Negation of Noun Phrases with *not*

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In this paper, I give a semantic account of the grammaticality of the negative particle *not* with noun phrases in English. On the way to developing my solution, I explore a few previous attempts at this problem, including an extension of Horn's discussion of the availability of NEG-Q readings (Horn, 1989) and Barwise and Cooper's treatment of this phenomenon within the generalized quantifiers approach (Barwise & Cooper, 1981). I will show that while both of these approaches provide interesting insights, neither approach is an adequate solution. My solution focuses on the nature of the complement of the noun phrase. After a thorough investigation of a large data set, I conclude that negation of a noun phrase is possible if and only if the size of the complement of the noun phrase is representable by a continuous set of values, and the noun phrase contains no other aspect of its meaning that can be negated.

In English, there are several instances where *not* can grammatically negate the subject of a sentence. For example, the following sentences are grammatical:

(1) a. Not everyone can afford a fifty dollar haircut.
b. Not many discus throwers can claim to have accomplished such a feat.
c. Not one thing was left untouched by the wrath of the tornado.

The question one might be prone to ask is, can all noun phrases be negated with *not* ? Negation of the subject of a sentence with *not* is not syntactically valid if the subject does not contain a quantified noun phrase[1] . Thus, a sentence such as **Not Salome came to the party* is ungrammatical, whereas we have seen in (1) above that several sentences with quantified noun phrases are in fact grammatical. However, not all sentences containing *not* modifying a quantified noun phrase subject are grammatical. Consider the following examples in (2):

(2) a. *Not some people came to my party last week.
b. *Not several events are planned for that weekend.
c. *Not each company is expected to present a quarterly report.

Now one may ask, exactly which quantified noun phrases can *not* negate? Several researchers who have studied the general topic of negation have commented on the fact that

[1] There are other instances where *not* can negate the subject of a sentence. These cases are when *not* is used in conjunction with *but* (or *and*). Doran (1997) states that the *not...but* construction is a case of a complex conjunction, as opposed to the usage of *not* as a modifier of noun phrases or quantifiers, as discussed in this essay. I assume that this model is an accurate description of the behavior, and I will not discuss it further in this essay.

every x can be negated by *not*, and yet **not some x* is ungrammatical. Horn (1989) discusses the work of many linguists and philosophers on this topic, most importantly Jespersen (1917, 1924), Sapir (1930), Carden (1972), and Horn (1972), each of whom focus on the *every/some* distinction. Within the realm of logic, it is quite easy to overlook other quantifiers and focus on the distinctions between *every* and *some*. However, these analyses do not take into consideration the full breadth of the issue for natural language.

In terms of the larger picture, Horn (1989) and Barwise & Cooper (1981) offer possible solutions to the problem of classifying the entire set of quantifiers in terms of their ability to be negated. Horn presents a sketch of a solution to the problem, explaining the classification of quantifiers as a result of the availability of a one-word lexical item, a lexical item that expresses a meaning equivalent to what would be the meaning of the negated quantified noun phrase. Horn states that "NEG-Q will be available for those predicate denials which do not have a lexicalized paraphrase" (p.499). Barwise and Cooper consider a wider range of examples, and conclude that there may be a different explanation for almost every case of the unavailability of a negated quantifier reading.

My mission in this paper is to develop a unified analysis of the grouping of quantifiers according to their ability to be negated by *not*. In the process, I will draw on portions of various analyses of quantifiers (Barwise & Cooper, 1981; Keenan & Stavi, 1986; Tottie, 1991) and negation (Horn, 1989, and those cited in Horn). My analysis rests on the claim that negation by *not* is only allowed when the denotation of the negated noun phrase has a readily definable interpretation; more specifically, the set of possible sizes for the set denoted by the negated noun phrase must be a continuous range of values. On our way to solidifying this notion, we must consider in greater detail the theories Horn (1989) and Barwise & Cooper (1981) have developed to explain this phenomenon. To begin our investigation, however, we must first gain a sense of exactly which quantified noun phrases can be negated by *not*.

Classifying Quantifiers: A Data Sample

The following table displays the behavior of *not* with different kinds of noun phrases.

Table 1. Example sentences demonstrating when it is grammatical (or interpretable) to negate a noun phrase with *not*. Note the contrasts in behavior between determiners that are usually grouped together, such as every/each/all.

