly, there is a distinction between two classes of nominals/infinitivals: *l'hypothèse (the hypothesis)*, *la croyance (the belief)*, *supposer (suppose)*, *penser (think)*, *croire (believe)*, on the one hand (those can embed the subjunctive); *l'opinion (the opinion)*, *l'avis (the opinion)*, *la conviction (the conviction)*, *la certitude (the certainty)*, *être convaincu (be convinced)*, *être sûr (be sure)*, *être certain (be certain)*, on the other. There is a close resemblance with the picture we drew for Italian,⁹ except that for stronger elements in French, the subjunctive becomes virtually impossible, while it is simply dispreferred in Italian. Thirdly, in Italian and in French, it is possible to construct *the idea that* with a subjunctive, even when the embedded proposition is held true by the speaker (this poses again the unsolved question of the persistence of the subjunctive under epistemic predicates in Italian, even when the *Strength of Belief* and the *Congruence* conditions are met):

- (72) *L' idea che la terra sia/è sferica non è nuova.*
the idea that the earth be.SUBJ/IND round NEG is new
'The idea that the earth is round is not new.'

This suggests that French partially reproduces Italian in that French features a similar typology of nominal and infinitival subjunctive licensers; but it differs from Italian in that the indicative is *always* grammatical under nominals/infinitivals. In French, the situation can thus be summarized as follows: under non-finite forms of epistemic predicates, the subjunctive is only licensed by weaker elements on the belief scale, and

⁹Note that the subjunctive/indicative divide would have to be set lower in French, so as to run 'under' *l'opinion* and *l'avis*, which are admittedly less strong, i.e. attached to lower subjective probabilities, than *la conviction*, *la certitude*. At any rate, I think it is reasonable to regard *l'opinion* and *l'avis* as being stronger than *la croyance*, *la pensée*, *l'idée*, as they have a more assertive feel than the latter.

the indicative is always licensed; alternatively, both moods are possible without any meaning difference for weaker non-finite forms, and only the indicative is possible for the rest of epistemic predicates.

How can we interpret these facts? We suggest that the grammaticality of the subjunctive is no accident, and that it brings into the limelight a very intimate connection between the two languages. The fact that the indicative is *always* possible under French nominals/infinitivals argues in favor of two independent sources: it looks like French operates under two distinct rules. One is only visible under nominals and infinitivals: it is the *Italian rule*, which licenses the subjunctive for weaker beliefs; the other rule (let's call it the *French rule*) is always available, irrespective of the morphological nature of the predicate (be it a nominal, an infinitival, or a tensed verb). So now we have to account for the so-called *French rule*.

What explains the indicative under all epistemic predicates in French? One possibility is that the *French rule* is a simplification of the *Italian rule*: the threshold of the indicative is so low in French that the subjunctive becomes invisible, so to speak. But if the *French rule* and the *Italian rule* are essentially of the same breed, it becomes very unlikely that they can apply alternatively under nominals.

The existence of the *Italian rule* under nominals/infinitivals and its absence under tensed verbs suggests the following: given the obvious difference between tensed verbs and nominals/infinitivals, the absence of an explicit experiencer makes the subjunctive possible. One could argue that an experiencer enters into some specific relation, namely an *assertive relation*, with the propositional content of the embedded clause and that the indicative is the mood of assertion. But even if we accept this idea, we have to admit that Italian does not mark assertion morphologically (which seems to be reasonable, after all), while French does. Some facts support this view: first, the use of the subjunctive under a nominal form in the presence of an overt experiencer is

noticeably degraded.¹⁰

- (75) *Ton idée que la terre ??soit/est plate est intéressante.*
your idea that the earth be.SUBJ/IND flat is interesting
'Your idea that the earth is flat is interesting.'

Second, the hypothesis squares well with the following contrast about the evidential *sembler* (to seem), which can embed the indicative if it comes with an experiencer (but not so much if it doesn't):

- (76) *Il semble que Marie soit[?]est enceinte.*
it seems that Marie be.SUBJ/IND pregnant
'It seems that Marie is pregnant.'
- (77) *Il lui semble que Marie *soit/est enceinte.*
it to-him seems that Marie be.SUBJ/IND pregnant
'It seems to him that Marie is pregnant.'

Assuming that our hypothesis is on the right track, we need to address a problem, i.e. we are left without an explanation for the indicative under nominals and infinitivals, i.e.

¹⁰There is one counterexample to this though, namely the behavior of *espérer* (hope), which can embed the subjunctive even in the presence of an overt experiencer:

- (73) *Ton espoir que Marie vienne est partagé par tous.*
your hope that Marie come.SUBJ is shared by everyone
'Your hope that Marie comes is shared by everyone.'

We have currently no explanation for this fact, but it should be mentioned that the verb *espérer* is more tolerant than other epistemic predicates to the subjunctive. For example, it seems that universal quantifiers are a facilitating factor (so are the imperative in *espérons* (let's hope) and the gerund *en espérant* (hoping)):

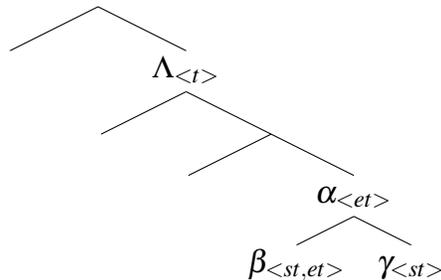
- (74) *Pierre a toujours espéré que Marie deviendrait/devienne chirurgienne.*
Pierre has always hoped that Marie become.COND/SUBJ surgeon
'Pierre always hoped that Marie would become a surgeon.'

contexts where all experiencer is absent. The optionality of the indicative is evidence, we claim, that the speaker has the option of ascribing the thought or belief to some implicit experiencer, contextually salient or not. In other words, the speaker has some latitude in individualizing or not the experiencer in non-tensed forms.¹¹ To summarize, we posit the following:

- (78) **Experiencer Factor:** In French, if an epistemic predicate E selects an overt experiencer, the indicative is required in the complement of E .

Here's how the mechanism works. A rule applies locally at LF, alongside the rules of interpretation: if there is a constituent Λ (type $\langle t \rangle$) containing α , mother of β and γ , where $\llbracket \beta \rrbracket$ is a function of type $\langle st, et \rangle$ expressed by an epistemic predicate E , and $\llbracket \gamma \rrbracket$ is a proposition ($\langle s, t \rangle$) expressed by clause ϕ , such that it is part of the assertion of $\llbracket \Lambda \rrbracket$ that x E s that ϕ , then the indicative is required in ϕ .

(79)



This condition is trivially met in simple cases like ‘*Jean pense que Marie est.IND enceinte*’ (‘*Jean thinks that Marie is pregnant*’): the whole sentence is a Λ constituent, and the free variable x takes value *Jean*. With nominals, the situation is slightly more complex. We have to look at the whole sentence in (80) and (81) in order to find a

¹¹Another explanation is feature transmission: the indicative under epistemic predicates in French is simply due to the transmission of the indicative feature by the matrix predicate. The advantage of this explanation is its simplicity, but it runs into the same problem of explaining the ubiquity of the indicative.

Λ constituent. The contrast between the two sentences comes from the fact that the former, but not the latter, asserts that there is a subject of the belief (*te (you)* in (81) is only inferred to be the subject of the belief). Conversely, the grammaticality of the indicative in (81) can be accounted for if we make the assumption that the N *idée* takes an optional implicit argument: when this implicit argument is realized (as a second person singular pronoun), the indicative is required.

(80) *Ton idée que Marie ??soit/est enceinte est troublante.*
 your idea that Marie be.SUBJ/IND pregnant is perplexing
 ‘Your idea that Marie is pregnant is perplexing.’

(81) *L’ idée que Marie soit/est enceinte te trouble.*
 the idea that Marie be.SUBJ/IND pregnant you perplexes
 ‘The idea that Marie is pregnant perplexes you.’

Similarly in (76), the optionality of this implicit argument creates a tie between the subjunctive and the indicative. What happens under negation? Special Contexts favor the subjunctive, even when the condition encapsulated in the *Experiencer Factor* is met:

(82) *Jean ne pense pas que Marie soit¹est enceinte.*
 Jean NEG thinks NEG that Marie be.SUBJ/IND pregnant
 ‘Jean does not think that Marie is pregnant.’

The reader can check that there is a Λ constituent in (82) if we assume the following LF: NOT... [Λ Jean thinks that Marie is pregnant]. But the subjunctive is possible, probably because the rule given in (12) above takes precedence over the *Experiencer Factor*. In other words, there is a hierarchical organization of the rules that govern mood distribution, and there is one ranking that we can be sure about:

- (83) *Fragment of the Hierarchy of Rules:*
Special Contexts Rule (12) >> Experiencer Factor (78)

Once the subjunctive is sanctioned by (12), (78) can no longer enforce the indicative. Now, why isn't the subjunctive obligatory? Presumably because (12) only *licenses* the subjunctive, but doesn't require it.

An important consequence is that the indicative in (82) need not be of a different nature from the indicative in the plain declarative '*Jean pense que Marie est enceinte.*' There is independent evidence supporting this claim. Noticeably, the indicative in French does not trigger a presupposition, the way it does in Italian. For example, it is possible to say (the oddness of (84) and (85) is due to the markedness of the indicative in a Special Context):

- (84) [?]*Jean ne croit pas que Marie est enceinte, et en fait je ne le crois pas non plus.*
Jean NEG believes NEG that Marie be.IND pregnant and in fact I NEG it believe NEG either
'Jean doesn't believe that Marie is pregnant, and neither do I, as a matter of fact.'

