

Blocking effects and polarity sensitivity

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Abstract

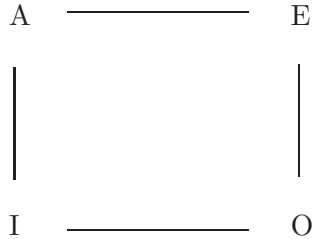
The absence of negative universal determiners in natural languages expressing “not all” has given rise to various speculations, ranging from an innate principle of grammar to blocking on the basis of pragmatic principles. After arguing that these proposals are flawed, I propose that there are no general principles standing in the way of such determiners, but that the two main processes which diachronically produce negative quantifiers presuppose conditions on use which are not met by negated universal statements.

Contents

1	No O	2
2	Horn’s account	4
3	<i>Nall, not all and all not</i>	5
4	Lexical merger	6
5	Semantic Reinterpretation and Universal Polarity	7
6	Conclusions	11

1 No O

The classical Square of Oppositions distinguishes four major types of quantification:



In this diagram, A stands for universal quantification (“all”), E for universal negative quantification (“no”), I for existential quantification (“some”) and O for negated universal quantification (“not all”). One of the most striking findings of ([22]) is that these quantifiers are the only ones (in finite domains) which obey some fairly general and abstract conditions such as Conservativity and Quantity and some others (ibidem, 464, Theorem 7.1.). Hence the prominence of these quantifiers in natural language and classical logic alike is only natural, assuming that these conditions are part of our cognitive endowment.

Almost as striking as this finding, however, is the observation in ([8]:252 ff.) that natural languages systematically refuse to lexicalize the O-quantifier, here identified with “not all”. There are no known cases of natural languages with determiners like “nall”; meaning “not all”. Even in cases that look very promising (like Old English, which has an item *nalles*, derived from *alles* “all”; by adding the negative prefix *ne-* the same that is used in words like *never*, *naught*, *nor*, *neither*), we end up empty-handed. *Nalles* does not actually mean “not all” or “not everything”, but “not at all” ([8]:261). Jespersen suggested that natural language quantifiers form a Triangle, rather than a Square. The task for natural language semantics is to make sense of this idea and perhaps even to derive the triangle from general principles of quantification, in much the same way that Van Benthem was able to derive the square from a few general principles. [9] even suggests that the absence of lexicalized negated universals cannot be accidental, and must be derived from innate linguistic principles. Huybregts proposes the following principle:

(1) **Lexicalization Principle**

Lexicalization of “not Q” is possible just in case lexicalization of “Q not” is impossible.

Note that this principle rules out lexicalization of “not all” just in case “all not” has been lexicalized. Since that is indeed the case (in English, the lexical item corresponding to “all not” is *no*), we make a correct prediction.

Huybregts' proposal is an instance of a well-known type of explanation in linguistics: absence by blocking. The presence of one form may block the presence of another. Usually, however, the blocking relation holds between expressions with the same meaning, and the underlying idea is economy of lexical resources. Having synonyms is not economical, hence to be avoided. In this case, however, we have blocking by a nonsynonymous expression. Notice, though, that Huybregts principle does not explain why it is "all not" that is lexicalized in language after language, and not "not all". Moreover, the predictions made by Huybregts' Lexicalization Principle fail to generalize beyond the European languages. It is a well-known feature of many Asian languages, including Japanese and Hindi, that they lack proper negative quantifiers ([5]). Instead of "no", they use combinations of existential quantifiers with negation ("not ... any"). Since there is no lexicalized "all not", then, we would expect to find lexicalization of "not all", if (1) is correct. But we do not. This makes it unlikely that the absence of "nall" in English is caused by the presence of "no". If there is a blocking effect, the blocking factor cannot be "no", but must be sought elsewhere.

Barwise and Cooper ([2]:186) postulate the following universal:

(2) **Monotonicity correspondence universal**

There is a simple NP which expresses the monotone decreasing quantifier -Q if and only if there is a simple NP with a weak non-cardinal determiner which expresses the monotone increasing quantifier Q.