Grammatical	Ungrammatical
1. Not **every** company expects to report increased earnings.	10. *Not **each** citizen files a tax return.
2. Not **all** of NASA's space-science work will be so auspicious.	
3. Not **a** peso is offered.	11. *Not **some** pesos are offered.
4. Not **one** thing in the house is where it is supposed to be.	
5. Not **many** people came to the meeting last week.	12. *Not **several** people came to the meeting last week.
6. Not **any** person can just walk right in there and get what they want.	
7. Not **more than half of** the team showed up last Friday.	13. *Not **most** of the team showed up last Friday.
8. Not **more than 200** people attended the opening gala celebration.	14. *Not **few** people left. 15. *Not **no** man left.
9. Not **less than one million** people enjoy listening to ABBA Gold every day.	16. *Not **the** man walked into the store. 17. *Not **John** came on time.

The most important thing to note about Table 1 is that several determiners that are normally grouped together in terms of their semantic behavior display opposite trends in grammaticality when used in coordination with negation. For example, Barwise & Cooper (1981) do not distinguish between *every, each,* and *all*, since all three share the same values for the semantic features Barwise & Cooper have determined are crucial for classifying the behavior of determiners (e.g., all three are +strong, indefinite, and monotonically increasing). However, note that *every x* and *all x* can be part of a negated noun phrase, while *each x* cannot be negated in this manner. Additionally, other semantic groupings Barwise & Cooper adopt, such as *some/a* and *many/several*, also fail to hold in terms of their ability to be negated. Perhaps most intriguing is the fact that *more than half x* can be negated, while *not most x* is ungrammatical.

Horn (1989): NEG-Q readings, scope, and lexical entries

In the concluding chapter of his book, A Natural History of Negation, Horn (1989) discusses the asymmetry in the possible readings for the scope of negation in sentences containing universal and particular quantification (see examples (3) and (4) below, taken from Horn, p. 497). In (3a), the quantifier is a universal, and the negation can have either wide scope over the quantifier, or narrow scope, which would entail scope over the 'predicate' portion of the sentence. In (4), the negation can only have scope over the 'predicate' portion. It is highly unlikely that anyone would interpret (4a) to mean the same thing as (4b), however (3b) is clearly one of the possible interpretations of (3a). Horn, following the notation of Carden (1970), terms the wide scope negation NEG-Q (~Q), and the narrow scope reading NEG-V (Q~).

(3) a. Everybody didn't come.
    b. Not everybody came.
(4) a. Somebody didn't come.
    b. Nobody came.

Horn also notes that the NEG-Q reading for particular quantifiers is not always unavailable. NEG-Q readings for particular quantifiers may be available in the case of "metalinguistic or second instance negation" (p.496). Horn notes that in these cases, "Crucially, each ease involves the disappointment of an expectation assumed to be shared by speaker and addressee" (p.494). An example of metalinguistic negation where the NEG-Q reading is available for *some* appears in (5) below.

(5) She swung round, she took two strides to him, waiting for someone to stop her, but someone didn't. (from John Le Carré's *The Little Drummer Girl*, quoted in Horn, 1989)

However, since the wide-scope reading of negation in particular sentences is rather unusual, Horn focuses on explaining the usual apparent asymmetry between the behavior of *every* and *some* with negation.

The crux of Horn's explanation for this asymmetry lies in what he calls Nexal Not, "a preference for overt negation to surface in its unmarked (nexal, predicate denial) position, as a particle or inflection on the finite verb or auxiliary" (p.498). Following from this, Horn states that inherently negative quantifiers (e.g., *nobody, none of the x*, etc.) exhibit a greater ability to restrict the NEG-Q reading in sentences like (4a), than strongly marked negated quantifiers (e.g., *not everyone*) exhibit for examples like (3a). Hence, we can interpret both the NEG-Q and NEG-V readings in (3a), but the NEG-Q reading is unavailable for (4a).

A prediction that arises from this argument is that a predicate denial will only be interpretable as a NEG-Q reading in the absence of a lexicalized paraphrase for the denial. Horn presents a few examples, among them are the examples in (4a,b) and in (6).

(6) a. Many students aren't happy during midterms.
b. Few students are happy during midterms.

The argument is that the NEG-Q reading of (6a) is blocked by the existence of a lexicalized negative quantifier with an equivalent interpretation (i.e., *not many* = *few*). While Horn's arguments seem to adequately (and elegantly) explain the availability of NEG-Q and NEG-V readings for predicate denials, his theory leaves many questions about the current investigation unanswered.

