WHY ARE THERE NO NEGATIVE PARTICULARS? HORN'S CONJECTURE REVISITED [*]

Jacques Moeschler (Jacques.Moeschler@lettres.unige.ch)

1. INTRODUCTION

This article examines one of contemporary pragmatics' most important discoveries, which is known as Horn's Conjecture. Horn's Conjecture (Horn 2004) is an important stipulation in pragmatic theory, particularly as concerns its relationship with formal logic. As will be shown below, Horn's Conjecture explains the absence in all natural languages of lexical items designating negative particulars. Horn's Conjecture has been posited as an explanation for the lack of such word expressions as *not all* and *some…not*, which are made up of strings of words or expressions rather than single lexical expressions such as *all, some* and *no.*

Although Horn's Conjecture is valid for all negative particulars (Moeschler 2006), only quantifiers will be discussed here. Firstly, the implications of Horn's Conjecture on the lexicon and on natural languages will be laid out (§2). Next (§3) the formal implications of Horn's Conjecture will be discussed, with special emphasis on an important consequence of his conjecture, and one which lies at the heart of pragmatic theory: the difference between truth-conditional contents and non-truth-conditional contents. The difficulties inherent in Horn's analysis will then be discussed (§4). In conclusion (§5), a new explanation for Horn's Conjecture will be given. It is based on explicature (Wilson & Sperber 2004) rather than on scalar implicature.

2. HORN'S CONJECTURE

Horn's Conjecture is undoubtedly one of the most interesting hypotheses in pragmatics to arise since the pragmatic turn, which was based on the founding work of Paul Grice in the William James lectures of 1967, and which was published in 1989 (Grice 1989). Horn's major contribution, which was presented in his doctoral thesis of 1972 and in his book on negation (Horn 1989), was to have shown the economy of linguistic systems in their lexical realization. His article on negation (Horn 1985), for instance, convincingly demonstrates why the treatment of negation from the perspective of pragmatics, itself located within the monoguist *vs.* ambiguist perspective, resolves the classical questions of internal and external negations.

Horn's Conjecture is related to the research which has been clearly laid out in neo-Gricean pragmatics (Horn 1984, Levinson 2000, and a more recent paper by Horn which will be published soon): the lexicon should not, as based on the Gricean canon stemming from the well-known modified Occam's razor principle, include the totality of information responsible for meanings in usage (cf. Grice 1978, 188-189, Moeschler & Reboul 1994, 243):

The modified Occam's razor principle
Meanings should not be multiplied beyond what is necessary.

[*] Special thanks to Marcia Hadjimarkos for her translation from French to English.

This research branch strives to simplify the description of the lexicon by offering explanations based on pragmatics for the variations in meaning of linguistic expressions. An expression is therefore characterized by its lexical content (the contribution of semantics in this manner is truth-conditional) and by its pragmatic properties, which trigger non-truth-conditional conversational implicatures. The neo-Gricean approach deals, from amongst the totality of Gricean implicatures, with generalized conversational implicatures: although they are cancellable, they are triggered by lexical expressions. It is possible to represent the structure of the semantics-pragmatics description of the neo-Gricean approach in the following way:

A lexical description of the expression E
a. according to semantics: $[[E_{<a>}]] \in D_{<a>}$: the denotation of the expression E of type *a* belongs to the totality of possible denotations of type-*a* expressions;
b. according to pragmatics: occ(E) +> E': the occurrence of the expression E conversationally implicates E'.

Horn's Conjecture is located within this context. It deals with expressions such as quantifiers, logical connectives and temporal adverbs, all of which can be placed on the logical square in the following way:

- A implies I, as E implies O, i.e. if the first statement is true, the second is also true, but the inverse is not true.
- A and O are contradictory, as are I and E, i.e., the two statements can be neither true nor false together.
- A and E are contraries, i.e. they cannot be true together.
- I and O are subcontraries, i.e. they cannot be false together.