As Barwise and Cooper note,

This proposal would predict that no language would have basic determiners meaning *not most*, *not every* or *not the* since *most*, *every* or *not the* are strong.

Note that Barwise and Cooper's purported universal, like Huybregts' principle of lexicalization, is too strong given the existence of languages like Japanese and Hindi. The "if and only if" should be replaced by an "only if", since the presence of expressions like "no" or "never" (so-called n-words) appears to presuppose the existence of positive existential quantifiers, but not vice versa. But the universal is not just too strong, it is also too weak, and it lacks explanatory power. As [8] points out, the blocking of *nall* is not an isolated phenomenon, but extends well beyond the traditional quantifiers. A similar blocking phenomenon may be observed among modal expressions and among connectives. To focus on just the latter case, consider the boolean connectives of English: *and*, *or* and *nor*. While *nor* is clearly a lexicalized negation of *or*, there is no counterpart *nand*. And indeed no natural language appears to have a connective like the Sheffer stroke, which expresses that its conjuncts are not all true.

2 Horn's account

Horn ([7], [8]) proposes a general explanation for the lack of negated universals, as well as the lack of negated conjunction and negated strong modals. This explanation is a pragmatic one. It runs as follows. The I and O quantifiers implicate one another in a Gricean sense. If you say that some student has left, you implicate that not all have left. If in fact all students had left, you should have used the more informative A quantifier (by Grice's Maxim of Quantity, cf. [4]). Conversely, if you say that not all students have left, you implicate that some student has left, by the same reasoning. Hence, even though I and O are not logically equivalent quantifiers, they may boil down to the same thing in ordinary contexts. This pragmatic equivalence itself does not yet explain why I is lexicalized, but O is not. But it would explain why languages do not lexicalize both quantifiers: they do not need both. The reason why I is lexicalized rather than O is then that negation is marked, and affirmation unmarked. There are no languages where affirmation is expressed by a special affirmation symbol while negation is expressed by the absence of that symbol. This asymmetry is pervasive in natural language (and indeed in artificial languages like predicate logic). Affirmative sentences are also more common than negative sentences as well as easier to understand for humans ([26]). Somehow, positive sentences are favored over negative sentences (indeed, the term *negative* itself has a negative connotation, demonstrating yet further this tendency). And this is why I is lexicalized, and not O. In languages like Japanese and Hindi, the priority of the affirmative over the negative is demonstrated even more strongly by the absence of E as well as I quantifiers.

At this point, it is useful to pause, and to consider the nature of the explanation. The account given raises a number of questions.

- If *null* is not needed, due to the presence of *some*, then why is *not all* used at all?
- Why should O be blocked by I, when natural language may employ several existential or universal quantifiers at the same time?
- If O is blocked by I, then why isn't E universally blocked by the possibility of negating I?

The first question will be elaborated upon in the next section, as it raises, in my view, the most serious concerns. The other two questions aim at the basic idea underlying Horn's theory, which is that natural languages may elavate parsimony to a principle of grammar. They forbid the addition of quantifiers which add nothing to the expressive possibilities of the language, just as they forbid the generation of regular past tenses or plurals when there is already a listed irregular form. This idea is wide-spread (cf. e.g. [1], or [14], and can be traced back, at the very least, to [19]), and there is much to be said in its favor. At the same time, there is sufficient evidence to suggest that natural languages are not always miserly inclined toward their vocabularies. There is evidence of abundance, even waste, as well as evidence of parsimony. If languages like Dutch can support several universal quantifiers and various indefinite determiners, it is

not so easy to see why there couldn't be an item corresponding to the O-corner of the Square of Oppositions. What is especially worrisome is that I and O, the blocking and the blocked elements, are not even semantically equivalent. They are merely pragmatically equivalent. In contexts where the speaker has only partial knowledge, there is not even pragmatic equivalence. If I say that some of my students are gay, one should not infer immediately that not all my students are gay. Perhaps I am unaware of the sexual preferences of the remainder. But if I and O are often not even pragmatically equivalent, because the conditions for Gricean implicatures are not met, then why should O be superfluous? I conclude that Horn's theory, as it stands, is not satisfactory and in need of amending. I will propose an alternative which partially overlaps with Horn's theory but also identifies some other factors standing in the way of lexicalized O.