- (85) [?]*Je ne crois pas que Marie est enceinte.*
I NEG believe NEG that Marie be.IND pregnant
'I do not think that Marie is pregnant.'

- (86) *Je n' ai pas d' opinion à propos de Marie, mais pensez-vous qu' elle a une chance de gagner?* (French)
I NEG have NEG of opinion about Marie but think-you that she has.IND a chance of win
'I have no opinion about Marie, but do you think she has a chance to win?'

In French, the universal inference does not arise in the nuclear scope of *no* (*no*-test), i.e. sentence (87) is compatible with a context in which it is not part of the speaker's

assumptions that the teacher wants to punish every student:

- (87) *Aucun de ces dix élèves ne pense que le professeur veut le*
none of these ten students NEG thinks that the teacher want.IND him
punir.
punish
'None of these ten students thinks that the teacher wants to punish him.'

If we assumed, as a vast majority of the literature does (see Giorgi and Pianesi 1997, Farkas 2003, Panzeri 2003, Schlenker 2005), that the French indicative found under epistemic predicates is the mood of assertion, what would we expect in Special Contexts? Consider negation: when the epistemic predicate is negated, it seems reasonable to say that the assertive relation does not hold. If we assume, as Schlenker (2005) does, that (i) the subjunctive has no semantic contribution of its own, (ii) that predicates which select the indicative trigger the presupposition that the embedded proposition is true in the *context set*¹² of individual x' at time t' in world w' (following Stalnaker 1975), and (iii) that a principle of *Maximize Presuppositions!* applies, whereby the subjunctive is only felicitous when the indicative is not (due to a lack of presupposition), it is clear that the indicative found under a superordinate negation outscoping an epistemic predicate cannot be the mood of assertion: in other words, the only source for the indicative in that case ought to be the *Congruence Condition* (in our own terminology). But this does not seem to be the case, because agreement with the speaker is not required for the presence of the indicative in Special Contexts (witness (85) and (86)). Note that explaining the appearance of the Polarity subjunctive as the effect of a suspension of the assertion relation (assuming that the assertion relation is a *sufficient* condition for the indicative) will be difficult for other reasons: not all Special Contexts

¹²The *context set* corresponds to the set of worlds in which the embedded proposition is evaluated. For predicates such as *believe*, the context set of x is the set of all worlds compatible with x 's beliefs. Note that this account does not extend easily to fiction predicates, which are also indicative-governors in French, and, strikingly, in Italian.

are contexts in which the assertion relation is denied (witness ‘*the only X that...*’, or even more clearly ‘*John is now less certain that...*’). Therefore, the occurrence of the subjunctive in Special Contexts need not be due to the absence of assertion (this is only a negative characterization of Special Contexts, for want of a positive one, which still remains to be found). In view of the data, our simple-minded *Experiencer Factor* fares better than more sophisticated alternatives: even under negation, an epistemic predicate still selects for an experiencer, hence the potential persistence of the indicative.

Let’s posit the following disjunctive rule for French:

- (88) **Principle F:** In French, the indicative is possible under an epistemic predicate iff SB or CC or MF or EF is satisfied (where *SB* stands for the *Strength of Belief Condition*, *CC* stands for the *Congruence Condition*, *MF* stands for the *Morphology Factor*, and *EF* stands for the *Experiencer Factor*).

There is no compelling reason to discard the existence of SB, MF and CC in French. But nothing really hinges on that question anyway, because Principle F (88) will be satisfied as long as EF is (this is so in all relevant cases). Therefore, the role that the other three factors might play in French is somehow obscured. Regarding CC in particular (this is the crucial factor in our discussion), the fact that the presupposition is not triggered in French can be due either to the absence of CC in French, or to the existence of EF: it is likely that the indicative does not trigger a presupposition if it is always possible to interpret it in a way that involves no presupposition whatsoever.

1.3 Homing in on the source of the intervention

Having said that the indicative morphology, when realized under epistemic predicates, gives rise to intervention effects in Italian, but not in French, we were led to specify the semantic values of this mood in the two languages. Let’s now recapitulate the

results. First, we summarize the semantic import of the indicative mood outside of Special Contexts (as they tend to favor the subjunctive). Hence Table 1.2 below, which shows the contribution of the indicative in the sentences ‘*He believes that Mary is pregnant*’ and ‘*He believes that Mary will be pregnant*’. Some words of clarification are in order. In view of what we said earlier about the semantics of epistemic predicates, the *Strength of Belief Condition* does not apply in the case at hand (*believe* is a weak verb), but it would in the Italian sentence ‘*È sicuro che Maria è incinta*’ (‘*He is certain that Mary is pregnant*’) and maybe also in the French sentence ‘*Il est certain que Marie est enceinte*’, although we have no evidence that French is sensitive to this factor altogether. The second factor, *Congruence with the Speaker’s Assumptions*, clearly plays a role in Italian, as the sentence under scrutiny yields the inference that the speaker takes for granted that Maria is pregnant (otherwise, the indicative would not be grammatical). As for French, the factor is likely to apply, albeit not necessarily. The *Experiencer Factor* is exclusive to French; the *Morphology Factor* only comes into play when the embedded predicate has a future meaning.

<i>Licensing Factors of the Indicative</i>	<i>French</i>	<i>Italian</i>
	<i>Il croit que Marie est.IND enceinte</i>	<i>Crede che Maria è.IND incinta</i>
Strength of Belief	n/a	n/a
Congruence with the Speaker’s Assumptions	optional	✓
Experiencer Factor	✓	n/a
Morphology Factor	n/a	n/a
	<i>Il croit que Marie sera.IND.FUT enceinte</i>	<i>Crede che Maria sarà.IND.FUT incinta</i>
Strength of Belief	n/a	n/a
Congruence with the Speaker’s Assumptions	optional	optional
Experiencer Factor	✓	n/a
Morphology Factor	✓	✓

Table 1.2: The Semantic Value of the Indicative

Let's now introduce a superordinate negation, in order to recreate the conditions that give rise to the contrast between (2) and (6), reproduced as (89-a) and (89-b) below:

- (89) a. *Gianni non pensa che Maria ha.IND chiuso occhio sul treno. (Italian)
 b. ?Jean ne pense pas que Marie a.IND fermé l'œil dans le train. (French)

Negation is one of the Special Contexts (i.e. superordinate subjunctive-triggers). The indicative remains possible in those contexts, although it is marked.¹³ For the sake of theoretical parsimony, we propose that this indicative can and must be accounted for by the same principles that were used for plain declarative contexts (Table 1.2). Consider the sentence '*He does not believe that Mary slept a wink*'. In both languages, the *Strength of Belief Condition* will not apply, due to the negation modifying the epistemic predicate. The *Congruence Condition* is potentially activated in both languages, as well as the *Experiencer Factor* in French: in brief, the French indicative has two sources, while the Italian indicative has only one (Table 1.3).

It follows from the intervention data that the indicative licensed by the *Congruence Condition* acts as an intervener in Italian; and we formulate the hypothesis that the presupposition triggered by that indicative is the very root of the intervention.

¹³When the embedded proposition is subjunctive-marked due to the presence of a superordinate negation scoping over *croire/credere*, i.e. when the sufficient condition is suspended as in (90) below, the sentence is felicitous even in a context in which the speaker knows that Maria is indeed sick (in both languages): in other words, the subjunctive in a Special Context is neutral with respect to the presuppositions of the conversationalists:

- (90) *Tutti sappiamo che Maria è ammalata. Ma Gianni non crede che Maria sia*
 all we-know that Maria is sick but Gianni NEG believes that Maria be.SUBJ
ammalata.
 sick
 'We all know that Maria is sick. But Gianni doesn't believe that Maria is sick.'

<i>Licensing Factors of the Indicative</i>	<i>French</i>	<i>Italian</i>
	<i>Il ne croit pas que Marie a.IND fermé l'œil</i>	<i>*Non crede che Maria ha.IND chiuso occhio</i>
Strength of Belief	n/a	n/a
Congruence with the Speaker's Assumptions	optional	✓
Experiencer Factor	✓	n/a
Morphology Factor	n/a	n/a

Table 1.3: The Source of the Intervention

- (91) **Hypothesis:** The presupposition carried by the indicative licensed by the *Congruence Condition* intervenes between an NPI and its superordinate licenser.

We will devote Chapter 2 to substantiating this *Hypothesis*. The lack of intervention in French is due to the fact that no presupposition is triggered. And the lack of triggering correlates with the availability of another source for the indicative, namely the *Experiencer Factor*. The correlation is not accidental: even in Italian, in a case where the indicative has multiple possible sources besides the *Congruence Condition*, the presupposition is not triggered. This is so in (92) below, where the *Morphology Factor* suffices to account for the indicative:

- (92) *Gianni non pensa che Maria dormirà, e nemmeno io lo penso.*
Gianni NEG thinks that Maria sleep.IND.FUT, and neither I it think
'Gianni doesn't think that Maria will sleep, and I don't think so either.'

As expected, no intervention occurs if we substitute an NPI for the predicate *sleep* (witness (8) and (9) repeated below as (93-a) and (93-b)):

- (93) a. Gianni non pensa che Maria chiuderà.IND.FUT occhio sul treno. (*Italian*)
b. Jean ne pense pas que Marie fermera.IND.FUT l'œil dans le train. (*French*)

What happens if it is part of the common ground that Maria will sleep? Again, the NPI is licensed, because the presupposition fails to be *triggered*, due to the existence of alternative sources for the indicative. We'll say more about the constraints bearing on the triggering of presuppositions in Chapter 2: but the Italian data already provide a useful insight into the mechanism.