A and I are positive, E and O are negative, A and E are universals and I and O are particulars. Figure 1 presents a precise image of the logical square (Horn 2004, 11):

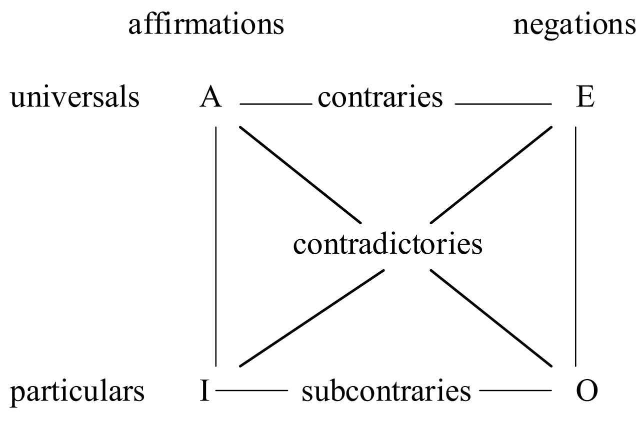

Figure 1: the logical square

The crucial point, as shown in Figure 2, is that natural languages all have expressions for A (universal positives), E (universal negatives) and I (positive particulars) but not for O (negative particulars).

A	I	E	O
all	*some*	*no*	**nall*
always	*sometimes*	*never*	**nalways*
both	*one (of them)*	*neither*	**noth*
and	*or*	*nor*	**nand*

Figure 2: Lexical realizations of positive and negative universals

Words for *not and (*nand), not both (*noth), not always (*nalways)* and in particular for *not all (*nall)* do not exist. This fact leads to Horn's generalization, which is formulated within the framework of Horn's Conjecture:

Horn's Conjecture (Horn 2004, 11)
Natural languages tend not to lexicalize complex values, since these need not be lexicalized.

Horn predicts that *some…not* (like *not all*) will not be lexicalized, which is in fact true. However, a difficulty arises from the fact that Horn's analysis does not explain in which way(s) a negative particular is a complex value, nor why a positive particular will be lexicalized.

In order to answer these questions, it is necessary to examine certain elements of the theory of generalized implicatures, which developed in large part from the founding work of Gazdar (1979).

3. Scalar implicature theory

It is now appropriate to introduce the key notion which allowed Horn to fortify his conjecture: the notion of scalar implicature. The notion of scalar implicature is a special type of Gricean implicature: quantitative implicature. Gazdar was the first scholar to show the asymmetrical relationship between the quantitative implicatures triggered by Grice's first maxim of quantity (1975, 45, "Make your contribution as informative as is required") and semantic implications. Gazdar observed that for sentences which contain the quantifiers *some* and *all* in (1), or the logical connectives *and* and *or*, sentences (a) quantitatively implicate sentences (b), while sentences (c) imply sentences (d), and sentences (d) imply sentences (a):

(1) a. Some of the students participated in the colloquium.
b. All of the students did not participate in the colloquium.
c. Some, and in fact all of the students, participated in the colloquium.
d. All the students participated in the colloquium.

(2) a. Cheese or dessert.
b. Cheese or dessert, but not both.
c. Cheese or dessert, and in fact both.
d. Cheese and dessert.

In other words, a speaker who uses *some Ns* cannot mean *all Ns*, although he can cancel this implicature. If on the other hand the speaker uses *all Ns*, he will logically be implying *some Ns*. Gazdar's analysis is therefore based on the opposition between implication, a truth-conditional relationship, and implicature, a non-truth-conditional relationship. This gives rise to the following generalization:

Generalization

a. An upper-bound term *F* truth-conditionally implies a lower-bound term *f* : *F* → *f*.
b. A lower-bound term *F* Q-implicates the negation of the upper-bound term F: *f* +> ¬*F*.
c. These terms form a quantitative scale <*F, f*>. According to the quantitative scale, the strong term *(F)* implies the weak term *(f)*, which implicates the negation of the strong term.

It is now possible to formulate Horn's Conjecture with greater precision:

Horn's Conjecture (2)

a. Universals are strong terms. They imply the particulars of the same pole, whether positive or negative, which are defined as weak terms: A → I, E → O.
b. Particulars implicate the negation of the strong term of the same pole: I +> ¬ A, O +> ¬E.

Analysis of these points appears to be confirmed by the facts, as shown in examples (3):

(3) a. All the students participated in the colloquium → Some of the students participated in the colloquium.
b. No student participated in the colloquium → Some of the students did not participate in the colloquium.
c. Some of the students participated in the colloquium +> It is false that all the students participated in the colloquium.
d. Some of the students did not participate in the colloquium +> It is false that no student participated in the colloquium.

On taking a closer look, however, it becomes apparent that although the relationship I +> ¬A is intuitively correct, this does not seem to be the case in (3d); that is, the implicature O +> ¬E.