3 *Nall, not all and all not*

Horn's blocking theory appears general enough to not just predict the blocking of *nall* but even that of *not all*, *not every* etc. For a negated universal can be expressed more economically by a simple existential sentence in cases of pragmatic equivalence. But we know that negated universals are possible, and that they are used. Things become even more puzzling when we also consider another combination of quantification and negation: *every ... not* sentences. These should be blocked, according to the same reasoning, by *no*, and they are. I investigated this matter by inspection of a large (16 million wordtokens) corpus of English texts (mainly Internet postings). This yielded only 6 sentences with universal *every* having wide scope over negation in the same clause, as compared to 375 clauses where negation takes scope over an occurrence of *every* (18 of which were cases where negation followed *!* *tshape every* but could only be interpreted as having scope over it. There is, then, a remarkably strong blocking effect acting against *every ... not* sequences. One of the rare exceptions found was the following quote from the bible:

- (3) For God so loved the world, that he gave his only Son, so that everyone who believes in him might not perish, but have eternal life.

In order to account for the virtual absence of *every ... not* clauses, I would like to appeal to pragmatic principles of the kind invoked by Horn. A pragmatic account is attractive precisely because the blocking is not absolute. The 6 examples in my corpus suggest that *every ... not* clauses are not ungrammatical, but simply rare owing to a strong preference for using *no*. The preference can be seen as an instance of a larger phenomenon: if languages have a choice between a single word and a more complex construction to express the same meaning, they choose the single word over the more complex construction. This is also known as the blocking of periphrastic by morphological constructions. For instance: *who* is strongly favored over *which person*, *prettier* blocks *more pretty*, and Dutch *nooit* "never" blocks *niet ooit* "not ever" ([6]).

Given that morphological or lexical expression is favored over syntactic expression, the question arises why *not every* is not blocked by the possibility

of using *some*. After all, *not every* is complex, whereas *some* is syntactically atomic. The reason is that pragmatic equivalence is too weak a condition for blocking. Only if there were a lexical equivalent, a quantifier like *nall*, would blocking be expected. But as Horn noted, such a quantifier is notably absent, not just in English, or Dutch, but quite generally. So the presence of negated universals is not so mysterious.

However, we are still left with the problem of having to account for the absence of lexical O-quantifiers. As I have argued, a blocking theory along the lines of [8] is not likely to be correct. I propose that the nonexistence of *nall*, *never* and their ilk is due to other factors than blocking. Let me begin by noting that a minimal system of quantifiers will not lexicalize the right-hand axis of the Square of Opposition. The negative quantifiers E and O are dispensible due to the universal presence of negation. Minimal systems of quantification may undergo enlargement, however, through a couple of well-known mechanisms of linguistic change. What I would like to argue in this paper is that these mechanisms are more suited to produce new quantifiers in the E-corner of the Square than quantifiers in the O-corner. While lexicalization of the O-corner is not ruled out *a priori*, on my account, it would have to be a rare phenomenon. The processes to consider are lexical merger and semantic reinterpretation.

4 Lexical merger

The first process to consider is contraction of adjacent elements. It is well-known that the n-words of Germanic and Slavic, as well as those of Latin, arose as a result of lexical merger. Thus Latin *nemo* "nobody" stems from *ne homo* "not man", English *never* from *ne ever*, German *nicht* "not" from *ne wicht* "not anything", etc. Languages without n-words are often of a syntactic type which makes such contraction impossible. Thus Japanese or Hindi, typical SOV-languages, have the SOV-type of negation: a negative suffix on the verb. Indefinite pronouns occur before the verb in SOV-languages, and so negation is never adjacent to an indefinite pronoun in these languages. If adjacency is a requirement for contraction, then one major source of n-words is not available for these SOV-languages. Contraction of adjacent elements is common only when the elements to be contracted frequently cooccur (cf. [16] for *mu! ch* elaboration of this point). It is unclear whether we should view this frequency requirement in terms of simple string frequency (as [16] suggests), or whether some more sophisticated notion such as *mutual information* is involved (cf. [3]). Most likely, the latter is the case, because frequently occurring strings such as *not the* show no inclination whatsoever towards coalescence. Presumably, this is because the juxtaposition of two high-frequency items is in no way remarkable enough to engender syntactic change. However, when one of the items becomes predictable (or highly probable) in the presence of the other, contraction might be the result. Negation does not have to be fully pronounced if its presence can be inferred from the immediate context. But no matter how one fine-tunes the requirement, some requirement of frequent cooccurrence would have to be a factor in lexical coalescence. Given that negation does not cooccur particular!

