

Information Structure and the Scope of Sentential Negation*

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1 Introduction

Apparent irregularities in the semantic scope of sentential negation have been noticed by many linguists and philosophers. A well-known problem is the existential force of most sentential subjects in negative statements. Many authors conclude from the presence of this existential force that the subject lies outside the scope of negation (e.g. Frege 1892, Strawson 1950, Kamp 1981). Another irregularity, noticed by Kraak 1966, Jackendoff 1972, Gabbay & Moravcsik 1978, Kuno 1980, Payne 1985, McGloin 1987, and Horn 1989, among others, is that, in certain contexts, some parts of the predicate do not seem to be affected by sentential negation either. It has been suggested that the scope of negation must exclude these 'non-negated' constituents as well. A different approach to the first problem (e.g. Kempson 1975, Gazdar 1979, and Horn 1986), or to both (Horn 1989), however, maintains that sentential negation is indeed external and has scope over the entire subject-predicate structure, and that the existential force of subjects and the feeling that only part of the predicate is negated in certain sentences are better handled by a non-truth-conditional account. Similar observations are applicable to the yes/no question operator or Q-operator, as discussed in Kuno 1980, 1982.¹

This paper provides a unified account of these two phenomena. Following Horn's externalist point of view, and using evidence from Catalan and English, it is argued that the readings where part of the sentence is felt as 'non-negated' are the outcome of the interaction of logico-semantic structure and informational structure, the latter being the component of language where 'packaging' relations like focus/open-proposition (Prince 1981, 1986, Ward 1985) are established and interpreted. In particular, it is proposed that informational meaning and semantic meaning interact by means of partial cancellation, yielding the understandings where some part of the clause is felt to escape the scope of negation or the Q-operator, without the need to resort to any additional constraints.

2 The Facts

In what follows, we will refer to the readings where part of the proposition is felt to lie outside the scope of negation or the Q-operator as *INFRAPROPOSITIONAL READINGS*, and to the elements that lie outside the scope of negation or the Q-operator as *OUTSIDER TERMS*. As we have seen, outsider terms may be either subjects or complements of V.

2.1 Subjects

The scopal relation between subject definite descriptions and sentential negation has been a matter of controversy for many years. A sentence like (1), in one of its ‘readings’,

- (1) Gomez Addams didn’t sell his South American holdings.

seems to convey the understanding that Gomez Addams exists; in other words, that there is a Gomez Addams about whom we communicate a negative predicate. Some semantic theories incorporate this understanding in their formal semantic representation of negation by either arguing or assuming that negation is internal and does not have scope over the subject (Frege 1892, Strawson 1950, Kamp 1981, *inter alia*) or by arguing that the subject in (1) must be analyzed as an existential quantifier which gives rise to logical scope interactions with the negation operator (Russell 1905) (cf. Lukasiewicz 1922 for a different ambiguitist approach), yielding the wide-scope reading of negation, where there is no existential claim for *Gomez*, and the infrapositional reading, where there is.

In contrast, one may address the issue in a totally different fashion: let negation have scope over the entire predication, including the subject, at all times, and attribute the existential force of the subject NP in (1) to some non-truth-conditional property of this NP (cf. Kempson 1975, Gazdar 1979, Horn 1989, among others).² Horn (1989:§7.3.4), for example, argues that subjects tend to be felt as lying outside the scope of negation because they tend to be topics. Topics, being what the sentence is about (cf. Strawson 1964, Reinhart 1981) are not within the scope of assertion and, therefore, are pragmatically understood as being outside the scope of negation as well.

2.2 Complements of V

It is not subjects alone which appear to give rise to infrapositional readings. Jackendoff (1972) notices that sometimes negation seems to apply to only part of the predicate (cf. also Gabbay & Moravcsik 1978). One such example is, for instance, the sentence in (2) (in Jackendoff 1972:255),³

- (2) Max didn’t kill the JUDGE with a hammer.

where negation is felt to affect only the direct object and not the entire VP or sentence, i.e., not only the subject *Max* but also the PP *with a hammer* behave like outsider terms. Jackendoff argues that this is an example of his rule of ‘association with focus’, a rule that somehow connects logical operators with the focus element in the sentence to establish an intimate tie between the two.