The indicative found under epistemic predicates in plain declarative contexts survives in Special Contexts in French. This is what makes French special. Otherwise, it is likely that the French indicative would be a presupposition trigger, hence an intervener, under epistemic predicates, and would pattern like its Italian counterpart.

CHAPTER 2

Analysis

In Chapter 1, we have established that the Italian indicative creates an intervention because it carries a presupposition. This is this claim that we would like to generalize:

- (1) **Intervention by Presupposition:** An NPI is not licensed in the scope of a presupposition trigger.

The next move is to ascertain that presuppositions can indeed disrupt NPI licensing.

2.1 NPI licensing is disrupted by presuppositions

2.1.1 Intervention by implicatures

First of all, we review one of the most influential analyses of a phenomenon which bears resemblance to our topic. Chierchia (2004) offers an analysis of intervention effects caused by the conjunction *and* and universal quantifiers such as *everybody* and *always*. He proposes that the ungrammaticality of (2) is due to an inference, to wit, an indirect implicature, which arises from the interaction between the negation and the universal generalized quantifier *everybody*.

- (2) *It is not the case that everyone has any potatoes.

The NPI *any* is an existential quantifier, and, as such, it is indexed to some contextually given domain of individuals. Moreover, it signals a domain expansion (this idea traces back to Kadmon and Landman 1993), such that, when computing the meaning of a sentence containing *any*, one quantifies over expansions of the domain. So, the meaning of (3-a) is (3-b), and the meaning of (4-a) is (4-b). In the following, D represents the contextually specified standard domain, g represents an increasing function from sets into sets, which turns a quantificational domain into a superset of that domain, and Δ represents the contextually supplied domain of such functions; *some* is a generic existential generalized quantifier (not to be confused with the PPI *some*):

- (3) a. I don't have potatoes.
 b. $\neg [\text{some}_D'(\text{potato}')(\lambda x. \text{I have } x)]$
- (4) a. I don't have any potatoes.
 b. $\forall g \in \Delta, \neg [\text{some}_{g(D)}'(\text{potato}')(\lambda x. \text{I have } x)]$

In (4-a), the speaker denies having any kind of potatoes, even tokens of a not so common kind, e.g. *frozen* potatoes (this is the effect of domain widening). To account for the ungrammaticality of (2), Chierchia resorts to a pragmatic constraint on *strength*: *any* is felicitous only if it leads to a gain of information. In other words, the sentence containing *any* must be *stronger*, i.e. must *entail*, the equivalent sentence with a plain existential. Put differently, the NPI *any* competes with, and is parasitic on, an ordinary indefinite: if the NPI doesn't have a communicational advantage, it gets trumped by the plain indefinite. Chierchia captures the idea, put forward by Ladusaw and Fauconnier, that NPIs are only licensed in a downward-entailing environment, as only those environments let the NPI meet the constraint. We also understand why *any* is not allowed in a positive context: this is a context where, instead of yielding a gain of information, it leads to a loss thereof:

- (5) a. I have potatoes.
 b. $\text{some}_D'(\text{potato}')(\lambda x. \text{I have } x)$
- (6) a. *I have any potatoes.
 b. $\forall g \in \Delta, \text{some}_{g(D)}'(\text{potato}')(\lambda x. \text{John has } x)$

Here, (5-a) entails (6-a): if I have potatoes on the standard domain D , I also have potatoes on every (reasonable) expansion of D : so (6-a) fails to be stronger than (5-a), violating the strengthening condition on the use of *any*. The explanation for the intervention in (2) (repeated as (8-a)) calls for an extra piece of machinery: comparing (7-a) and (8-a), we observe that the latter is stronger than the former, leading us to expect the NPI to be felicitous.

- (7) a. It is not the case that everyone has potatoes.
 b. $\neg[\forall x \text{some}_D'(\text{potatoes}')(\lambda y. x \text{ has } y)]$
- (8) a. *It is not the case that everyone has any potatoes.
 b. $\forall g \in \Delta \neg[\forall x \text{some}_{g(D)}'(\text{potatoes}')(\lambda y. x \text{ has } y)]$

Chierchia's solution consists in introducing the so-called *strong meaning* of a sentence, i.e. a combination of the literal meaning and of all the implicatures carried by it. When assessing strength of sentence a , it is the strengthened meaning $\llbracket a \rrbracket^s$ (and not just the literal one, $\llbracket a \rrbracket$) which counts (here Chierchia departs from K&L). (7-a) actually carries the scalar implicature that someone has some potatoes: *everyone* is a strong scalar term which normally does not give rise to scalar implicatures, but, when in the scope of a scale reverser, it becomes the lower end of a scale, and thus triggers an *indirect* SI. Taking the implicature into account, we now have to compare the meanings given in (9-b) and (10-b).

- (9) a. It is not the case that everyone has potatoes.

- b. $\neg[\forall x \text{ some}_D'(\text{potatoes}')(\lambda y. x \text{ has } y)] \wedge \exists x \text{ some}_D'(\text{potatoes}')(\lambda y. x \text{ has } y)$
- (10) a. *It is not the case that everyone has any potatoes.
 b. $\forall g \in \Delta[\neg[\forall x \text{ some}_{g(D)}'(\text{potatoes}')(\lambda y. x \text{ has } y)] \wedge \exists x \text{ some}_{g(D)}'(\text{potatoes}')(\lambda y. x \text{ has } y)]$

And it becomes clear that the first conjunct (i.e. the truth conditions) of (10-b) entails the first conjunct of (9-b) (every model in which an individual doesn't have a potato in the broad sense of the term is a model that makes the first conjunct of (10-b) true, and is a situation where the first conjunct of (9-b) is true too) but the second conjunct of (10-b) fails to entail the second conjunct of (9-b), as desired.

Chierchia's system is remarkable in at least two respects: (indirect) implicatures are factored in locally as soon as possible in the same order in which their triggers are introduced in the syntactic tree, and they are made part of the global meaning of the sentence (i.e. they are taken into consideration when checking for the acceptability of NPIs). The latter move is spectacular in that it erases the traditional divide between semantics and pragmatics.¹

¹We are now in a position to address a qualm that the reader might have: we have said that strong epistemic predicates, e.g. *essere sicuro*, license the indicative in Italian. What happens when they are embedded in the antecedent of an indicative conditional, which is not a Special Context, and preserves the indicative of certainty? Well, the NPI is ungrammatical in (11), *as well as in its French counterpart*:

- (11) **Se Gianni è sicuro che Maria ha il minimo problema, chiamerà la polizia. (It.)*
 if Gianni is sure that Maria have.IND the slightest problem he-will-call the police
 'If Gianni is sure that Maria has any problem, he will call the police.'
- (12) **Si Jean est sûr que Marie a le moindre problème, il appellera la police. (Fr.)*
 if Jean is sure that Marie have.IND the slightest problem he call.IND.FUT the police
 'If Jean is sure that Marie has any problem, he will call the police.'

That the two languages pattern the same suggests that presupposition is not at fault (we haven't seen a French presuppositional indicative intervene); instead, the strength of the predicate is the culprit: this is in line with our semantics of epistemic predicates, which analyzes *be sure* as a strong scalar term. The effect disappears *in both languages* with a weak predicate:

But what happens when the scalar implicatures are not calculated? There are two cases: either the scale is truncated, or the implicature is cancelled. The first is exemplified in (14-a), where eleven qualifies as a weak term on the scale <..., 33, 22, 11> when it comes to counting sets of soccer players (to be compared with (14-b), in which eleven is a strong scalar term):

- (14) a. I never had eleven kids who won any championship.
 b. *I didn't meet eleven people who read any of my poetry.

The second case is illustrated by (15):

- (15) (*Context*: I think no student read anything, therefore...)
 *I doubt that every student read anything.

Chierchia claims that strengthening (the condition on NPI licensing) must be checked with respect to *strong* meanings: it doesn't matter whether the implicature is cancelled (and the plain meaning seems to be good enough), because in any event it is the strong meaning of the competitor (the sentence that contains a plain existential) that must be entailed. But neither $\llbracket(15)\rrbracket$ nor $\llbracket(15)\rrbracket^s$ is stronger than \llbracket I doubt that every student read something \rrbracket^s . With numerals on the contrary, the availability of a suitable scale leads to a strong meaning which is equivalent to the plain meaning.

- (13) *Se Gianni pensa che Maria abbia il minimo problema, chiamerà la polizia.*
 if Gianni thinks that Maria have.SUBJ the slightest problem he-will-call the police
 'If Gianni thinks that Maria has any problem, he will call the police.'

Chierchia's system captures these facts, as an indirect SI is triggered in (11), i.e. 'it is not the case that if Gianni (just) thinks that Maria has any problem, he will call the police'.

2.1.2 Proposal

We propose to harness Chierchia’s main insights to account for the intervention we observe with the Italian indicative. Building on the semantics of NPIs as domain widen-ers, our goal is to include presuppositions in the global meaning of a sentence, in a way similar to the strengthening mechanism designed by Chierchia. So if \underline{pp}' is a clause with presupposition p and an assertive component p' , and if we decide to refer to a proposition q containing an indefinite as $q_{[x]}$ (where the variable x can take the value *NPI* or the value *indefinite*), we reformulate the strengthening condition as follows:

- (16) **Strengthening Condition:** An NPI is felicitous in clause \underline{pp}' only if $\llbracket \underline{pp}'_{[NPI]} \rrbracket^s$ entails $\llbracket \underline{pp}'_{[indefinite]} \rrbracket^s$.