The question which now arises is whether (3d) is in fact true. If a negative answer is given, it follows that Horn's Conjecture must be explained in a different way: if the O terms (negative particulars) are not lexicalized, this is not because they denote complex values, but because their implicatures are not calculable. The conclusion may be drawn that the possibilities of lexicalization are directly linked to the possibility of associating lexical items with their pragmatic inferences.

4. THE CONUNDRUM OF HORN'S CONJECTURE

This paper will now test Horn's Conjecture, which supposes the analysis of positive and negative particulars and is based on the differences between truth-conditional contents, which are produced by implication, and non-truth-conditional contents, which are produced by scalar implicature.

When one returns to the relationships of *implication,* one can observe that these relationships are truth-conditionally consistent, on condition that, for positive universals, quantification cannot apply to an empty set, as this existential implication would be false.

(4) a. $\forall xFx \rightarrow \exists xFx$: *all x are F* implies that *some x are F.*
b. $\neg\exists xFx \rightarrow \neg\forall xFx = \exists x\neg Fx$: *no x is F* implies that *all x are not F* or that *some x are not F.*

As the implications of (4a-b) show, I and O, that is, positive and negative particulars, do not have identical truth conditions: the existence of at least one *x* bearing a property *F* is asserted for I, whereas the existence of at least one *x* with bearing a *non-F* property is asserted for O. Horn, however, proposes the following analysis of particulars: the assertion of one of the subcontraries (I or O) Q-implicates the other, since subcontraries cannot be false together. For Horn, therefore, (5a) and (5b) Q-implicate (5c):

(5) a. Some men are bald.
b. Some men are not bald.
c. Some men are bald and some men are not bald.

The following difficulty now comes to light: according to Horn, therefore, utterances whose truth-conditions are different (I and O) have identical Q-implicatures. Is such a thing possible? In order to verify Horn's analysis, one must first verify its logical consistency. It will be shown that this is indeed the case, which unfortunately has serious consequences for pragmatics. An alternate version of Horn's Conjecture will be set forth in § 5.

The question that immediately arises is why Horn analyzes particulars in this way. In a theory of scalar implicatures à la Horn, the usage of a weak term on the Horn scale generally implicates the negation of the strong term. Why, therefore, are positive and negative particulars linked by implicature? In order to answer this question, one must first return to the analysis of the scalar implicatures of particulars, as set out in (6a) for I and in (6b) for O:

(6) a. $\exists xFx +> \neg\forall xFx = \exists x\neg Fx$
b. $\exists x\neg Fx +> \neg\neg\exists xFx = \exists xFx$

The conclusion is thus reached that Horn's analysis is correct: I indeed implicates O and O indeed implicates I, which allows the conclusion that I and O both Q-implicate the conjunction of both I and O. If one tries to understand the meaning of this implicature, one arrives at the following observation: the content of the scalar implicature of particulars given in (7) only corresponds to the truth conditions of subcontraries: the constraint which states that subcontraries cannot be false together:

(7) a. I +> I & O
b. O +> O & I

In other words, saying *Some men are bald* Q-implicates *Some men are bald and some men are not bald*, which makes it impossible for a situation to exist in which both *Some men are bald* – which corresponds to the situation in which *No man is bald* – and *Some men are not bald* are both false. There is in fact no possible world in which *No man is bald* and *All men are bald* are simultaneously true. Horn's logical analysis, which is truth-conditional, appears to be correct. It should thus follow that his pragmatic analysis, which analyzes the Q-implicatures of negative particulars, also is correct. However, certain restrictions concerning the role of implicatures in the process of comprehension must be introduced at this juncture. It will be demonstrated that while pragmatic analysis is correct for positive expressions, it is problematical for negative ones.

Analysis in terms of scalar implicature and Q-implicature will now be reexamined. Horn's analysis supposes that quantitative scales (8) produce implications (9a and c) and implicatures (9b and d) for examples (10) and (11).

(8) a. <*all, some*>
b. <*no, some...not*>

(9) a. all the Ns → some Ns
b. some Ns +> not all the Ns
c. no N → some Ns…not
d. some Ns…not +> not no N

(10) a. All linguists know logic.
b. Some linguists know logic.
c. Not all linguists know logic.

(11) a. No linguist knows logic.
b. Some linguists do not know logic.
c. It is false that no linguist knows logic.