How does Horn's analysis extend to an analysis of the current question of when it is grammatical to negate a noun phrase? Clearly, the two problems are closely tied. However, when Horn discusses the availability of the NEG-Q reading of *some...not* sentences, he essentially overlooks the reality that not only is the NEG-Q reading unavailable, the construction **Not some x* is in fact ungrammatical. Why is it ungrammatical? Are we to infer that we cannot say *not some x* because of the existence of a lexicalized negative quantifier with the same meaning (for example, *nobody* = *not somebody*)? If this is a reasonable inference, then it quickly becomes apparent that an extension of Horn's analysis cannot adequately explain the current problem.

The first problem arises if we take a closer look at the meaning of a sentence like (7).

(7) *Not somebody came.

Do we understand this sentence to mean *Nobody came* ? If we can force ourselves to comprehend the sentence at all, we will most likely interpret (7) as *Nobody came* . But is it also possible that this sentence could be interpreted as *Everybody came* ? Take for example the following possible utterances.

(8) Not <u>some</u>body came... <u>no</u>body came.

(9) Not <u>some</u>body came... <u>every</u>body came.

Although (8) and (9) use a special type of ‘conjunction’ negation (see footnote 1), both sentences, with proper stress on the underlined portions, are reasonable utterances. Thus, one would no longer be willing to accept the assertion that *not somebody = nobody*. Even if one **is** willing to accept that *not somebody = nobody*, then what is the explanation for why the construction *not somebody* is ungrammatical? Could it not be interpreted simply as *nobody came*? Is it ungrammatical because there exists an inherently negative quantifier that expresses the same meaning? This does not seem to be a satisfactory explanation, as we will soon see.

Consider the following sentences containing negated noun phrases.

(10) *Not some people came to the party.

(11) Not many people came to the party.

(12) *Not most people came to the party.

For (10), we might argue that it is ungrammatical because we could instead say *Nobody came to the party*, where the meaning of *not some people* could be expressed by the less marked, inherently negative *nobody*. However, according to Horn, (11) could be expressed equivalently by *Few people came to the party*. Why, then, is (11) clearly acceptable? If we support an extension of Horn’s analysis, should it not be ungrammatical? Also, note that (12) is ungrammatical, although there appears to be no inherently negative lexical item that is equivalent to *not most*. One might be tempted to say that *not most = less than half,* however we run into the same problem we experienced with interpreting *not some*. Can *not most* in (12) also be interpreted as *everyone* or *more than most* ? Additionally, is *less than half* an inherently negative quantifier? Thus, it seems that an extension of Horn’s analysis is inadequate for explaining when a noun phrase can be preceded overtly by negation in an English sentence.

Barwise & Cooper (1981): Subsection 4.11- Negation of Noun Phrases and Duals

As opposed to the general solution that an extension of Horn’s account would supply for the current problem, Barwise & Cooper (1981) offer a somewhat disjoint account of the grammaticality of negating noun phrases. Using a data set very similar to the one presented in Table 1, the generalizations B&C develop in this section deal with what they define as the dual of a quantifier, as well as with the monotonicity of the determiner involved in the negated noun phrase. B&C state that these generalizations are the only apparent semantic generalizations to be made, since “this distribution [of grammatical negation of NPs] cannot be explained *purely* in terms of the semantics of quantifiers” (p.197). As support for this claim, they cite the difference in behavior between *every*, *all*, and *each* (see Table 1, #1, 2, and 10). Now let’s take a closer look at the solutions they proposed.

Part of the solution B&C propose can be summarized with their ‘Language Universal 9’:

> <u>U9. Constraint on negating self-dual and monotonically decreasing quantifiers</u>. If a language has a syntactic construction whose semantic function is to negate a quantifier, then this construction will not be used with NP’s expressing monotonically decreasing or self-dual quantifiers.

The first specification of this constraint deals with monotonically decreasing quantifiers. The argument is that for every negated monotonically decreasing quantifier, there exists a non-negative monotonically increasing quantifier that expresses an equivalent meaning (derived from B&C’s Universal 5, p.186). Applying this to our data set in Table 1, B&C would say that instead of expressing #14 and #15 as written, we could simply say: *Many people left* and *some people left* .

The second specification of this constraint focuses on the concept of a dual of a quantifier. B&C define the dual of a quantifier Q on E as, “the quantifier Q defined by Q = {X E | (E - X Q}, i.e. Q = ~(Q~) = (~Q)~. If Q = Q then Q is called *self-dual* “ (p.197). As an example, ||**every man**|| is the dual of ||**some man**|| (the reverse is also true). If a quantifier Q is self-dual then the wide scope reading for the negation is equal to the narrow scope reading (essentially ~Q = Q~). B&C assert that in the case of a self-dual quantifier, using a specific syntactic construction to show that negation has wide scope over the quantified noun phrase is unnecessary. The sentences in #16 and #17 in Table 1 contain self-dual quantifiers (*the man* and *John*), and thus the negated noun phrase constructions should be prohibited in these cases.