Kuno (1980, 1982) notes similar restrictions for negation or the Q-operator in Japanese: their scope generally only extends to the focal verbal constituent that immediately precedes them. In fact, English, while distinct from Japanese in word order and directionality of scope, also shows parallel effects for both operators. Compare (2) with (3). Notice that in (3) only *judge* is understood as the ‘aim’ of the yes/no question.

(3) Did Max kill the JUDGE with a hammer?

In most of the literature, it is clearly concluded or tacitly assumed that the semantics of sentences like (2) and (3) cannot include a sentential negation operator with scope over the entire proposition. When trying to define the logico-semantic scope of negation in these sentences, however, we encounter references to non-logico-semantic, informational notions like focus and theme. A clear example is Payne (1985), who does not seem to clearly endorse an exclusively logico-semantic approach to the diversity of readings, and affirms, using Praguean terminology, that 'the contextually bound elements are removed from the scope of negation, and what is actually negated is the contextually free portion of the sentence' (1985:199). And it is again Horn (1989:515) who proposes that there should be no need to resort to multiple logico-semantic ambiguity to account for the VP infrapositional readings: 'the negative element takes semantic scope over the entire predication, but [...] will be understood as associated with that rhematic constituent which receives the intonation peak'.⁴

3 Informational Meaning

It is precisely this position, expressed by Payne and Horn with respect to VP outsider terms, that we develop in this paper in terms of the interaction of semantic and informational meaning, while applying it to all outsider terms: subjects and complements of V. We take the position that sentential negation and the Q-operator always have semantic scope over the entire predication, with no exceptions, and we derive the infrapositional readings from the different informational structures of the sentence and their different overlapping patterns with the invariable semantic structure. Before moving on, however, we must introduce some theoretical notions regarding informational meaning and the informational component.

3.1 What is Informational Meaning?

It is well known that sentences that are truth-conditionally equivalent can be encoded in different syntactic constructions. This logico-semantically-vacuous variation has been attributed to differences in informational meaning. Informational meaning represents a packaging of information in discourse (Chafe 1976, Prince 1986) that reflects the beliefs of the speaker about the hearer's attentional state. Thus, informational meaning is composed of a set of instructions with which speakers direct hearers to enter the information encoded in a given sentence into their discourse model or, alternatively, their stock of knowledge (cf. Vallduví, forthcoming). Informational meaning is established and interpreted in the informational component of language (cf. Lambrecht's 1988 'information structure'), which is linked to the syntax in the same way the logico-semantic component is.

Informationally, we divide the sentence into **focus** and **ground** ($S = \{ \text{focus, ground} \}$), and the latter is subdivided into the **link** and the **tail** ($\text{ground} = \{ \text{link, tail} \}$). The focus constitutes the assertion of the utterance in von Stechow's (1981) and Lambrecht's (1988) terms, or the 'informative part' in Halliday's (1967),

and it is the only non-elidable part of the sentence, since it is the only addition of information at the time of utterance. The ground roughly corresponds to the open-proposition or presupposition in Akmajian 1979(1970), Chomsky 1971, Prince 1981, 1986, or Lambrecht 1988. The ground is treated as already relevant and 'around' somehow at the time of utterance. Its main informational force consists in anchoring the focus appropriately in the discourse model or stock of knowledge. It is further divided into the link, which corresponds to (a subset of) the topic in the topic-comment framework (or the theme in Halliday 1967), and the tail, which bears some overlap with what has been called antitopic (Chafe 1976, Lambrecht 1981). The former is always sentence-initial and functions as an address-marker, in the sense that it activates a given discourse entity or a given address in the stock of knowledge under whose label the oncoming information is catalogued (hence the aboutness feeling).⁵ Further detail on these informational primitives can be found in Vallduví, forthcoming.