ly frequently with a universal quantifier, we do not expect a lexical merger. Additional factors might contribute to the lack of mergers in this case. Discourse relations such as *denial*, which link a negative sentence to a previously uttered or presupposed proposition, may overrule any tendency toward incorporation (cf. [6]). For example, in Dutch the sequence *niet ooit* is usually blocked by *nooit*, but not (as noted in [21] in echoic denial contexts (marked by focus on the adverb of negation):

- (4) a. *Ik heb niet ooit met haar gedanst.
 I have not ever with her danced.
 "I have never danced with her"
- b. Nee, ik heb NIET ooit met haar gedanst.
 No, I have NOT ever with her danced
 "No, I have NOT ever danced with her"

It appears to me that negated universals are fairly often used as denials. This makes it likely that *not every*, *not all* etc. are too infrequent in nondenial contexts to make merger a real possibility. The combination of negation and universal quantifier does not reach the frequency threshold required for merger.

5 Semantic Reinterpretation and Universal Polarity

Assuming that merger of negation and universal quantifiers is not a likely source of lexical items corresponding to the O corner of the Square of Opposition, there is still another avenue which we must explore. Languages such as French and Catalan show that n-words not only arise through a process of coalescence, but also as a result of semantic reinterpretation. French negative expressions such as *personne* or *rien* originate from polarity sensitive indefinites, meaning "someone" and "something", respectively. Because of their status as polarity items, they cooccurred so frequently with negation, that they came to be seen as the true bearers of negation, and the negation as a redundant marker ([13]). In other words, in the context of negation, we may witness a shift from I to E. Isn't it possible, then, that there could be a similar shift from A to O? If a universal quantifier is (almost) always used in a negative environment, we might reinterpret it as an O-quantifier, and treat the negation as redundant or meaningless.

Unfortunately for this line of reasoning, there are hardly any serious cases of universals exhibiting a strong preference for negative contexts. Perhaps the most common case is the preference of certain universal noun phrases for negative predicates ([18], [15]). Since this is one of the most plausible cases of polarity sensitivity among universally quantified expressions, I will dwell upon this type of collocation a bit longer. The following examples from French, English and Dutch illustrate the phenomenon:

- (5) a. Luc a perdu tout bon sens.
 b. Luc has lost all good sense.
 c. Luc heeft alle gezond verstand verloren.

The noun phrases in question usually contain an abstract mass noun. As ([18]:91-93) points out, the use of *tout* in (5a) requires a negative predicate. Positive predicates are not compatible with *tout bon sens*, not even when negation is added:

- (6) a. *Luc a recouvré tout bon sens.
 b. *Luc n'a plus tout bon sens.

I note without further illustration that similar restrictions hold in English and Dutch. The crucial point is the ungrammaticality of (6a) and its counterparts in English and Dutch. Since polarity sensitive *tout* does not combine with simple negation, there is no fixed context within which the universal quantifier could undergo a meaning shift. Recall that shifts from I to E in the context of negation go hand in hand with loss of negative meaning for the negation operator. While expletive negation is not an unusual feature in the languages of the world (as are expletive uses of many other function words), there is no similar loss of meaning attested for nonfunction words such as negative verbs. Moreover, there is no fixed negative verb combining with *tout*, but rather a whole slew of different negative predicates. This means that there is no fixed, frequently recurring combination of expressions which would allow for reassignment of meaning, but! rather an ever-changing array of possibilities.