In terms of the other examples in Table 1, B&C also mention as an aside that it is possible that #10 and #11 are unacceptable because of the tendency of *each* and *some* to prefer wide scope. They discuss example #13, but offer no solution. This section of their paper (subsection 4.11) seems to be focusing on defining new terms and quantifier universals within the realm of the theory of generalized quantifiers, rather than on providing a general solution to the specific problem of when noun phrases can be negated. As with the proposed extension of Horn's analysis, B&C's solution is questionable in some respects and leaves parts of the data set unexplained.

The first question the analysis raises is the question of the existence of a 'linguistic economy' that would prohibit a syntactic construction expressing a negated monotonically decreasing quantifier because there exists a monotonically increasing quantifier that could express the same meaning. There are many instances in natural language where there are several different syntactic ways of expressing approximately the same meaning. Is negation a special instance of linguistic economy? Another question one could ask about this proposed explanation is whether we would in fact interpret **Not few men left*, to mean *Many men left*, as B&C propose (*many* is the monotonically increasing quantifier that corresponds to *not few*, where *few* is a monotonically decreasing quantifier). This is reminiscent of my argument against the proposition that *not somebody* = *nobody*. Consider the following examples, akin to (8) and (9) above.

(13) Not <u>few</u> men left ... <u>many</u> men left.

(14) Not <u>few</u> men left ... <u>no</u> men left.

Presumably, both (13) and (14) are plausible utterances (with stress placed on the underlined portions), although (13) may perhaps be the more common interpretation (that is, if we can interpret **Not few men left* at all). Can we then say then definitely say that *not few* = *many* ? Thus, it seems that the constraint that focuses on monotonicity is not a satisfactory partial explanation for the current problem.

The biggest hole left open by their argument is the question of the motivation behind the statement that *some* and *each* prefer wide scope readings. They make this claim in a parenthetical statement with no supporting evidence, and so they did not give a good idea why this is true nor why it is applicable in this situation. B&C are implying by this statement that negation *cannot* have wide scope over the quantifiers *each x* and *some x*. This may very well be true, however they provide no insight into **why** this is true[2]. B&C's explanation appears to be an inadequate partial solution, and when one considers that B&C cannot explain why *not most x* is ungrammatical, one is ever more anxious to search for a solution that might handle all of the examples discussed thus far.

A Unified Approach to the Negation of Noun Phrases

I began this project with the hope that there might be some generalization to be made that would distinguish between grammatical and ungrammatical instances of negating noun phrases. I have surmised that a generalization can be made concerning the fact that the quantifiers in the grammatical sentences exhibit the same underlying property that allows them to be legally negated by *not.* To form an initial statement of this generalization, let's take a closer look at the cases of negating *some* and *every*.

*NOT EVERY vs *NOT SOME*

Consider again the following pairs of sentences from Table 1:

#1 Not **every** company expects to report increased earnings.
#11 *Not **some** pesos are offered.

In the case of example #1, there was an expectation or a belief present in the discourse (whether it be on the part of the addressee or some unnamed 'cultural entity') that every company expects to report increased earnings. The speaker is conveying to the addressee that the set of companies that expect to report increased earnings is not the total set of companies. One could say that the size of

[2] This portion of the analysis is very similar to Horn's analysis of why *some...not* sentences cannot have the NEG-Q reading. Horn would say that the wide scope reading is prohibited or restricted by the existence of an inherently negative lexicalized quantifier that expresses the same meaning. The error in an extension of Horn's theory becomes even more apparent when we begin to consider what the equivalent of *not each x* might be. *Some x* does not quite seem to be adequate, and when we continue to consider the issue, we come up empty.

the set that expects to report increased earnings is less than the size of the entire set of companies. If we let the size of the entire set of companies under consideration in the discourse be N, then the size of the set that expects to report increased earnings is some value less than N, namely:

(15) $0 \leq |\{\text{companies that expect to report increased earnings}\}| < N$

When we consider example #11 in this light, the situation is not so transparent. What exactly does **not some* denote? When considering Horn's analysis, I observed that although the most readily apparent interpretation of *not some* is *no*, it is also possible that *not some* can mean *every*. Given the context of the bare *not some* construction[3], it is difficult to distinguish whether the size of the set of pesos that are offered is less than or greater than the size of *some pesos* (the size of *some pesos* is the amount of pesos anticipated to be offered by the person who is the source of the original discourse expectation). If we let the total amount of pesos in this portion of the universe be M, then (16) is the analogous representation of the size of *not some*.