In this classic analysis, in (10) and (11), the (a) sentences imply the (b) sentences, and the (b) sentences Q-implicate the (c) sentences. If Horn's scale (8a) is conceivable, that is, if implicature (9b) is true, the same is not true for the negative scale (8b), the relationship (9d) and the Q-implicatures from (11b) to (11c).

Let us suppose that a speaker says (11b), which is reproduced as (13):

(13) Some linguists do not know logic.

Can one reasonably affirm that the speaker means that it is false that no linguist knows logic? This would seem peculiar even in a polemical context, in which a speaker wished to implicate the negation of (11a) by affirming (11c): on the contrary, in this case (10b) would be used, as E and I are contradictory.

(14) Anne : No linguist knows logic.
Jacques 1: But I know some linguists who know logic: Larry, Deirdre, Nicolas.
Jacques 2: ?? But I know some linguists who do not know logic: George, Charles, Ronald.

It is therefore difficult to admit that by using a negative particular, the speaker wishes to Q-implicate the negation of the universal negative. The question now arises as to what the speaker wishes to say with a negative particular.

If the denotation of a sentence like (13) is examined, one can, in a set-theoretic fashion, represent it in the following way (Figure 3):

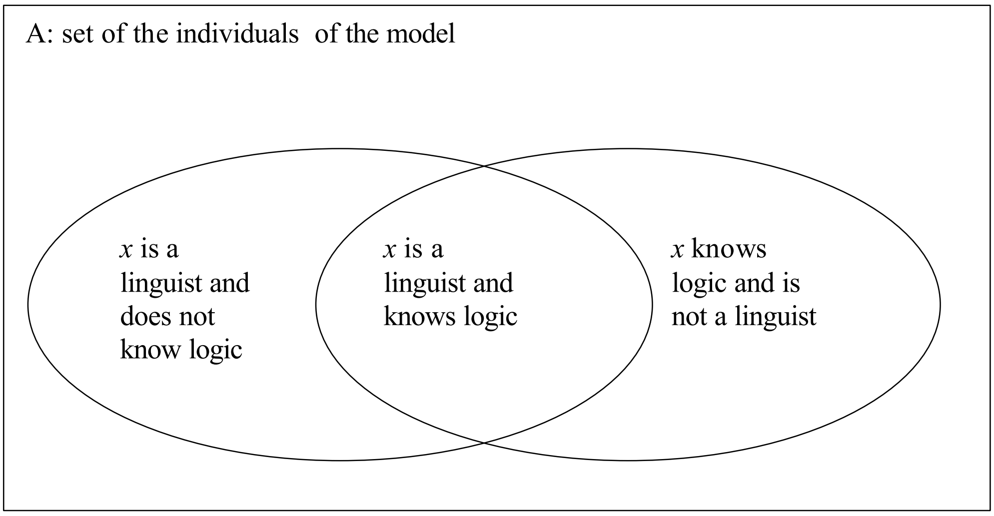

Figure 3: set-theoretic representation of the contents of (13)

The set-theoretic representation shows that the meaning of (13) is not the falseness of *No linguist knows logic*, but rather that other linguists do know logic. This situation is both unfavorable and favorable for Horn's analysis. It would appear that what (13) communicates is indeed something like (15a), but not something like (15b), which shows that although Horn's analysis of subcontraries is correct from the truth-conditional point of view, his analysis of non-truth-conditional aspects, that is, of the Q-implicature, is not:

(15) a. Some linguists know logic.
b. It is false that no linguist knows logic.

Can it therefore be stated that Horn's analysis of subcontraries was correct, and that his analysis of semantic scales was incorrect? The situation is in fact rather more complex: if Horn were incorrect in his analysis of Q-implicatures, this would only concern the negative scale. In fact, no objection to his analysis in terms of the scalar implicatures of positive particulars can be raised, and the scale <*all, some*> appears to function. Can the same be said of the scale of negatives, <*no, some...not*> ? It is important to point out that although quantitative scales link lexical units (which is why they are the basis of *generalized* implicatures), the scale of negatives does not link lexical units, but one unit and one construction. The legitimacy of such a scale must be questioned, because the previous statement implies that the mechanisms on which generalized implicatures are based can be grammatical constructions, as in the construction (16a), on which the presupposition is (16b) is based:

(16) a. Hans is tall for an Appenzeller native.
b. Appenzeller natives are short.

However, if one accepts that generalized implicatures can be the result of grammatical constructions, as has been asserted in Fox's recent analyses of disjunction and measurement constructions (Fox 2006, Fox & Hackl, to appear), one arrives at the conclusion that Horn's scales are not essential to scalar implicatures.