Universal quantifiers which require negative predicates are sufficiently peculiar to warrant some more discussion. As I noted above, the nouns in these quantifiers are abstract mass nouns. The type of quantification involved is mass quantification of a particular kind. The universal quantifier does not quantify over individuals, as in the case of count nouns, nor over parts of a whole (as with concrete mass nouns, like *sand* or *air*), but over parts in a more abstract sense. If Luc lost all good sense, he lost every aspect or degree of good sense. It is interesting that count determiners, such as Dutch *elk* "every" and *ieder* "every" can be used in combination with a mass noun if the predicate is inherently negative:

- (7) a. Jan is gespeend van ieder idealisme.
 Jan is devoid of every idealism
 "Jan is devoid of all idealism"
 b. Jan verloor elke hoop.
 Jan lost every hope
 "Jan lost all hope"

Normally, count determiners do not combine with mass nouns (as their name already suggests). In the present construction I assume the count determiners make use of a covert operator which turns the mass nouns into count nouns. There is an overt counterpart to this covert operator, the expression *vorm van* "form of". Note in this connection that the following sentences are equivalent in Dutch:

A logical representation for (7a) would be:

$$(8) \forall x (x @ \text{Idealism} \rightarrow \text{Devoid-of}(j,x))$$

where the @ sign indicates the "form-of" or generalized part-of relation. In this formula, the universal quantifier is treated as having scope over the negative predicate *devoid of*. The fact that these universal quantifiers must have wide scope over the negative verb is argued for in [15] on the basis of their equivalence with narrow scope existential quantifiers:

- (9) a. Jan ontbeert ieder gevoel voor humor
 Jan lacks every sense of humour
 Jan lacks all sense of humour
 b. Jan ontbeert enig gevoel voor humor

 Jan lacks any sense of humour
 "Jan lacks any sense of humour"

(To be sure, there is also a reading of (9b) which translates as "Jan lacks some sense of humour", which I consider to involve wide scope existential quantification, with *enig* having scope over the verb *ontberen* "to lack".) (To be sure, there is also a reading of (9b) which translates as "Jan lacks some sense of humour", which I consider to involve wide scope existential quantification, with *enig* having scope over the verb *ontberen* "to lack".)

This state of affairs looks perhaps a bit suspicious: universal quantifiers which appear to require negative predicates, and hence are polarity sensitive, but yet do not appear within the scope of those predicates. Normally, negative polarity items are remarkable for always appearing within the scope of their triggers ([17], [27]). How come these universals work differently? A possible answer can be found in the work of Jackson ([12], [11]). Jackson argues that sentences with polarity items are "general statements", i.e. equivalent to universally quantified sentences. The only way in which universal quantifiers selected by negative predicates can give rise to general statements is by assuming wide scope. Now Jackson's theory is certainly too strong in that it only accounts for one type of negative polarity item, the type that adds emphatic character to a statement. Such items are for instance English *any*, *ever*, *at all* and Dutch *ook maar* "so much as, even" or *een zier* "anything". However, there are also other types of polarity items, whose rhetorical function is to downtone, to understate, rather than to emphasize ([8], [10], [24], [25]). Litotes constructions belong to this type (e.g. Dutch *onverdienselijk* "without merit" is used only in litotes: *hij schildert *(niet) onverdienselijk* "he paints not without merit"). However important this objection may be for a general theory of polarity items, it does not matter for our present purposes, since sentences such as those in (7a) and (9) are rhetorically strong, not weak, and hence would fall under the purview of Jackson's theory.