(16) $|\{\text{pesos to be offered}\}| = 0$ or M

This ambiguity is precisely the reason why we cannot negate noun phrases that contain the determiner *some*.

The distinction between the grammaticality of *not every* and the ungrammaticality of *not some* leads us to make the following proposition.

> (Proposition 1). A quantifier Q can be grammatically negated by *not* if and only if there exists a continuous set of possible values for the size of the negated quantified set.

We can then see that *every x* can be negated since the size of the denotation of *not every x* is [0, N-1], while the size of *not some x* is 0 or N, and so *some x* cannot be negated (where N signifies the cardinality of the entire set of *x* s under consideration). Let us now consider how Proposition 1 fares with the remainder of the data set in Table 1.

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[3] By using the term bare, I meant to indicate that the *not* is not being used as part of a complex conjunction such as *not...but*, as was used to clarify the meaning of *not some* in examples (8) & (9) above.

FALLING IN LINE: ALL, MORE THAN X, LESS THAN X, FEW; MANY vs. SEVERAL; MORE THAN HALF vs. MOST

ALL. The behavior of *all* with negation is exactly parallel to that of *every*, as one might expect. In the following sentence from Table 1, the amount of 'NASA's work that will be so auspicious' is some value from 0 to N-1, where N signifies the total size of all of NASA's space-science work. Thus, *all* can be grammatically negated by *not* since the size of its negated quantified set is a continuous range of values, [0, N-1].

#2 Not **all** of NASA's space-science work will be so auspicious, though.

MORE THAN X, LESS THAN X, FEW Y. It is readily apparent why the first and second of these quantifiers are grammatical when negated, and the third is ungrammatical. Consider again the following examples from Table 1:

#8 Not **more than 200** people attended the opening gala celebration.
#9 Not **less than one million** people enjoy listening to ABBA Gold every day.
#14 *Not **few** people came to the meeting.

During the discussion of Barwise & Cooper's (1981) analysis, I suggested that *not few* could mean both *no* and *many* (although intuition may lead one to believe that *many* is the more likely interpretation). As was the case with *some*, the size of the set denoted by the negation of *few* has two possible values, zero or many. We see that *few y* does not satisfy the conditions put forth by Proposition 1, and therefore, it cannot be negated by *not.*

For examples #8, we can quickly see that the size of the set of people that 'attended the opening gala celebration' is somewhere from zero to 200, [0, 200]. Additionally, for example #9, the size of the set of people that 'enjoy listening to ABBA Gold every day' is somewhere between one million and the total human population (= N), or [1,000,000, N]. We see that in both cases, there exists a continuous set of natural numbers that expresses the possible size of the set denoted by the negated quantifier, and so *more than x* and *less than x* can be grammatically negated in subject position.

MANY vs. SEVERAL. As noted earlier, the contrast in grammaticality between the negated *many* and the negated *several* is somewhat surprising considering the fact that their semantic behavior has been equated in other quantifier analyses (e.g., Barwise & Cooper, 1981). However, we can utilize Proposition 1 to tease apart the cause of the disparity. The first step toward understanding the disparity is to ponder the precise difference in meaning between *many* and *several*.

Clearly, both *many* and *several* convey that the quantified set has a value somewhat greater than zero. According to Keenan & Stavi (1986), the communicative utility of sentences containing *many* "does not lie in what they literally say about the world" (p.258). They assert that the speaker is expressing a "value judgment" of the size of the subject involved, and that the use of the word *many* is used to indicate that the size is *significant* in the speaker's world view. Essentially, *many* can denote a set of size anywhere from two to the size of the total set, depending on the given situation, although the speaker is clearly not aware of the exact size. One could also say that the denotation of *several* is strictly a function of a speaker's arbitrary measure, although the difference between the two lies in the upper bound on their denotations. In opposition to *many*, *several* is used to indicate a size of somewhere from two or three to some value <u>less than the total size of X</u>. In summary, both *many* and *several* are vague quantifiers, each can be used to indicate that the number involved is significant in some respect, but only *many* can be used to possibly indicate that a total set was involved.

The difference between *many x* and *several x* results in a difference in the grammaticality of their corresponding negating quantifiers. Reconsider sentences #5 and #12 from Table 1.

#5 Not **many** people came to the meeting last week.
#12 *Not **several** people came to the meeting last week.