The following situation therefore arises: scalar implicatures of negative particulars are not the result of a quantitative scale, but of their status as subcontraries. This point will now be examined more closely in terms of both negative and positive particulars.

Horn's scalar analysis leads to the following conclusion: particulars, whether positive or negative, have the same implicatures, even when they do not have the same truth-conditions. This data is reiterated below: (17a) and (17b) Q-implicate (17c):

(17) a. Some linguists know logic.
b. Some linguists do not know logic.
c. Some linguists know logic and some linguists do not know logic.

Three objections to this analysis can be formulated, however:

1. Is it indeed possible to affirm that the speaker, in stating (17a) or (17b), means (17c)? If one returns to a semantic analysis of the meaning of each of these sentences, it appears that the subcontrary sentence is truth-conditionally implied, but not implicated. If the real motives of Gricean theory were used, it would be necessary to understand *some* in each of these sentences as *only some*; that is, as a restriction, a weak quantity or a weaker quantity than anticipated. The presence or absence of the negation plays a major role in the comprehension of the sentence: the negative sentence automatically contrasts with the positive sentence, but the same cannot be said of the positive sentence.

2. The second objection stems from the fact that, if these sentences had identical implicatures, it would be impossible to understand how the speaker chose one rather than the other in order to communicate what he wished to say. This gives rise to an extremely awkward situation: the positive and the negative sentences both say the same thing. As Figure 3 shows, these sentences do not have the same truth-conditions, and unless one admits that implicatures are not dependent on what is said, they cannot communicate the same information and therefore cannot have the same implicatures.

3. The final and most important objection is that subcontrary implicatures are a conjunction of propositions, respectively I & O. But in order for the complex proposition I & O to achieve implicature status, its content would have to be more specific than I and O, respectively. Is it possible to say that the conjunction of two subcontraries is more specific than one of the two? The conjunction I & O refers to all linguists, among whom one identifies those linguists who know logic and those linguists who do not. This results in a group of individuals that is larger than the subset of linguists who know logic or the subset of linguists who do not. In the example derived from Figure 3, the result of the implicature à la Horn is a subset (18c) made up of the combination of subsets (18a) and (18b) (cf. Figure 4):

(18) a. [[some linguists do not know logic]] = {George, Charles, Ronald}
b. [[some linguists know logic]] = {Larry, Deirdre, Nicolas}
c. [[some linguists do not know logic and some linguists know logic]] = {George, Charles, Ronald, Larry, Deirdre, Nicolas}

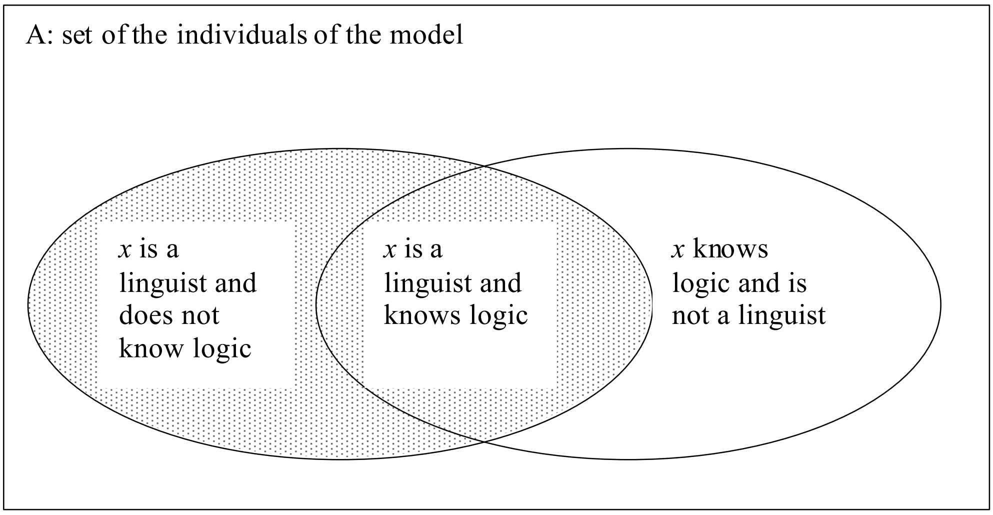

Figure 4: denotation of the Q-implicature of I and of E

Can it be supposed even for an instant that the group of individuals described by a scalar implicature is larger than the group of individuals corresponding to the semantic description (the denotation) of the sentence? The response is of course negative, and the conclusion of this analysis is therefore defective. The time has come to propose an alternative analysis.