The motivation for doing so should be quite obvious: there is a great insight to be gained if we can show that presuppositions and implicatures show some common behavior, as this would bridge a gap between these two types of inferences. We repeat (3) of Chapter 1 as (17-a) below and check that the *Strengthening Condition* is not met (the presuppositions are underlined, and s represents the speaker in the metalanguage):

- (17) (Context: Maria has a very good chance to win.²)
- a. *Gianni non crede che Maria ha.IND la minima possibilità di vincere.
 - b. $\forall g \in \Delta [\text{think}'((\text{some}_{g(D)}'(\text{chance}'))(\lambda y.m \text{ has } y))(s) \wedge \neg [\text{think}'((\text{some}_{g(D)}'(\text{chance}'))(\lambda y.m \text{ has } y))(g)]]$
 - c. Gianni non crede che Maria ha qualche (=some) possibilità di vincere.
 - d. $\text{think}'((\text{some}_D'(\text{chance}'))(\lambda y.m \text{ has } y))(s) \wedge \neg [\text{think}'((\text{some}_D'(\text{chance}'))(\lambda y.m \text{ has } y))(g)]$
 - e. b. $\not\Rightarrow$ d.

²This context is necessary in order to license the use of the indicative.

Note that we need not adopt Chierchia’s complex machinery. Let’s simply assume that NPIs need to be placed in the scope of a downward-entailing function.

- (18) **Downward Entailingness:** A function f of type $\langle \sigma, t \rangle$ is DE iff for all x, y of type σ such that $x \Rightarrow y : f(y) \Rightarrow f(x)$

Next, let’s define an operator μ , which transforms trivalent meanings into bivalent ones:

- (19) Let F be a sentence.
 $\mu(\llbracket F \rrbracket) = 0$ iff $\llbracket F \rrbracket = \#$ or 0
and $\mu(\llbracket F \rrbracket) = 1$ iff $\llbracket F \rrbracket = 1$.

The notion of meaning that is relevant for NPI licensing is the μ meaning. Let’s check that the ungrammaticality of (17-a) is still accounted for under that premise: does it provide a DE environment?

- (20) a. Gianni non crede che Maria ha.IND letto un libro (*‘Gianni doesn’t believe that Maria has read a book’*).
b. $\mu(\llbracket (20-a) \rrbracket) = \text{think}'((\text{a book})'[\lambda y.m \text{ read } y])(s) \wedge \neg[\text{believe}'((\text{a book})'(\lambda y.m \text{ read } y))(g)]$
c. Gianni non crede che Maria ha.IND letto un romanzo (*‘Gianni doesn’t believe that Maria has read a novel’*).
d. $\mu(\llbracket (20-c) \rrbracket) = \text{think}'((\text{a novel})'[\lambda y.m \text{ read } y])(s) \wedge \neg[\text{believe}'((\text{a novel})'(\lambda y.m \text{ read } y))(g)]$
e. $\mu(\llbracket (20-a) \rrbracket) \not\Rightarrow \mu(\llbracket (20-c) \rrbracket)$

The first conjunct of (20-b) fails to entail the first conjunct of (20-d), as desired.

2.1.2.1 Evidence

There is one crucial piece of evidence lending support to our device: the particles *too* and *either* are presupposition triggers, but only *too* creates an intervention:³

- (21) a. (*Context*: Mary said something interesting during the meeting.)
*I doubt that John said anything interesting too.
b. (*Same context*.) I doubt that John said something interesting too.
c. (*Context*: Mary didn't say anything interesting during the meeting.)
I doubt that John said anything interesting either.

Assuming the following representations for the relevant μ meanings, we check that (21-a), unlike (21-c), doesn't provide a DE environment:

- (22) a. I don't think that [John]_F read a book too.
b. $\mu(\llbracket(22\text{-a})\rrbracket) = \exists x [x \neq j \wedge \text{(a book)' } (\lambda y.x \text{ read } y)] \wedge \neg[\text{think}'((\text{a book})'(\lambda y.j \text{ read } y))(\text{S})]$
c. I don't think that [John]_F read a novel too.
d. $\mu(\llbracket(22\text{-c})\rrbracket) = \exists x [x \neq j \wedge \text{(a novel)' } (\lambda y.x \text{ read } y)] \wedge \neg[\text{think}'((\text{a novel})'(\lambda y.j \text{ read } y))(\text{S})]$
e. $\mu(\llbracket(22\text{-a})\rrbracket) \not\Rightarrow \mu(\llbracket(22\text{-c})\rrbracket)$
- (23) a. I don't think that [John]_F read a book either.
b. $\mu(\llbracket(23\text{-a})\rrbracket) = \exists x [x \neq j \wedge \neg[(\text{a book})'(\lambda y.x \text{ read } y)]] \wedge \neg[\text{think}'((\text{a book})'(\lambda y.j \text{ read } y))(\text{S})]$
c. I don't think that [John]_F read a novel either.
d. $\mu(\llbracket(23\text{-c})\rrbracket) = \exists x [x \neq j \wedge \neg[(\text{a novel})'(\lambda y.x \text{ read } y)]] \wedge \neg[\text{think}'((\text{a novel})'(\lambda y.j \text{ read } y))(\text{S})]$
e. $\mu(\llbracket(23\text{-a})\rrbracket) \Rightarrow \mu(\llbracket(23\text{-c})\rrbracket)$

As the *tooeither* pair shows, the NPI is sensitive to the polarity of the presupposition it falls under. This fact substantiates our proposal, since it indicates that the source of

³Note that the ungrammaticality of (21-a) is directly due to the interaction between *too* and the NPI *anything*. Crucially, it is not due to the interaction of *too* with the NPI licenser *doubt* alone (it would be if *too* were a PPI), witness (21-b).

the intervention is not the mere presence of a presupposition, but the contribution (a potentially negative one) its very content makes to a broader mechanism.

Intervention is also expected with cognitive factive predicates like *know*: in the complement of *know*, an NPI is predicted to be ruled out, because the inference from (24-a) to (24-b) doesn't hold (Mary could in fact have bought a green car).

- (24) a. John doesn't know that Mary bought a car.
 b. John doesn't know that Mary bought a red car.

Strikingly, this is what happens in French and Italian (but not in English, see 2.2.2): the licensing of an NPI contained in the complement of a *cognitive factive predicate* is disrupted (26). This fact is expected, as the complement of a cognitive factive predicate is normally presupposed. However, some of those verbs, (*découvrir* (*find out*) is one of them), allow for a non-factive reading of their complement (this reading is made possible by the presence of the subjunctive in the embedded clause), and the intervention effect disappears, as shown in (27).⁴ Similarly, (28) exhibits a non presupposed complement, and no intervention ensues.⁵

⁴Likewise, the contrast between the indicative and the subjunctive version of (25) is explained by the presupposition carried by the former and absent from the latter. French cognitive factives are indicative-governors in plain declarative sentences, but some of them, like *se souvenir* (*remember*), can be built with an embedded subjunctive in Special Contexts, in which case they fail to trigger the presupposition that their complement is part of the common ground.

- (25) *Pierre ne se souvient pas que Marie ait/*a écrit quoi que ce soit à sa mère.*
 Pierre NEG REFL remembers NEG that Marie have.SUBJ/IND written anything to her mother
 'Pierre doesn't remember that Marie wrote anything to her mother.'

⁵As a matter of fact, the NPI in (28) has two potential licensers: one is the superordinate negation, the other is the interrogative complementizer *si*. One could argue that the lower licenser suffices to license the NPI, regardless of the inferences triggered *above* it, see the discussion about emotive factives and *only* below.

(26) **Pierre n' a pas découvert que Marie a écrit quoi que ce soit à sa mère.*
 Pierre NEG has NEG found-out that Marie has written anything to
 her mother
 'Pierre hasn't found out that Marie has written anything to her mother.'

(27) (Context: Marie hasn't written to her mother.)
Si Pierre découvrirait que Marie ait écrit quoi que ce soit à sa mère, il serait fâché.
 if Pierre found-out that Marie have.SUBJ written anything to
 her mother he would-be mad
 'If Pierre found out that Marie had written anything to her mother, he would be mad.'

(28) *Pierre ne sait pas si Marie a écrit quoi que ce soit à sa mère.*
 Pierre NEG knows NEG whether Marie has written anything to
 her mother
 'Pierre doesn't know whether Marie has written anything to her mother.'

Notice again that no intervention arises when the polarity of the presupposition containing the NPI is negative (i.e. when the NPI finds itself in a DE context within the presupposition):

- (29) a. *Pierre n' a pas encore découvert que Marie n' a pas écrit quoi que ce soit à sa mère.*
 Pierre NEG has NEG still found-out that Marie NEG has not written
 anything to her mother
 'Pierre hasn't found out yet that Marie hasn't written anything to her mother.'
- b. *Presupposition:* Marie hasn't written anything to her mother.

This case is not problematic for our technical proposal: it can be treated along the same lines as (21-c).

Questions corroborate our *Hypothesis* (1) (this is true in French, not in English, see 2.2.2):

(30) *Marie a- t- elle écrit quoi que ce soit à sa mère ?*
Marie has she written anything to her mother
'Has Mary written anything to her mother?'

(31) **Comment Marie a- t- elle écrit quoi que ce soit à sa mère ?*
how Marie has she written anything to her mother
'How has Mary written anything to her mother?'