3.2 Structural Representation

Obviously, informational meaning must be recoverable from the surface shape of the sentence. This can be done by morphological, phonological or syntactic means, or, as is usually the case, by means of a combination of these. In Catalan —to a larger extent than in English— the informational articulation of the sentence is structurally expressed in the syntax by means of right- or left-detachment of non-focal constituents, yielding the configuration in (4) (cf. Vallduví 1989):

- (4) [XP non-focus (link) [IP FOCUS] non-focus]

This abstract configuration is instantiated in sentences like the ones in (5). The example in (5)a is a right-dislocation, or *emarginazione* in the Italian literature, and (5)b is a left-dislocation (functionally equivalent to an English topicalization):

- (5) a. [XP [IP *hi*_i VAN OBRIR BOTIGA,] a Londres_i.]
 loc PAST-3p-open store in London
 ‘(They) OPENED A STORE in London.’

- b. [XP A Londres_i [IP *hi*_i VAN OBRIR BOTIGA.]]
 in London *loc PAST-3p*-open store
 ‘In London (they) OPENED A STORE.’

c. cf. the canonical:

- (*Hi) van obrir botiga a Londres.

In (5), the presence of the clitic locative pronominal *hi* (compare the cliticless canonical in (5)c), string order in (5)b, and prosody in (5)a show that the locative PP *a Londres* is in an external non-argument position.⁶ In addition, Catalan being a null-subject language, it has been argued that whenever overt preverbal subjects occur, they are not in a canonical subject slot in the clause, but in an external adjunction position (Rigau 1988; cf. Bonet 1989 for a similar analysis). In other words, the

terminology, (8)a is an example of sentential focus, (8)b an example of predicate focus, and (8)c an example of verbal narrow focus:⁸

- (8) a. (... quan) VAN OBRIR BOTIGA A LONDRES ELS LLADRÓ.
 ‘(...when) the L. Bros. opened a store in London.’
 Φ [*yes*(L. Bros. opened a store in London)]
- b. Els Lladró_i *pro*_i VAN OBRIR BOTIGA A LONDRES. (= (6)a)
 ‘The L. Bros. OPENED A STORE IN LONDON.’
 $\Lambda np_1, np_1 =$ L. Bros., [Φ [*yes*(np_1 opened a store in London)]
- c. Els Lladró_i *pro*_i n_j ’hi_k VAN OBRIR, de botiga_j, a Londres_k.
 ‘The L. Bros. OPENED a store in London.’
 $\Lambda np_1, np_1 =$ L. Bros., $\lambda np_2 \lambda pp_3$ [Φ [*yes*(np_1 opened np_2 pp_3)]] (in-L)
 (store)

It is impossible to fully justify here this informational representation, which is obviously empirically modelled after the syntactic representation of informational meaning in Catalan. Suffice here to say that, as opposed to other analyses, our formalization is more efficient in handling instances of sentential or predicate focus, which are far more common than cases of narrow focus, and fares well in cases of double focus too. The fact that the non-focal elements rather than the focus is abstracted away from the clause may seem odd to the reader familiar with representations of focus currently available in the literature, but our characterization reflects the conceptual argument that what is informative or asserted, the focus, is the actual reason for the clause to exist, and, therefore, at the relevant level, the former must be represented as standing within the latter.

4 Deriving the Infrapropositional Readings

4.1 The Negation and Q- Operators

Let us finally move to the goal of this paper: we are now ready to try to obtain the infrapropositional readings in negative and interrogative sentences. As we have seen, the semantic meaning of sentences (6) and (8) has remained constant, while different informational understandings have been established. In other words, the logico-semantic proposition

- (9) *yes*[open (store, in London, L. Bros.)]

is shared by all the sentences in (6) and (8). However, each of these sentences has a different informational representation, some of which we have already spelled out in the above examples. So far, there has been no conflict in the understandings derived from both types of meaning: the interaction between the two has null effects. This, however, is not always the case. To see this, let us extend the informational representations in (7) and (8) to their negative and interrogative counterparts, i.e., sentences where, instead of having a *yes* operator we have negation (\sim) or a Q-operator (*Q*).