In #12, note that there are two possible values for the size of the set denoted by *not several*, less than the value for *several* given by the discourse, or greater than that value. This is very similar to the cases of *few* and *some*. Clearly, both (17a) and (17b) are acceptable possible interpretations of *not several* in #12. It is possible that *not several people* indicates *every person* (17b), since *several* cannot be used to indicate the entire set. Additionally, (17b) provides evidence that the upper bound on the value of *many* is greater than the upper bound on *several*.

(17) a. Not <u>several</u> people came ... <u>few</u> / <u>no</u> people came.
b. Not <u>several</u> people came ... <u>everybody</u> / (<u>many</u> people) came.

The range of sizes for the set denoted by *not several* is not a continuous set of values (the size is either less than or greater than the value of *several*), and so *several* cannot be negated.

On the other hand, the size of the set denoted by *not many* cannot be more than *many*, since it is possible that *many* indicated the size of the entire set (*many* may possibly equal *all*, so *not many* $\neq$*all*). Note the examples in (18) below. The clarification in (18a) sounds redundant, whereas the clarification in (18b) is simply not appropriate.

(18) a. Not <u>many</u> people came ... <u>few</u> people came.
b. *Not <u>many</u> people came ... <u>everyone</u> came.

Hence, *not many* can only denote a set of size less than the value given for *many* by the discourse (if this value is M, in terms of #5, $0 \leq |\{\text{people who came to the meeting last week}\}| < M$, although the size is most likely considerably closer to 0 than to M). This set is a continuous set of values, and so *many* can be grammatically negated.

<u>MORE THAN HALF vs. MOST</u>. The upper bounds on the denotations of *more than half* and *most* plays a key role in the ability of *more than half x* to be negated, while *not most* is ungrammatical. A speaker that utters either of these quantifiers must be aware of the approximate total size of the set of objects X in order to be using them in the appropriate manner (i.e., following the Maxim of Quality, Grice (1975)). When a speaker uses *more than half x,* the addressee understands that the size of the set denoted by *more than half x* could be anywhere from one greater than half of |x| to the size of the entire set. However, *most* means anywhere from greater than 50% of the set to some value less than 100% of the set, depending on the given situation. So, when we try to negate *most*, it is possible that *not most* could mean more than *most* or less than *most* , since *most* cannot indicate that the total set was involved[4] . Again, we find that the negation of a quantifier is ungrammatical exactly when the set that contains the possible values for

[4] Note that *most* <u>can</u> be used logically to indicate *all*, or 100% of the set. However, in a normal discourse, if a speaker wants to indicate that 100% of the set has some property, then the speaker would use *every* or *all*. By using *most*, the speaker may not succeed in conveying the necessary information to the addressee, thereby violating Grice's Maxims (Grice, 1975). The use of *most* to indicate *all* is exceptional, and therefore we are considering the standard use of *most*, which is to indicate anywhere from more than 50% to less than 100% of the set.

the size of the set denoted by the negated quantifier is not a continuous set of positive integral values. As expected, since *more than half* denotes a set of size anywhere from >50% to 100% of the set (i.e., there are no 'two sides' to *more than half*), the possible values for the size of the negated quantifier is a closed, continuous set of values, namely [0, | N/2 |], and so the negation is grammatical.

FRINGE POSSIBILITIES: ANY and BOTH

<u>ANY</u>. The argument for why *any* can be grammatically negated also supports Proposition 1, although the precise 'size' of the negated set is not so much at issue. To get an idea of the denotation of *not any*, Tottie (1991) notes that, "In present-day-English it is only normal to use not-negation at the beginning of a sentence if the meaning is 'not just any'" (p.102). We can extend this statement to assert that a speaker uses the phrase *not any x* to indicate that they have a specific set of individuals in mind who in fact <u>can</u> have the property mentioned in the sentence. To make this clear, consider example (19) below.

(19) Not anybody is allowed to shake hands with the Queen. [from Tottie, 1991, p.102]

In this example, the speaker means to indicate that nobody, except a very specific group of people (possibly only foreign diplomats) is allowed to shake hands with the Queen. With each use of *not any x*, the negated quantified noun phrase denotes a specific, closed set. This falls in line with Proposition 1 in that the range of possible values for the size of the negated set is closed and continuous. Thus, *not any x* is grammatical.

<u>BOTH</u>. The grammaticality of *not both x* also supports Proposition 1, but like *any*, it is slightly different than the previous examples considered in that the size of the negated set is a fixed value. Unlike *any*, however, the speaker who uses *not both* either intentionally or unintentionally ambiguates the subject of the sentence. Consider the following example.

(20) Not both David and Amy came to my party.