5. AN ALTERNATIVE SOLUTION

Horn's Conjecture stipulates that the lexicalization of *some…not* is unnecessary, because natural languages tend not to lexicalize complex values. Horn recognizes that the semantic and pragmatic content of a negative particular – and this is the opposite of what occurs for a positive particular – is complex and that it therefore does not need to be lexicalized.

I would like to propose a weaker version of Horn's Conjecture, which stipulates simply that the content of a negative particular is *impossible*. The revised version of Horn's Conjecture would then read as follows:

Horn's Conjecture revisited
Only lexicalize those concepts whose specifications are calculable.

This formulation uses new terms. Instead of content, *concepts*, *calculability* and *explicature* are mentioned. These terms are examined below.

a. The lexicalization of a *concept* is referred to, rather than the lexicalization of content, because the most important point is to explain how natural languages lexically express concepts which are the constituents of the language of thought. A quantifier is the linguistic expression of a concept of quantity. It determines the value of the concept for a group of individuals. For example, *some N* can be used only if the number of *N* is equal to or more than two (and less than all).

b. *Calculability* is the most important pragmatic notion used in the revised approach to Horn's Conjecture. It is posited that the pragmatic interpretation is the result of an enrichment, and that those terms referred to by neo-Griceans as *generalized implicatures* are in fact no more than *enrichments of the logical form of the utterance*. These are *non-free enrichments* which are structurally associated with lexical items.

c. The level of calculability is not that of *implicature*, but of *explicature;* i.e. the complete propositional form of the utterance. It is posited that what neo-Griceans call generalized implicatures are actually explicatures of logical form (Carston 2002 and 2004 for a detailed analysis). Explicatures for utterances (17a-b) are therefore given as follows:

(19) a. Some linguists know logic.
b. Only some linguists know logic.

(20) a. Some linguists do not know logic.
b. Only some linguists do not know logic.

The first advantage of this approach is that it allows the compatibility between (19a) and (19b) to be taken into account. If the proposition expressed by (19a) is (19b), it is therefore not surprising that it should also be compatible with (20a), and that the opposite is true as well.

The second advantage of this approach is that it allows a content to be attributed to what is calculable. According to the relevance-theoretic approach to which this paper adheres, what is relevant (that is, what produces a positive cognitive effect that compensates cognitive effort) is calculable. A positive effect is produced by adding new information or by modifying previous information. Relevance is defined as the relationship between positive effect and cognitive effort: the more effects an utterance produces, the more relevant it is; and conversely, the more processing efforts an utterance demands, the less relevant it is. The relevance of (19a) is therefore linked to the positive effect (19b) and the relevance of (20a) to the positive effect (20b). The important point to be made here is that it is not necessary to draw a propositional scalar implicature from either (19a) or (20a), which corresponds respectively to the negation of positive and negative universals. Pragmatic enrichment only concerns the quantifier *some,* which when enriched becomes *only some*. This explains why the formulation of O (which is (21a)) is difficult to accept in French, because it is undersood in the same way as (21b), which is difficult to process, and because it is often linguistically realized as (21c), which can be interpreted differently from (21b); i.e. (21d).

(21) a. ?(?)Pas tous les linguistes ne connaissent la logique. (Not all linguists know logic.)[1]
b. Il est faux que tous les linguistes connaissent la logique. (It is false that all linguists know logic.)
c. Tous les linguistes ne connaissent pas la logique. (All linguists do not know logic.)
d. Aucun linguiste ne connaît la logique. (No linguist knows logic.)

It will be observed that one of the interpretations of (21c) is a much stronger statement than (21a), because it corresponds to E (*aucun*, *no*). On the other hand, (21c), or O, means simply that there is at least one linguist who does not know logic. This is not the meaning of (21d), which states that there is no linguist who knows logic.

A proposition very different from that of Horn has been reached. It has been shown that positive and negative particulars do not communicate scalar implicatures, but simply pragmatic specifications which concern the restriction of the meaning of the quantifiers *some*

[1] For some speakers the quantifer *tous (all)* cannot be preceded by negation in French. However, other speakers find (21a) at least marginal. This is not the case in English.

and *only some* in either a positive or negative sentence. Because this has been shown, the question of the calculability of a complex construction no longer needs to be asked, and it can be understood why the current essay represents as explicatures what Horn defines as Q-implicatures.