Informational representations for the interrogatives are in (10) (*que* is the Catalan instantiation of the Q-morpheme):⁹

- (10) a. Que VAN OBRIR BOTIGA A LONDRES ELS LLADRÓ (, pas)?
 ‘Did the L. Bros. open a store in London?’
 Φ [$Q(\mathbf{L. Bros. opened a store in London})$]
- b. Els Lladró; que *pro*_i VAN OBRIR BOTIGA A LONDRES?
 ‘The L. Bros. did they OPEN A STORE IN LONDON?’
 $\Lambda np_1, np_1 = \mathbf{L. Bros.}, [\Phi [Q(np_1 \mathbf{opened a store in London})]]$
- c. Els Lladró; que *pro*_i *hi*_j VAN OBRIR BOTIGA, a Londres_j?
 ‘The L. Bros. did they OPEN A STORE in London?’
 $\Lambda np_1, np_1 = \mathbf{L. Bros.}, \lambda pp_2 [\Phi [Q(np_1 \mathbf{opened a store } pp_2)]]$ (in-L)
- d. Els Lladró; que *pro*_i *n*_j’*hi*_k VAN OBRIR, de botiga_j, a Londres_k?
 ‘The L. Bros. did they OPEN a store in London?’
 $\Lambda np_1, np_1 = \mathbf{L. Bros.}, \lambda np_2 \lambda pp_3 [\Phi [Q(np_1 \mathbf{opened } np_2 pp_3)]]$ (in-L)
 (store)

Sentences (10)a, (10)b, (10)c, and (10)d are informationally equivalent to sentences (8)a, (8)b, (6)b (=7), and (8)c, respectively. They have the same informational structure and meaning (aside from the propositional operator¹⁰), which in Catalan is straightforwardly represented in the surface structure of the sentence. Each of the sentences in (10) shows the same dislocation pattern as its affirmative counterpart in (6) and (8). At the same time, the sentences in (10) are all instantiations of the same logico-semantic proposition in (11):

- (11) $Q[\text{open (store, in London, L. Bros.)}]$

We see, then, that while the sentences in (10) are all logico-semantically equivalent, they are, in contrast, informationally distinct from each other.

The same observations can be directly carried over to the negative sentences in (12):

- (12) a. (... que) no VAN OBRIR BOTIGA A LONDRES ELS LLADRÓ.
 ‘(... that) the L. Bros. didn’t open a store in London.’ (neg-external reading)
 Φ [$\sim(\mathbf{L. Bros. opened a store in London})$]
- b. Els Lladró; no *pro*_i VAN OBRIR BOTIGA A LONDRES.
 ‘The L. Bros. didn’t open a store in London.’ (neg-internal reading)
 $\Lambda np_1, np_1 = \mathbf{L. Bros.}, [\Phi [\sim(np_1 \mathbf{opened a store in London})]]$
- c. Els Lladró; no *pro*_i *hi*_j VAN OBRIR BOTIGA, a Londres_j.
 ‘The L. Bros. didn’t OPEN A STORE in London.’
 $\Lambda np_1, np_1 = \mathbf{L. Bros.}, \lambda pp_2 [\Phi [\sim(np_1 \mathbf{opened a store } pp_2)]]$ (in-L)
- d. Els Lladró; no *pro*_i *n*_j’*hi*_k VAN OBRIR, de botiga_j, a Londres_k.
 ‘The L. Bros. didn’t OPEN a store in London.’
 $\Lambda np_1, np_1 = \mathbf{L. Bros.}, \lambda np_2 \lambda pp_3 [\Phi [\sim(np_1 \mathbf{opened } np_2 pp_3)]]$ (in-L)
 (store)

The four sentences in (12) are informationally distinct from each other. Each of them is informationally equivalent (except for the propositional operator) to the corresponding lettered sentences in (10). This is shown, again, by the Catalan

surface structure. The logico-semantic structure of the sentences in (12), however, remains constant:

(13) \sim [open (store, in London, L. Bros.)]

This is precisely what Kempson 1975, Gazdar 1979, Horn 1989, and the other partisans of the externalist approach to sentential negation argue for. We will now see how we can derive the infrapropositional readings without fiddling with the logical scope of negation, just as these authors propose. The readings in question are derived by exploiting the partial-overlap interaction between the logico-semantic and the informational representations of sentences like (10) and (12).

Mark that the informational representations for the sentences in (10) and (12) are, obviously, motivated exclusively by the informational meaning they convey, just as they were in the affirmative sentences in (7) and (8). Notice, incidentally, that it is precisely the outsider terms in these sentences which are dislocated to non-argument slots. Catalan clearly reflects structurally the fact that outsider terms must be non-focal, as observed by some of the authors mentioned above.