(32) **Pourquoi Marie a- t- elle écrit quoi que ce soit à sa mère ?*
why Marie has she written anything to her mother
'Why has Mary written anything to her mother?'

The presuppositional nature of the clause under the *wh*-phrase is indeed crucial: if the proposition expressed by the clause is not held to be true by the conversationalists, the licensing of the NPI becomes possible:

(33) *Pourquoi Marie écrirait- elle quoi que ce soit à sa mère ?*
why Marie would-write she anything to her mother
'Why would Mary write anything to her mother?'

Finally, we don't observe intervention caused by *givenness*. This counts as evidence that *givenness* and presupposition are distinct phenomena:

(34) (*Context: Peter has broken my Chinese vase.*)
I doubt that [John]_F broke anything.

Conversely, *conventional implicatures à la Potts* (2005) intervene:

(35) ??I doubt that, as is commonly held, Peter committed any crimes.

The parenthetical *as is commonly held* is not a presupposition trigger according to Potts. But the fact in (35) might suggest otherwise.

Let us consider the rest of presupposition triggers: emotive factives (*regret, be surprised*), definite descriptions, *only, because*-clauses, focus particles, change of state predicates, *it*-clefts.⁶

⁶The examples presented in the following sections are for the most part in English, which is, of the three languages under scrutiny, the most permissive to NPI licensing. French behaves like English unless indicated otherwise. Italian has no NPI corresponding to *any* and *ever*, but has *n*-words instead (*niente, mai*). Unfortunately, *n*-words cannot be used in our comparison, as they are not allowed under some *bona fide* NPI licensers, such as antecedents of conditionals. Even *il minimo* is not a clear counterpart of French weak NPI *le moindre*, (*the slightest*), but rather of French *le plus petit*, as exemplified by the following sentences:

- (36) **(Non) c' è il minimo problema.* (Italian)
 (NEG) there is the smallest problem
 'There is(n't) any problem.'
- (37) *Il y a *(pas) le plus petit problème.* (French)
 it there have (NEG) the more small problem
 'There is(n't) any problem.'
- (38) *Se c' è il minimo problema, chiamate la polizia.* (Italian)
 if there is the smallest problem, call the police
 'If there's any problem, call the police.'
- (39) **Se Gianni dice che c' è il minimo problema, chiamate la polizia.* (Italian)
 if Gianni says that there is the smallest problem, call the police
 'If Gianni says that there's any problem, call the police.'
- (40) *Si Jean dit qu' il y a le moindre problème, appelez la police.* (French)
 if Jean says that there-is the smallest problem, call the police
 'If Jean says that there's any problem, call the police.'
- (41) *??Si Jean dit qu' il y a le plus petit problème, appelez la police.* (French)
 if Jean says that there-is the more small problem, call the police
 'If Jean says that there's any problem, call the police.'

We have no explanation for the behavior of *il minimo/le plus petit*. But incidentally, note that this atypical behavior deprives us of a potentially crucial data point: sentence (39) contains a non-presuppositional indicative in the scope of an NPI-licenser, and would have been a very precious control for our claim that presuppositional indicatives disrupt NPI licensing.

2.1.2.2 Against movement

In this subsection, we present additional data that corroborate our *Hypothesis* (1) and help rule out some syntax-oriented proposals. NPIs are not licensed within a *because-clause*, if the event described by that clause is a presupposed fact:⁷

- (43) (Context: Peter broke your Chinese vase.)
*You are mad at Peter, not because he broke anything, but because he won't own up to it.
- (44) You are mad at Peter, not because he broke anything (of course, he never did such a thing), but because he says you are on the chubby side.

Intervention effects created by universal quantifiers (e.g. (10-a)) have given rise to a tradition which considers that NPI licensing essentially involves a movement of the NPI to the immediate vicinity of the NPI licenser. Guerzoni (2006) is a recent representative of that trend: she harnesses Pesetsky (2000) and argues that NPIs can be licensed either by phrasal movement or by feature movement at LF (the latter is subject to so-called Beck interveners (DE operators and quantificational operators)). Guerzoni argues that licensing fails when both movements are blocked.

But it seems that no movement-based theory can easily account for the ungrammaticality that arises, not from the syntactic makeup of the sentence, but merely from the presupposed nature of the information conveyed: this is the case in the *because*-clauses in (42-a), (42-b) and (43).

⁷Similar facts were already mentioned in Linebarger (1987), but were not accounted for along the lines that we propose: Linebarger argues that the NPI in (42-a) triggers an implicature of non-factivity, which clashes with the whole context:

- (42) a. *I didn't help him because I have any sympathy for urban guerillas, although I do sympathize with urban guerillas.
b. *Dogs don't hear because they have any eyes. They hear because they have ears.

Moreover, *too* is an intervener which does not create an island to phrasal movement. Therefore, even if we treated it as a Beck intervener (by brute force), the ungrammaticality of (21-a) would remain unaccounted for.

There is another strand of syntactic theories, which appeal to scope: Brugger and D'Angelo (1995), for example, argue that the intervention induced by the Italian indicative is due to the fact that the indicative-marked proposition undergoes movement out of the scope of the NPI licenser at LF. But this rationale runs counter to pronominal binding, as exemplified in Italian (69-a) of Chapter 1. French provides another argument against a scopal account: suppose that the intervention due to cognitive factive predicates stems from a movement of the embedded clause. This entails that the landing site of the proposition must be at least higher than the NPI licenser. And the fact that pronominal binding remains possible suggests that it is also lower than the subject of the main clause. But what happens if the NPI licenser must outscope the subject? We would expect pronominal binding to become impossible. But this is not the case, as shown by the grammaticality of (45) (we exhibit the scopal relations in (46)):

(45) *[Tout le monde]_j ne sait pas qu' il_j va mourir un jour.*
 all the world NEG know NEG that he goes die some day
 'Not everyone knows that they are going to die some day.'

(46) NOT>[tout le monde]_j>sait>il_j.

Definite descriptions are well-known syntactic islands. But it is remarkable that they create an intervention effect only if they trigger an existence and a uniqueness presuppositions, not if they have a generic meaning. Therefore this is again a case that is compatible with our pragmatic account: the syntactic material remains superficially⁸

⁸Granted, the presupposition might have some syntactic representation in (47), e.g. a [+specific] feature on the determiner; but making this feature responsible for the intervention effect would miss the general character of the facts described in this chapter.

the same, and the intervention occurs as a consequence of the presupposition itself:

- (47) (*Context*: Two men are flirting with Mary; one is very generous, while the other is not.)
*I don't like the man who offered anything to Mary.

- (48) I don't like the man (if there is such a man) who offered anything to Mary.

In the same connection, the dual quantifier *both* doesn't license NPIs in its restrictor, while the universal quantifier does:⁹ again, we propose that this is due to the presuppositions (existence and uniqueness of a plural individual) triggered by the quantifier.¹⁰

- (50) a. *Both students who understand any linguistics have applied to UCLA.
b. Every student who understands any linguistics has applied to UCLA.

If our analysis is correct, the presence of an NPI in (50-b) speaks against the claim that universal quantifiers trigger the presupposition that their restrictor denotes a non-empty set.

2.2 Puzzles

2.2.1 Rescuing and Strawson-DEness

Counterexamples to our *Hypothesis* (1) exist: for example, there is a class of non-intervening presupposition triggers which stand out because they are *also* NPI licensers

⁹Giannakidou (2006) mentions this fact too.

¹⁰We cannot place an NPI licenser above the NPI, because then the intervention that actually arises can be put down to an indirect scalar implicature:

- (49) *We don't know both students who understand any linguistics.

(a fact that has not been noticed so far): these are the *emotive factive predicates regret* and *be surprised* (whose complements are presupposed) and *only*.¹¹

- (52) a. John is surprised that Peter criticized anybody.
b. John regrets that Peter criticized anybody.
c. Only Paul criticized anybody.

Let's propose the following *Generalization*, which is a qualification of our *Hypothesis* (1):

- (53) **Generalization:** An NPI cannot be licensed in the scope of a presupposition trigger, unless the latter is itself an NPI licenser.

This *Generalization* is consonant with facts that Chierchia observes about direct implicatures, which do not cause any intervention:

- (54) Typically, few students know any linguistics.

In (54), the *direct* implicature triggered by the weak scalar item *few* (namely: '*Some students know some linguistics*') does not interfere with the licensing of the NPI: Chierchia points out that the trigger of the implicature is identical to the NPI licenser. So the implicature here does not stem from the interaction between a scale reverser and the scalar item. This being so, the *plain* meaning can be computed *before* the strong one, and this gives us a chance to check *any*-licensing before the implicature is fac-

¹¹ Authors disagree about the presupposition of *only* and some even deny that it presupposes anything. Horn (1996) proposes the following characterization, which is adopted by von Stechow (1999):

- (51) a. Only John ate a vegetable.
b. *Presupposes:* Someone ate a vegetable.
c. *Asserts:* Nobody other than John ate a vegetable.

tored in. Chierchia claims that there is no such leeway with indirect implicatures, as the function application that is used is contingent on whether the function is DE or not. Whether this is correct or not, it is interesting to note that the same phenomena occur with a different kind of inferences, namely presuppositions: this suggests that presuppositions and implicatures share some crucial properties. Also, it suggests that it is possible to introduce the inferences (i.e. consider the *strong meaning*/ μ *meaning* of a sentence) at a rather late stage. At this point, this is hardly an explanation for the lack of intervention we've seen so far (because we cannot motivate the delay by any mechanism), and it is unclear why such delay would be allowed for English cognitive factives and disallowed for their French and Italian counterparts.