As has been shown, Horn's Q-implicatures are just truth-conditional logical implications. In other words, they are truth-conditional aspects of the meaning of utterances. The same conclusion is reached through a pragmatic interpretation in terms of explicature: the pragmatic restriction of *some* and *only some* stops the universal interpretation of *some.* In a non-empty quantification, *some x* is compatible with *all the x*.

The conclusion has been reached that negative particulars do not trigger Q-implicatures or scalar implicatures. On the contrary, they trigger basic (that is, propositional) explicatures which limit quantification. The question of why the lexicalization of *some...not* is not possible, as mentioned above, remains to be explained.

The final analysis proposed here simply maintains Horn's proposition ("The lexicalization of *some...not* is not necessary."). However, it is preferable to make a general proposition, which allows one to distinguish between syntax, the lexicon, and pragmatics. In terms of the present research, lexicalization presupposes the translation of a concept into a linguistic form in order that its use gives rise to calculable variations of meaning in appropriate contexts. *Some* is a good candidate, as it can cover a very large number of subsets, depending on what the speaker wishes to say:

(23) a. Some students, a dozen, were successful.
 b. Some citizens, several hundred, assembled in the street.
 c. Some linguists, less than one hundred, know logic.

It is difficult, however, to find a word which, used alone, restricts the scope of *some* applied to the negation of a predicate, and which would therefore cover the non-crosshatched portion of Figure 5:

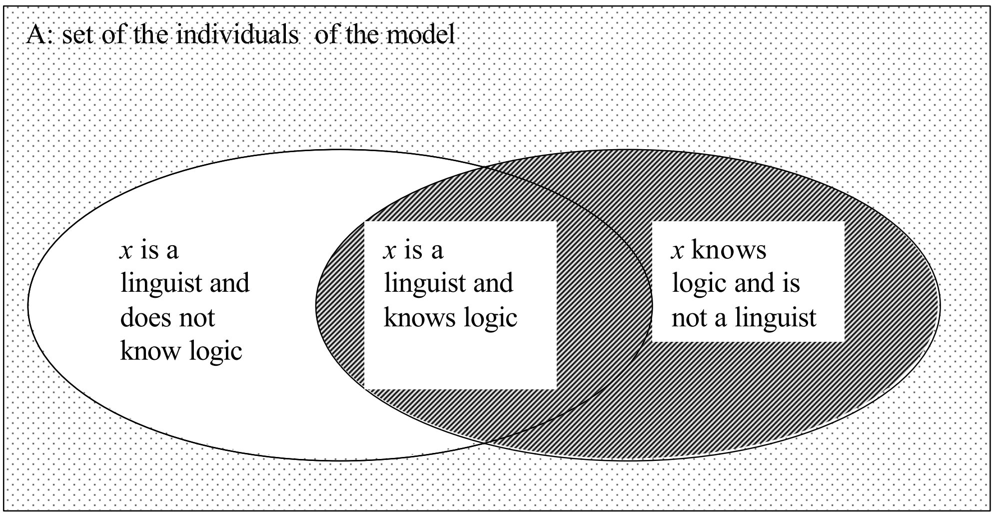

Figure 5: a set-theoretic representation of *some...not*

This gives rise to the hypothesis according to which *some...not* cannot be lexicalized, and that only a syntactical construction allows one to communicate the explicature *only some...not*. In other words:

a. A concept cannot be lexicalized unless its explicatures are calculable.
b. If a concept cannot be calculated, syntax takes over.
c. Pragmatics intervenes in order to enrich the logical representations associated with concepts and with syntactical constructions.

6. A BRIEF CONCLUSION

As seen above, Horn's Conjecture makes correct predictions about the non-existence of negative particulars, but it neither describes nor correctly explains their properties. The conclusion has been reached that negative particulars are not associated with any generalized implicatures. Instead, they give rise to explicatures; that is, pragmatic enrichments which are either propositional or truth-conditional. The legitimacy of treatment in terms of scalar implicatures of the logical square has been called into question, as the theory of scalar implicatures cannot, in the best of cases, explain the relationships between particulars and universal positives. It is therefore possible to conclude that the theory of scalar implicatures is outdated, and that it is necessary to replace it with a robust truth-conditional pragmatic theory: a theory of generalized explicatures.

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