The speaker of (20) intends to deny the assertion that the two people mentioned, David and Amy, came to her party. The addressee is to infer that one person, and not the other, did in fact come to the party. The identity of the person who came to her party is ambiguous, however this is unimportant in terms of the ability of *both* to be negated. The set of possible values for the size of the negated set is closed and continuous, in fact the set is equal to {1}, and so the negation of *both x* is grammatical.

DISCOURSE FACTORS: CARDINALS vs A and ONE; NO

At this point, it may have occurred to the reader that if the denotation of the determiner is sandwiched somewhere between zero and the total size of the set involved (and does not include either of those ends), then the determiner cannot be grammatically negated. Thus, one would expect that all cardinal determiners that do not equal zero should be ungrammatical when negated. This is generally true. Take for example (21) below.

(21) *Not two/twenty/300 hundred people came to the movie debut.

However, if the determiner denotes a set of size one, the negation is grammatical.

(22) Not one/a person came to the movie debut.

The grammaticality of *not one x* is rather unexpected, considering the consistency of the data discussed up to this point. However, it is possible that (22) is only grammatical because it has been established among the speakers of the language that this kind of quantifier indicates *none*, or a set of size zero. This is evidenced by the fact that when sentences like (22) are spoken, considerable stress is placed on the determiner, as if to indicate a special interpretation. This emphasis is generally absent in the other cases of grammatical noun phrase negation (not every, not all, not many, not less/more than n) where the range of values for the size of the negated quantified set is unambiguous. Also consider that one can coerce a ‘more than one’ interpretation from *not one*, if a large amount of stress is placed on *one*, and a clarifying phrase is added.

(23) Not **one** person came to the movie debut, (how could you say such a thing?), **hundreds** came.

We can see that the ‘no one’ or ‘none’ interpretation of *not one* is difficult to reverse, and also the meaning of *not a* is such that it cannot possibly be reversed. Note that in reading (22), if the stress on the determiner is absent, the sentence will appear ungrammatical.

To account for these cases, we will have to alter Proposition 1 slightly. The following needs to be added:

> Addition to Proposition 1: Negation of a quantifier is also legal if the set of possible values for the size of the negated set is established unambiguously within the discourse of the language.

The fact that *not no* is ungrammatical (#15 in Table 1) is somewhat puzzling in terms of Proposition 1. We understand *no X* to indicate a set of size zero, and thus the size of the negation of *no* should be any of the values between one and the total size of the set of Xs. However, the use of *not no* is ungrammatical, although its meaning, upon careful consideration, is unambiguous. There are two closely related possible reasons for this disparity. Within natural language, there seems to be a limitation on having two negative elements modifying the same entity within a sentence. This avoidance of double negatives may also be invoked because of the blatant flouting of any sense of linguistic economy. Using two negative morphemes in a row could be easily by-passed by using a single, non-marked positive quantifier such as *some* [5] .

EXTENDING PROPOSITION 1: EACH, THE INDIVIDUATOR

The last determiner I will discuss in this paper is *each. Each x* is a special quantifier in that it not only quantifies X, but it also describes a manner in which the members of X are related to the predicate of the sentence. Take for example the following sentence.

(24) Each citizen is required to pay taxes.

Each indicates that every member of the set of citizens is required to pay taxes. In addition, *each* establishes that the citizens must pay taxes *individually*, that the action cannot be performed as a group. The 'individuating' portion of the meaning of *each* is a necessary component of its meaning. This is not the case with the other universal quantifiers, *every* and *all*.; these universals are unspecified in terms of 'manner'. The sentence *'Everybody went to the game'* could mean that the people went in one large group, different small groups, or individually.

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[5] Admittedly, this explanation is sort of a hybrid of parts of both Horn's (1989) and Barwise &Cooper's (1981) analyses. The negation of 'no' is technically, or logically, sound. However, the constraints of natural language stray from the constraints of logic, and this is a brilliant case of this fact. The morphosyntax rejects 'not no' not because it is uninterpretable, per se, but because there is a restriction against the use of two negative morphemes on a single entity.

The difference between *each* and *every/all* explains the fact that *not each* is ungrammatical, while *not every/all* is perfectly acceptable. With *not each*, it is unclear whether the negation negates the universal quantification portion of *each* or the manner or ‘individuating’ portion of *each*. Witness the following clarification examples, with stress placed on the underlined portions.

(25) a. Not <u>each</u> company is expected to pay taxes....only a <u>few</u> are required to pay them this quarter.
b. Not <u>each</u> company is expected to pay taxes....the companies are all expected to pay the tax as a group.