Let us then no longer worry about the wide scope of the universal quantifiers in (7a)-(9), and return to the question of why these quantifiers require negative predicates. And perhaps more importantly, what makes these predicates "negative" in the first place? One way to test the negative character

of the predicates in question is by verifying their monotonicity properties (cf. e.g. [23], [27], [20]). We might say that a predicate is negative just in case it reverses generalized entailment. For instance: let $f(q) \leq f(p)$ whenever $p \leq q$ (p entails q), for any p, q , then f is said to reverse entailment. Now for some of the predicates in question, this gives intuitively correct results. Take for example the verb *lack*, and assume that *black pupils* \leq *pupils*. We then verify that *This school lacks pupils* \leq *This school lacks black pupils*, and so the predicate *lack* is negative in the weak sense of reversing entailment. But what about verbs such as *lose*, as in (5a) above? Clearly, if our school lost pupils, it does not follow that it lost black pupils. So according to the monotonicity, or entailment reversal, test, the verb *lose* is not negative. Yet there is a sense in which *lose* is negative and *recover* is positive. One relevant difference appears to lie in the existential entailment that *recover* supports, as opposed to *lose*. If I lost a book, it does not follow that a book (still) exists. Perhaps I lost it in the flames of my fireplace. On the other hand, if I recover a book, then there is a book. However, the lack of existential entailments is not sufficient to characterize the set of predicates at hand. In particular, this criterium would also include a number of intensional predicates which do not have a negative character, such as *look for*. Compare: *John abandoned/lost/relinquished/is beyond/ gave up/*looked for all hope*. Some other characteristic properties of these negative verbs will help to set them apart from ordinary intensional predicates. First of all, they allow for modification by adverbs such as *completely* or *totally*:

- (10) a. John completely lost hope.
 b. John totally abandoned that theory.
 c. *John is totally looking for a unicorn.

Second, these predicates are mereologically distributive. For example, if someone loses a bike, he also loses the various parts of that bike, such as the wheels. Predicates such as *look for*, and so on are not distributive in that sense. If John is looking for a secretary, on the other hand, it does not follow necessarily that he is looking for every part of his or her body. This ties in, of course, with the general character of the universal quantifiers that combine with the negative predicates, and the possibility of modification by *completely*. Adverbs such as *completely* quantify over parts: eating a cake completely entails eating every part of it, and completely losing hope means losing all hope. Given the distributive nature of the negative predicates, one might wonder why the universal quantifiers are used at all. Under the analysis given above, to give up all hope means to give up every part of aspect of hope. But to give up hope boils down to the same thing, given distributivity. This should not be viewed as a problem, however, but as evidence that the universal quantifiers found in the sentences (5a)-(9) above serve a rhetorical function: they redundantly mark exhaustiveness, thereby lending emphasis to the sentences.

6 Conclusions

I have argued, contra [8] that the lack of lexical quantifiers of the O-variety does not follow from blocking by lexical quantifiers of the I variety, as a result of pragmatic equivalence. Instead, I have proposed an historical explanation. Assuming that the minimal system of natural language quantification never contains the negative quantifiers E and O (due to the universal presence of negation), the question arises through what means a language could acquire these quantifiers. From the study of negative quantifiers of type E, it appears that there are two main paths along which such quantifiers develop. The first is lexical merger of an existential quantifier with negation, the second is reinterpretation of negative polarity items. I want to assume that there is nothing a priori standing in the way of quantifiers of type O. My contention is, that neither merger nor reinterpretation is likely to occur for universal quantifiers because the conditions which favor these processes are not met. Merger requires that universals frequently cooccur with an adjacent marker of negation. In English (and there is no reason to believe that other languages are different in this regard) such combinations are fairly infrequent. In particular, given the presence of a universal quantifier, the chance that the immediately preceding element is *not* is fairly small. Reinterpretation requires rather similar conditions: we should have universal quantifiers which are (either completely or largely) limited to negative contexts if we want a reinterpretation of A-type quantifiers as I-type quantifiers. Although it appears that there are universal quantifiers which require negative contexts, these are not of the type needed for meaning reassignment. First of all, they happen to have scope over the negative elements in question, and second, the negative elements are not simple one fixed element, say *not*, but involve a widely varying set of predicates. Of course, this does not rule out the possibility that some language has developed a set of universally quantified polarity items in simple negative sentences, but the literature is rather tacit on this possibility. If they occur, they should be of the understating or rhetorically weak kind.

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