The problem with emotive factives and *only* is one of the few among all the ones considered in this chapter that have received attention in the literature. It has long been noticed that *sorry* or *only* are NPI licensers, despite the fact that they do not create DE-environments: it is clear that (55-a) does not entail (55-b), because it is not a know fact that Mary bought a Honda:

- (55) a. John is sorry that Mary bought a car.
 b. John is sorry that Mary bought a Honda.

To remedy this, von Stechow (1999) introduces the following trivalent notion of entailment, labeled Strawson-entailment:

- (56) **Strawson Entailment:** Φ Strawson-entails Ψ if and only if, assuming that the presuppositions of Ψ are satisfied, whenever Φ is true, Ψ is true.

When the downward monotonicity of a context is calculated, i.e. when one examines whether $\Phi(p)$ entails $\Phi(q)$, where $q \subset p$, the right notion of entailment, according to von Stechow, is thus Strawson-DEness, defined below:

- (57) **Strawson Downward Entailingness:** A function f of type $\langle \sigma, t \rangle$ is Strawson-DE iff for all x, y of type σ such that $x \Rightarrow y$ and $f(x)$ is defined: $f(y) \Rightarrow f(x)$

This accounts nicely for the licensing of NPIs in the scope of emotive factives, *only*, and English cognitive factives. But this solution has its drawbacks. It fails to account for the intervention effects described so far; also, it falls short of an account for the non-licensing of strong NPIs under *regret*.¹²

The literature distinguishes at least two classes of NPIs. *Strong* NPIs are found in a subset of the environments that license *weak* NPIs. Examples of strong NPIs are *at all*, *lift a finger*, *bat an eyelash*, *sleep a wink*, *budge an inch*; *need*, *care to*, *bother with* and unstressed *any* and *ever* are said to be weak. A good test for the strength of an NPI is provided by the function *fewer than three students*: strong NPIs are not licensed in its scope. In the algebraic system proposed by Zwarts (1996), weak NPIs are licensed by monotone decreasing (downward entailing) functions, while strong NPIs require that their licenser be not only downward entailing, but also anti-additive.

- (59) **Anti-additivity:** A function f is anti-additive iff $f(A \cup B) = f(A) \cap f(B)$, where \cup and \cap are Boolean disjunction and conjunction.

Fewer than three students is a downward-entailing function, but it is not anti-additive, hence the ungrammaticality of (60-b):

- (60) a. Fewer than three students drank and fewer than three students smoked.
 $\not\Rightarrow$ Fewer than three students drank or smoked.

¹²Speakers vary on this particular case, but there seems to be a tendency to discard (58-a) and to accept (58-b):

- (58) a. *John regrets that he lifted a finger to help Sue.
 b. John regrets lifting a finger to help Sue.

- b. *Fewer than three students slept a wink.

Let us modify (59) so as to make it compatible with von Fintel's proposal:

- (61) **Strawson Anti-additivity:** A function f of type $\langle \sigma, t \rangle$ is Strawson Anti-additive iff for all x, y of type σ , $f(x) \cap f(y)$ and $f(x \cup y)$ Strawson-entail each other.

It appears that *regret* is Strawson Anti-additive, and should thus license strong NPIs:

- (62) I regret that the students read *Anna Karenina* or *War and Peace*.
 $\Leftrightarrow^{\text{Strawson}}$ I regret that the students read *Anna Karenina* and I regret that the students read *War and Peace*.

Furthermore, shall we say that the intervention effects created by the Italian presuppositional indicative, as well as by the French/Italian cognitive factives, are testimony that Strawson-DENess does not apply in those two languages? Although von Fintel only offers a *necessary* condition of NPI licensing (and for that reason cannot be accused of overgenerating), adopting Strawson-DENess would just add to the mystery we are facing.

The problems that von Fintel's proposal faces have led Lahiri to add a new condition (Lahiri 1998). To account for the non-licensing of NPIs in some SDE environments, such as singular definite descriptions, he points out that those are also SUE (Strawson Upward-Entailing) in their restrictors, and thus proposes that weak NPIs are only licensed in the scope of functions that are SDE but not SUE (examples given by Guerzoni and Sharvit (2007)):

- (63) **Strawson Upward Entailingness:** A function f of type $\langle \sigma, t \rangle$ is Strawson-UE iff for all x, y of type σ such that $x \Rightarrow y$ and $f(y)$ is defined: $f(x) \Rightarrow f(y)$

- (64) *The student who has any books on NPis is selling them.
- (65) a. The student who has old books on NPis is selling them.
 b. The student who has books on NPis is selling them.
 c. a. $\Rightarrow^{Strawson}$ b. (Strawson Upward-Entailment)
 d. b. $\Rightarrow^{Strawson}$ a. (Strawson Downward-Entailment)

Under a negation, the environment remains SDE *and* SUE:

- (66) *I don't like the student who has any books on NPis.
- (67) a. I don't like the student who has old books on NPis.
 b. I don't like the student who has books on NPis.
 c. a. $\Rightarrow^{Strawson}$ b. (Strawson Upward-Entailment)
 d. b. $\Rightarrow^{Strawson}$ a. (Strawson Downward-Entailment)

This proposal also rightly predicts the ungrammaticality of NPis in the restrictor of *both* and in *it*-clefts in positive sentences (*it*-clefts are non-SDE, SUE environments) (those facts are captured by our theory), as well as their grammaticality under *again* *and even*, and in *it*-clefts placed under a negation (the latter three are facts that our theory fails to predict) (see 2.2.2 below for a description of the data):

- (68) a. *I think it is John who broke anything.
 b. I don't think it is John who broke anything.

But there are cases where Lahiri's proposal won't help. For example, the complements of cognitive factive predicates placed under a negation are SDE, but not SUE: granted, they can contain NPis in English (this is predicted under Lahiri's account), but not in French/Italian. More problematic yet, the nuclear scope of *too* (again, placed under a negation), is SDE but not SUE (so are presuppositional *because*-clauses):

- (69) a. I don't think that [Mary]_F read old books too.
 b. I don't think that [Mary]_F read books too.
 c. a. $\not\Rightarrow$ ^{Strawson} b. (Strawson Upward-Entailment)
 d. b. \Rightarrow ^{Strawson} a. (Strawson Downward-Entailment)

We are thus faced with a dilemma: neither our theory nor Lahiri's proposal can capture all the facts, and they capture different facts. None has a clear advantage over the other; only further research will tell us which, if any, is on the right track.

The puzzles left unexplained by von Stechow are also at the core of Giannakidou (2006) (see also Quer 1998). She notes that factive contexts do not license NPIs,¹³ and this, she says, brings support to her own theory of NPI licensing. According to her, NPIs are only licensed in the scope of nonveridical operators (and factivity is veridical):

- (70) **Definition of Nonveridicality:** A propositional operator F is veridical iff Fp entails or presupposes that p is true in some individual's epistemic model $M_E(x)$; otherwise, F is nonveridical.
 A nonveridical operator F is ANTIVERIDICAL iff Fp entails that NOT p in some individual's epistemic model: $Fp \Rightarrow \neg p$ in some model $M_E(x)$.

- (71) **Licensing by Veridicality:** A polarity item α will be grammatical in a sentence S iff α is in the scope of a nonveridical operator β in S .

- (72) **Antilicensing by Veridicality:** A polarity item α will not be grammatical in a sentence S iff α is in the scope of a veridical operator β in S .

¹³It is important to say that Giannakidou is the only author, to the best of our knowledge, who addresses the problem of the intervention created by presuppositions. Although she provides a richer array data than von Stechow, she sees the phenomenon as an all-or-nothing one: her solution amounts to saying that English NPIs have resources that NPIs in other languages do not have, namely, they can be *rescued*. What we show is that licensing and non licensing under presupposition triggers can occur in the same language. She also claims that *why* is a robust intervener, but all the data we have collected go against that claim, see 2.2.2.

According to Giannakidou (2006), there is no exception to her principle: in Greek, no polarity item is licensed in the scope of a veridical operator. Importantly, she talks of NPIs and Free Choice Items indiscriminately, which makes it difficult to actually compare the data (she gives Spanish examples, but only with Free Choice Items, not with NPIs). She thus proposes to discard Strawson-DEness, which leaves the licensing of NPIs under emotive factives and *only* in English and French unexplained (she doesn't mention the licensing of weak NPIs in the scope of factives like *know*; in fact, nobody has, to the best of our knowledge).¹⁴

Giannakidou proposes the notion of *rescuing*: for her, NPI licensing is truly disrupted by factive operators (in English as well), but English weak NPIs can be rescued because they have access to the global context of the sentence they appear in:

- (73) **Rescuing by nonveridicality:** A polarity item α can be rescued in the scope of a veridical expression β in S, if (a) the global context C of S makes a proposition S' available which contains a nonveridical expression β ; and (b) α can be associated with β in S'.

Examples of *rescuing* are provided below:

- (74) a. Only John ate a vegetable.
 b. *Inference:* Nobody but John ate a vegetable. (*This is an environment which is known to license NPIs, and it contains a non-veridical expression, 'nobody but John'*)
- (75) a. John regrets that Mary bought a car.
 b. *Inference:* John would prefer that Mary didn't buy a car. (*Similarly, the non-veridical expression n't would be the rescuer here*)

¹⁴The situation of French is interesting, because it is somehow intermediate between English and Greek: in French, NPI licensing is impossible under cognitive factives, but possible under emotive factives and *only*.