The ambiguity of the negation of *each* leads to its ungrammaticality. This last example prompts us to further refine and finalize Proposition 1.

<u>Proposition 1</u>
A quantifier Q can be negated by *not* if and only if there exists a continuous set of possible values for the size of the negated quantified set, and Q contains no other aspect of its meaning, other than the quantifying aspect, that could also be negated. Negation of a quantifier is also legal if the set of possible values for the size of the negated set is established unambiguously within the discourse of the language.

Conclusions and Future Research

At the start of this investigation, I introduced several examples of negation of noun phrases in subject position. After presenting a wide range of examples, I then proceeded to explore the adequacy of the analyses of Horn (1989) and Barwise & Cooper (1981) for explaining the patterns in the data. Horn’s discussion focused on the availability of NEG-Q and NEG-V readings for sentences of the form *Q...not*. An extension of Horn’s analysis suggested that noun phrases would only allow negation if there did not already exist an inherently negative lexical item that expressed an equivalent meaning. A discussion of the two possible meanings for *not some* , and other problems with the analysis, led me to abandon an extension of Horn’s analysis as a plausible solution to the problem. After that, I presented the analysis of Barwise & Cooper (1981), which focused on using monotonicity and the self-dual to determine which noun phrases *cannot* be negated. I proceeded to demonstrate that Barwise & Cooper’s analysis was inadequate as it stands as well. As a result of the incompleteness of these two analyses, I decided to proceed on my own, with the hope that a unified analysis might still be possible.

On considering the disparity between the grammaticality of *not every* and **not some*, I made an initial proposition to explain which quantifiers can be legally negated with *not*. After a whirlwind exploration of the behavior of *not* with a wide range of quantifiers, I settled on the proposition that a quantifier Q can be negated by *not* if and only if there exists a closed, continuous set of possible values for the size of the negated quantified set, and Q contains no other aspect of its meaning, other than the quantifying aspect, that could also be negated. The second qualification was added to accommodate for the somewhat aberrant interpretation of *each*, as compared to the other quantifiers in this paper. Additionally, I asserted that negation of a quantifier is also legal if the set of possible values for the size of the negated set is established unambiguously within the discourse of the language. This provision was added to accommodate for the grammaticality of *not any*, as well as the 'unexpected' grammaticality of *not one* and *not a*.

Support for the flavor of my approach can be found in Keenan & Stavi (1986). In a brief discussion of what they term 'negative determiners', Keenan & Stavi assert that negative determiners should be interpreted as the complement of the positive determiner without the negation:

> "In general where Q is a set of properties (a possible full NP denotation) we write Q' for the set of those properties which are not elements of Q. That is, Q' $=_{df}$ P-Q. We may then define those functions we need to interpret "negative" dets as follows: For every function f (from P into P^*), f' (f complement) is that function from P into P* which sends each property s to (f(s))'. (p. 265-66)

My hypothesis can be restated in terms of this view that regards the negated quantifier as the complement of the positive quantifier. I can say very generally that negation of a quantifier Q is grammatical if and only if the complement of Q is a continuous set.

The approach I have presented appears to be a very intuitive theory of the behavior of *not* with noun phrases. Presumably, if I follow the analysis of generalized quantifiers presented in Barwise & Cooper (1981), where every noun phrases is treated as a quantifier, then to fully verify my proposition, I would have to test it against every possible type of noun phrase construction. I am confident at this point that the grammaticality of the negation of these other noun phrase types could be straightforwardly explained using my Proposition 1. At this point, however, I do not have the space to undergo that kind of a thorough proof.

Another interesting associated investigation would be to explore the interaction of NP-negation with focus particles, such as *even*, *only*, and *just*. It appears at first glance that in general, *only* can only be used in coordination with NP-negation in a *not...but* construction (see footnote 1), and *just* can be used in this construction and also between *not* and *any* (as was discussed above). The behavior of *even* is a different story; it seems that *even* can be legally inserted between *not* and any cardinal determiner. Although this also appears to be a very interesting avenue for exploration, it is also left for a future exercise.

One possibility for implementing my hypothesis into a grammar (such as lexicalized TAG) would be to introduce a NEG+ feature for those noun phrases that satisfy the constraints stated in Proposition 1. The categorization of quantifiers presented in proposition 1, the idea of a continuous complement of a quantifier, seems to be relevant only to the ability of a quantifier to be negated. This is most likely a result of the apparent reality that only negation focuses on the complement of a quantifier. Further exploration of this topic as a whole, based on the current investigation, may provide additional insight into the phenomenon of noun phrase negation.

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