4.2 A Unified Account

Let us take, for example, sentence (12)b, where the outsider term is the subject. The informational meaning this formula expresses is as follows: I instruct you to activate or go to the discourse entity 'the Lladró Brothers' and I inform you (or I assert) that 'not opening a store in London' is a satisfactory instantiation of the gap in the relevant assumed frame 'els Lladró are-predicated-something-of'. The ground is assumed to be relevant and non-controversial at the time of utterance. While (12)b semantically expresses that it is not the case that the Lladró Brothers opened a store in London, simultaneously it informationally expresses that 'the Lladró Brothers are predicated-something-of' is taken for granted. The subject *els Lladró*, while within the scope of negation in the semantics, remains outside the scope of assertion in the informational representation, and, therefore, as Horn (1989:512) suggests, in some sense, outside the scope of negation as well. This is how we capture his observation about the topichood —linkhood, in our terms— of most subjects. In fact, Catalan postverbal subjects, crucially, are never understood as outsider terms.

Consider now (12)d, for instance: the ground can be described as being 'the Lladró Brothers stand in some relation to a store and to London'. The only informative part, the only actual addition of information to the model at the time of utterance is 'not opening'. Again, while we semantically understand that it is not true that the Lladró Brothers opened a store in London, we informationally understand that some relation holds between them and a store and London. If we cancel out both understandings we obtain that the only element left to be negated *de facto* is *open*. The informational status of complement-of-V outsider terms, then, just like with their subject counterparts, causes them to be understood as non-negated. This is represented in our informational formula, where only negation and the verb are within the scope of focus.

The same applies to interrogative examples like (10). In (10)c, for instance, in the semantics, *Q* has scope over the entire proposition. But in the informational

component, we interpret that the fact that the Lladró Brothers stand in some relation with London constitutes the ground. The only non-ground material is then ‘opening a store’, which is left as the only questionable part of the utterance, and, therefore, understood as the aim of the yes/no question.

Notice that with our analysis we directly incorporate Jackendoff’s ‘association with focus’ with no explicit stipulation of it. In fact, Jackendovian examples like the one in (2) are accounted for by our formalism, as shown in (14), or its corresponding interrogative (15):

- (14) Max didn’t kill the JUDGE with a hammer.
 $\Lambda np_1, np_1 = M, \lambda v_2 \lambda pp_3 [\Phi [\sim(np_1 v_2 \text{ the judge } pp_3)]]$ (with-hammer)
 (kill)
- (15) Did Max kill the JUDGE with a hammer.
 $\Lambda np_1, np_1 = M, \lambda v_2 \lambda pp_3 [\Phi [Q(np_1 v_2 \text{ the judge } pp_3)]]$ (with-hammer)
 (kill)

Again, the propositional operator takes wide logico-semantic scope in both examples, yielding the logico-semantic understandings that it is not the case that Max killed the judge with a hammer for (14) and that the speaker inquires whether or not it is the case that Max killed the judge with a hammer for (15). Both sentences, however, are informationally equivalent: we are informed that *the judge* is an appropriate complement of the ground, where the ground consists of Max standing in a relevant relation with the act of killing with a hammer. Given this, we are taken to understand *the judge* as the ‘object’ of negation or the aim of the yes/no question.

Crucially, the same treatment is given to subjects with existential force and to VP-internal outsider terms. There is no need to resort to two different sorts of explanation. The trick here is in placing the sentential operator (affirmation, negation, or Q) inside the scope of Φ . This move has null effects when the operator is affirmation, as desired, but important ones when the operator is negation or Q. In particular, it provides us with the infrapropositional readings, i.e. Jackendoff’s association with focus, with no additional stipulation of such a rule.

4.3 A Problem

While this approach has been successful in giving a unified account of the existence of outsider terms in negative and Q-operator sentences, it is unable to deal, at this moment, with sentences where sentential negation is clearly a part of the ground, i.e. where it is not ‘associated with focus’ in any of the ways discussed above. Such is the case in sentences like (16), where (16)b is a literal rendering into Catalan of (16)a (which, apparently, is dialectally restricted in English):

- (16) a. My CAR, I haven’t paid for yet.
 b. El COTXE, no he pagat encara.
 c. It’s my CAR I haven’t paid for yet.