- (76) a. John is surprised that Mary bought a car.
b. *Inference*: John didn't think that Mary had bought a car. (*Here again, rescuing by n't*)

However, we already know that *rescuing* will not explain the licensing of NPIs under factives in English: since French NPIs are licensed under emotive factives and are thus, by Giannakidou's theory, rescuable, we expect them to be licensed under cognitive factives too, which they aren't. Besides, if the proposition that rescues NPIs is as in (75-b), we wrongly expect that strong NPIs should be perfectly licensed under *regret* in English.

Treating emotive factives and *only* as forming a homogeneous class of triggers might be an impracticable undertaking after all: although they exhibit the same behavior in French (and in English), they clearly don't in Italian: the weak NPI *il minimo* is not licensed under *dispiacere* (*regret*, lit. *displease*) and *solo* (*only*), nor do strong NPIs like *muovere un dito*. And although *essere sorpreso* (*be surprised*) accepts weak NPIs, strong NPIs are not licensed in its scope. These facts cast doubt on our *Generalization* (53), but may not be fatal to it: the problem with triggers/licensors is a two-prong one. It is difficult to know whether the lack of licensing is due to a deficiency on the part of the putative licensors¹⁵ or to an intervention effect specific to Italian. Let it be said that this is one of the many conundrums that beset any general and unified theory of intervention. Let's also underline that the map of NPI licensing in the scope of a presupposition trigger across the three languages seems to obey at least one regularity: the set of licit configurations in Italian is a subset of the set of licit configurations in French. The same *subset relation* holds between French and English. Put more simply: English is more liberal than French in that respect, and French in turn is more liberal than Italian.

¹⁵It is indeed possible that licensors vary from language to language: for example, Giannakidou (2006) reports that none of these three items are licensors in Greek.

2.2.2 More puzzles

NPIs are not licensed under *pourquoi/perché* (*why*) and *comment/come* (*how*). But weak and strong NPIs are possible under *how* and *why* in English, with a particular semantic nuance:

- (77) a. Why has Peter ever been to Paris?
b. *Implication*: It is very surprising that he went to Paris, either because Paris is hideous, or because Peter is known to hate Paris.
- (78) a. Why did Peter even lift a finger to help Mary?
b. *Implication*: It was very unlikely/undesirable that he would help her.

Can we say that these are rhetorical questions (this is what Bhatt 1998 claims)? At any rate, they are not genuine information-seeking questions. However, that does not make *why* any less presuppositional. Notice that the same holds in French with *pourquoi diable*, which carries an indignant nuance:

- (79) *Pourquoi diable Marie lui a-t-elle raconté quoi que ce soit ?*
why evil Marie to-him has she told anything
'Why on earth did Marie tell him anything?'

These facts challenge our proposal, because they are not captured by it: it looks like it is the availability of an inference ((77-b) and (78-b)) which permits the presence of the NPI (in accordance with Giannakidou's *rescuing*), despite the presuppositional nature of the TP under *why* in (77-a) and (78-a), and under *pourquoi diable* in (79).

Also problematic for our *Hypothesis* (1): weak NPIs are perfectly licit in the complement of English cognitive factives:

- (80) a. John has kissed his neighbor. Mary doesn't know that he kissed anybody.

- b. John has kissed his neighbor. Mary hasn't found out that he kissed anybody.
- c. Paul married Meredith long ago. John has never found out that Paul had ever married her.

Is it possible that *ever*, *any*, *anything* and *anybody* have exceptional properties owing to their syntactic makeup (after all, they do seem to be syntactically different from French *quoi que ce soit*)? Alas, *care to*, another weak NPI, patterns exactly like them (and so does *bother with*):

- (81) (*Context*: Mary has been slacking the whole quarter and everybody thought she was going to drop out. But she finally passed the class, and she even got an A on her term paper. This is going to be a big surprise for many people.)
- a. Peter doesn't think that she cared to hand in a paper.
 - b. Peter doesn't know that she cared to hand in a paper.

Maybe English weak NPIs can move by phrasal movement at LF? This hypothesis is rather dubious, considering the syntactic form and nature of *care to*. And it is clearly falsified by (82), where the NPI *anybody* is in subject position, from which it cannot A-bar move:

- (82) Everybody left the party. Peter didn't find out that anybody left the party.

These facts constitute a spectacular counterexample to our *Hypothesis* (1). They have been unnoticed: Fitzpatrick (2005) claims that factive predicates create so-called factive islands that disrupt NPI licensing in English (he gives (82) as ungrammatical). And it appears that we have no good explanation for them. Not even a semantic difference between English and Romance predicates taken as natural classes will save the day. Although it is true that English can easily use the verb *know* in a non pre-

suppositional manner and French cannot (see (83) below), we fall short of an account for the contrast between *découvrir* (it is sometimes non presuppositional, but when its complement is presupposed, the intervention takes place) and *find out* (it causes no intervention whatsoever, even when its complement is clearly presupposed).

- (83) **Je ne sais pas qu' ils méritent notre respect.* (French)
 I NEG know NEG that they deserve our respect
 'I don't know that they deserve our respect.'

It bears saying however that there is some intervention effect with English cognitive factive predicates: they disrupt the licensing of so-called *strong* NPIs.

- (84) a. Mary doesn't think that Peter slept a wink last night.
 b. *Mary doesn't know that Peter slept a wink last night.

It is not clear that Anti-additivity will be of any help here, because, as it turns out, *not know that* meets the criteria for Anti-additivity and fails to license strong NPIs: (85-a) and (85-b) are indeed equivalent in English.¹⁶

- (85) a. Mary doesn't know that John read *Gone with the Wind* or *Anna Karenina*.
 b. Mary doesn't know that John read *Gone with the Wind* and Mary doesn't know that John read *Anna Karenina*.

Furthermore, although *too* intervenes when it is associated with the subject of a sentence, it doesn't when it is associated with the main verb:

- (86) a. (Context: Mary sold books by Hemingway.)

¹⁶The scalar implicature of *or* is not triggered in (85-a), which suggests that *not know that* is transparent to NPI licensing (Chierchia 2004 establishes the correlation between the two phenomena, i.e. NPI licensing and blocking of SIs). The fact that the disjunction is exclusive in the French translation of (85-a) comes as no surprise, since weak NPIs are not licensed in the complement of *ne pas savoir que*.

- *I doubt that [John]_F sold any books by Hemingway too.
- b. *Presupposition:* Somebody other than John sold books by Hemingway.
- c. (*Context:* Peter sold books by Hemingway.)
I doubt that Peter [read]_F any books by Hemingway too.
- d. *Presupposition:* Peter did something with books by Hemingway, other than selling them.

It doesn't intervene in the antecedent of a conditional either, even when associated with a subject:

- (87) I have helped Sue, and if [you]_F need any help too, I will be happy to oblige.

Again clearly is a presuppositional particle, but no intervention occurs, not even with strong NPIs:

- (88) (*Context:* Marie used to eat Chinese food until she became allergic to it.)
I doubt that she will eat any Chinese food again.
Presupposition: There is a time *t* prior to the utterance time such that Marie ate Chinese food at *t*.
- (89) (*Context:* Peter helped Mary in the past, but they are no longer friends.)
I doubt that he will lift a finger again to help her.
Presupposition: There is a time *t* prior to the utterance time such that Peter helped Mary at *t*.

Similarly, *even* is a non-intervening trigger:

- (90) (*Context:* Peter is the best student in the class; the assignment was to read three books for today.)
I doubt that even Peter read anything.
Presupposition: Peter was most likely to read a book.

- (91) (*Context*: Peter has always been eager to help Mary, but now they are no longer friends.)
I doubt that even Peter will lift a finger to help Mary.
Presupposition: John was most likely to help Mary.

In the same vein, aspectual verbs are non-interveners:

- (92) a. John hasn't stopped smoking anything.
b. *Presupposition*: John used to smoke.

It-clefts also are presupposition triggers, but they only create intervention effects with strong NPIs (the presuppositions triggered by the *it-clefts* are '*Someone broke something*' in (93) and '*Someone helped Mary*' in (94)):

- (93) (*Context*: Peter has broken my Chinese vase.)
I doubt that it was John who broke anything.

- (94) (*Context*: Mary has not done her homework alone, somebody helped her; but John and Mary are not on good terms.)
??I doubt that it was John who lifted a finger to help Mary.

Now that we have explored the realm of presupposition triggers, we can discard another potential explanation: some (Abbott 2005 and Abusch 2002) have proposed that some presupposition triggers are soft and others are hard, according to whether their presuppositions are easily neutralized or not. There is some appeal to this theory: if a presupposition is easily neutralized, Abusch argues, this is because it is not semantically encoded. Conversely, if it can easily be neutralized, we can assume that it is only a pragmatic inference. We could use this distinction to account for our intervention effects. Alas, the cartography of hard and soft triggers doesn't fit the data we have gathered and presented. For example, *discover* counts as *soft* (and intervenes in French

and Italian), but *again* and aspectual verbs like *stop* and *start* will count as *hard* (and don't intervene).

- (95) a. If anyone discovers that the method is also wombat-proof, I'd really like to know!
 b. #I don't know if Jane ever rented *Manhattan* before, but perhaps she's renting it again.

NPIs:	<i>Why</i>	<i>Not know that...</i>	<i>Not... [Definite Description]</i>	<i>Both</i>	<i>Not... because</i>	<i>Regret that...</i>	<i>Only</i>
Weak	*	*	*	*	*	✓	✓
Strong	*	*	*	*	*	??	✓

NPIs:	<i>Be surprised that...</i>	<i>Too</i>	<i>Again</i>	<i>Even</i>	<i>It-Cleft</i>	<i>Not... Aspectual verb</i>
Weak	✓	*	✓	✓	✓	✓
Strong	✓	*	✓	✓	??	✓

Table 2.1: NPI-Licensing in the Scope of Presuppositional Items in French

NPIs:	<i>Why</i>	<i>Not know that...</i>	<i>Not... [Definite Description]</i>	<i>Both</i>	<i>Not... because</i>	<i>Regret that...</i>	<i>Only</i>
Weak	✓ (rhetorical)	✓	*	*	*	✓	✓
Strong	✓ (rhetorical)	*	*	*	*	??	✓

NPIs:	<i>Be surprised that...</i>	<i>Too</i>	<i>Again</i>	<i>Even</i>	<i>It-Cleft</i>	<i>Not... Aspectual verb</i>
Weak	✓	*	✓	✓	✓	✓
Strong	✓	*	✓	✓	??	✓

Table 2.2: NPI-Licensing in the Scope of Presuppositional Items in English

2.2.3 Local accommodation and non-projection

Our proposal predicts that, whenever the presupposition is not triggered, the intervention effect should be suspended. We have seen cases (*because*-clauses, *découvrir*,

and definite descriptions) where this is actually the case. Local accommodation is another situation where the presupposition should be neutralized. Mainstream theories view local accommodation as being the incorporation of the presupposition into the assertive content. But, surprisingly, the intervention effect is not suspended in local accommodation:

- (96) **Pierre n' ignore pas que Marie a la moindre chance de gagner, car Pierre NEG ignores NEG that Marie has the slightest chance to win for en fait elle n' a aucune chance de gagner.*
 in fact she NEG has no chance to win

'Pierre is not unaware that Mary has the slightest chance to win, because in fact she has no chance to win.'

- (97) **Je n' aime pas l' homme qui a donné quoi que ce soit à Marie, I NEG like NEG the man who has given anything to Marie car cet homme n' existe pas.*
 for this man NEG exists NEG

'I don't like the man who gave anything to Mary, for that man doesn't exist.'

If the data above are correct, they could potentially provide new insight into the distinction between non-triggering of a presupposition and local accommodation: in (96) and (97), the presupposition is locally accommodated and the effect remains, as if the presupposition had to enter the recursion and disrupt NPI licensing before it gets removed at a very late stage (too late to salvage the sentence). But in cases of non-triggering, the presupposition simply is not factored in, and the NPI is acceptable.

Another observation should be made at this point: the alert reader remembers that intervention effects remained even in the absence of scalar implicatures (see (15) above). The extent to which this is a fruitful observation and whether we should pursue the parallel between implicatures and presuppositions, remains an open question at this point.

Finally (and no less informally), it is important to underline that intervention effects remain also when the presuppositions do not project. This happens when the presupposition trigger is contained in the second member of a conjunction, whose first member entails the presupposition:

- (98) a. *I doubt that Mary said something interesting during the meeting, and that John said anything interesting too.
b. *Presupposition:* Somebody other than John said something interesting during the meeting.
c. Mary said something interesting during the meeting, but I doubt that John said something interesting too.

As a whole, (98-c) does not presuppose anything, but when an NPI is substituted for the indefinite, ungrammaticality ensues. If we trust that intervention effects are a diagnostic for the inner workings of presupposition, we have good evidence here that conjunctions of the kind of (98-c), even though they do not transmit the presupposition to the top node, still involve the computation of a presupposition.

To summarize, every time a presupposition p is triggered (no matter whether it is accommodated, or whether it projects), p is a potential intervener. We still don't have a good understanding of this pattern. But the striking parallelism between presuppositions and implicatures should be emphasized. It also bears saying that our proposal (the comparison of μ meanings) does not constrain the introduction of presuppositions: in our framework, it is perfectly possible that some presuppositions be introduced *after* the system checks NPI licensing (or in a module which is not accessible to the module responsible for NPI checking). Therefore our *Hypothesis* (1) is not fatally falsified by the counterexamples provided above. It could even help explore the mechanisms of presupposition triggering and carve up the class of presupposition triggers in a novel way.

Summary and open questions

In this thesis we have established the existence of a new class of intervention effects. And we have shown that presuppositions are responsible for these effects. The study of the Italian indicative sparked the investigation; in exploring the difference between French and Italian, we have provided novel insights into the semantics of mood. Our goal was to bring into semantics the spirit of microparametric syntax.

The data concerning intervention are diverse across languages and fairly complex. They need further exploration. Some counterexamples appear more directly interesting than others: in particular, there is probably a lot to learn from the difference between French and English cognitive factives. Also, the behavior of *too* (which differs from other focus particles, and which does not consistently intervene) is a promising avenue.

Finally, the analogy between scalar implicatures and presuppositions deserves closer inspection. We do not claim that it advocates a unified analysis of those two phenomena, but, rather, that the mechanism which sanctions NPIs is sensitive to a broader range of inferences than previously thought.

CHAPTER 3

Appendix

3.1 List of Special Contexts in French and Italian

- In the scope of a superordinate negation, as sentence (11) above makes clear (this is, among all Special Contexts, the one that has the greatest tendency to shift mood);
- Within a direct or indirect question (this is a less powerful mood shifter);
- Within the antecedent of a counterfactual conditional (*'Si Jean pensait que Marie soit (SUBJ) malade...'*, *'If Jean thought that Mary were sick...'*), but not in indicative conditionals (**'Si Jean pense que Marie soit (SUBJ) malade...'*, *'If Jean thinks that Marie is sick...'*);
- Within a relative clause whose head noun is modified either by *seul* or the superlative *premier*, i.e. *'le seul X qui'* (*'the only X that'*), *'le premier X qui'* (*'the first X that'*):
 - (1) a. *Jean est le seul homme dont Marie est sûre qu' il soit/est*
Jean is the only man of-whom Marie is sure that he be.SUBJ/IND
compétent.
competent
'Jean is the only man who Marie is sure that he is competent.'
 - b. *Jean est le premier homme dont Marie est sûre qu' il*
Jean is the first man of-whom Marie is sure that he
soit/est compétent.
be.SUBJ/IND competent
'Jean is the first man who Marie is sure that he is competent.'
- In typical DE environments such as the adverbs *rarement* (*rarely*), *difficilement* (*hardly*), *de moins en moins* (*less and less*), and Generalized Quantifiers like

peu de gens (few people), *personne* (nobody), ‘*moins de trois personnes*’ (‘less than three people’), ‘*sans que*’ (‘without’), ‘*avant que*’ (‘before’), but also in the scope of non-monotonic quantifiers:

- (2) a. *Personne à part Jean ne pense que la France puisse/peut gagner la Coupe du Monde.*
 nobody but Jean NEG thinks that the France can.SUBJ/IND win the Cup of-the World
 ‘Nobody but Jean thinks that France can win the World Cup.’
- b. *Presque personne ne pense que la France puisse/peut gagner la Coupe du Monde.*
 almost nobody NEG thinks that the France can.SUBJ/IND win the Cup of-the World
 ‘Almost nobody thinks that France can win the World Cup.’

- Under ‘*trop... pour...*’ (‘too... to...’):

- (3) *Les Français aiment trop la démocratie pour penser qu’ on puisse/peut gouverner par les sondages.*
 the French like too-much the democracy to think that one can.SUBJ/IND govern by the polls
 ‘The French like democracy too much to think that one can govern according to the polls.’

- Within a sentential subject (but note that sentential subjects are normally subjunctive-marked: therefore the presence of the subjunctive under the epistemic predicate could be due to some sequence of mood phenomenon):

- (4) *Que Jean soit convaincu que Marie soit/est malade commence à se savoir.*
 that Jean be.SUBJ convinced that Marie be.SUBJ/IND sick begins to self know
 ‘That Jean is convinced that Marie is sick begins to be a known fact.’

- Likewise, under ‘*Il se pourrait que...*’ (‘It might well be that...’), which is a mandatory subjunctive-governor anyway.

3.2 French nominals/infinitivals embedding the subjunctive

- (5) *La pensée que Marie soit/est enceinte leur est venue ce matin.*
the thought that Marie be.SUBJ/IND pregnant to-them is come this morning
'The thought that Marie is pregnant occurred to them this morning.'
- (6) *Penser qu' on puisse/peut changer de vie est une chose très commune.*
to-think that one can.SUBJ/IND change of live is a thing very common
'To think that people can change their lives is very common.'
- (7) *La croyance qu' on puisse/peut guérir par les plantes est très répandue.*
the belief that on can.SUBJ/IND heal by the plants is very widespread
'The belief that on can heal with plants is very widespread.'
- (8) *Croire que les hommes soient/sont égaux est la base de la démocratie.*
to-believe that the men be.SUBJ/IND equal is the basis of the
democracy
'To believe that men are equal is the basis of democracy.'
- (9) *L' hypothèse qu' il y ait/a de l' eau sur Mars a ses partisans.*
the hypothesis that it there have.SUBJ/IND of the water on Mars has its
defenders
'The hypothesis that there is water on Mars has defenders.'
- (10) *L' opinion que Marie ??soit/est enceinte leur est venue ce matin.*
the opinion that Marie be.SUBJ/IND pregnant to-them is come this morning
'The opinion that Marie is pregnant occurred to them this morning.'
- (11) *La certitude que Marie ??soit/est enceinte leur est venue ce matin.*
the certainty that Marie be.SUBJ/IND pregnant to-them is come this
morning
'The certainty that Marie is pregnant occurred to them this morning.'

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