In these examples ‘not having paid for yet’ is the relevant assumed ground which serves to anchor the focus ‘car’. Since there is no ‘association with focus’ it would be

erroneous to try to give an affirmative ground to this sentence. In these sentences, then, we wish to have negation outside the scope of Φ . The very trick that allows us to derive the infrapositional readings, however, excludes these ‘negation-in-ground’ readings. Therefore, we need to abstract negation away from the clause, in the same way we would lambda-abstract other tail elements in (16) like *pay*. Before such a step is taken, however, we must determine what repercussions it may have for the overall proposal, and we must investigate the possibility of its being applicable to similar phenomena in the representation of informational meaning.

5 Conclusion

The semantic analysis of sentential negation as an operator with scope over the entire proposition has encountered two major difficulties: the existential force of most subjects and the outsider-term nature of some predicate-internal phrases. It has been concluded from this that in sentences with these irregularities we must abandon the idea of a wide-scope sentential operator.

I have argued that, to the contrary, these long-observed irregularities in the semantic scope of sentential negation need not be incorporated into the semantic representation of negative sentences, but rather, that they follow independently from the interaction of parallel but distinct simple semantic and informational representations. I have provided an independently-motivated formal representation of informational meaning which, when applied to interrogative and negative sentences, duly captures the infrapositional readings in question with no need of additional rules like ‘association with focus’. Finally, and more importantly, the inclusion of non-logico-semantic notions like focus in the semantic representation is rendered unnecessary.¹¹

NOTES

- * Several conversations with Megan Moser helped this paper take shape. The remaining deformities are my sole responsibility.
- 1. But see Horn (1989:472-73) for arguments that the Q-operator and negation are not analogous.
- 2. There are two analyses of this wide-scope negation operator: an Aristotelian two-place subject-predicate operator, or a Fregean one-place propositional operator. This controversy, though important, will be overlooked in this paper. For our purposes here, we will adopt a Fregean propositional operator (but cf. Horn 1989 for compelling arguments for the Aristotelian two-place term operator, which he heralds as superior to its alternatives).
- 3. In this example, and throughout the paper, capitalization signals the focus of the utterance.
- 4. The disadvantages and shortcomings of the internalist and ambiguit approaches to infrapositional readings are discussed in detail in Horn (1989).

5. Herring (1990, this volume), in a comprehensive crosslinguistic study of the syntactic position of informational elements, concludes that contrastive topics—our links—are invariably found in sentence-initial position. This finding is in perfect agreement with our model.
6. Notice, incidentally, that the only way to tell the ungrammatical 'cliticful' string in (5)c from the grammatical string in (5)a is by means of prosody.
7. In spite of this, for the sake of clarity and tradition, and since it is not crucial here, I will still place *pro* in preverbal position in the examples throughout the paper.
8. (8)a is presented as an embedded sentence to improve its felicity. In matrix sentences where two or more complements of V are overt and non-clitic, postverbal subjects are quite marginal. Also, notice in (8)c that the dislocated direct object is binding a clitic back in the clause, just like the locative, which we have already mentioned; in this case, it is a 'partitive' *n*-clitic, with *n*, *en* and *ne* as allomorphs.
9. I am aware that the English translations in (10) are sort of marginal. I decided to sacrifice English naturalness to obtain a more faithful rendering of the Catalan original. The English preposed phrase should not be read as a 'hanging topic' or full-fledged English left-dislocation (LD-2 in Prince's terms), but as an actual topicalization in a non-interrogative sentence.
10. It is unquestionable that the propositional operator is needed in the informational representation. Not only do we need to derive the infrapositional readings we are discussing in this paper, but we also have to informationally represent sentences where the affirmation/negation operator is the only focal element:
 - (i) She DID pass.
 - (ii) She had to pass, and pass she DID.

In these sentences the operator *yes* is the focus, and it must be represented as such in an informational formula by positioning it within the scope of Φ . These sentences are discussed in detail in Ward 1985 and also in Prince 1986.
11. This type of 'non-mingling' interaction between the different components of language that the proposal presented in this paper argues for is in agreement with the position found in Autolexical Theory and in some recent interpretations of Government-Binding Theory.

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