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A Note on Negative Polarity and Downward Entailingness

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The background for this small squib is Ladusaw's theory of the distribution of negative polarity items (NPIs). I discuss two sets of examples that don't seem to fit his theory: The first set shows NPIs occurring in environments which, strictly speaking, do not qualify as licensing environments by his criteria. The second set shows NPIs failing to occur in environments which he predicts to license them. I attempt to accommodate both by means of minor amendments that preserve the spirit of Ladusaw's approach.

1. Downward entailingness, conditionals, and a dilemma for Ladusaw

Ladusaw predicts an NPI to be licensed if it is in the scope of a downward entailing (DE) element. DE elements are those that validate the inference pattern of "strengthening" their scopes. E.g. the NP "nobody" is DE because of the validity of (1).

- (1) Nobody ate a green vegetable.
 † Nobody ate brussels sprouts.

Here the predicate "ate a green vegetable", which constitutes the scope of "nobody", has been replaced by the more informative, i.e. "stronger", predicate "ate brussels sprouts". (We call a predicate stronger than another if everything that falls under the former necessarily falls under the latter.) Since the inference is valid, Ladusaw predicts that NPIs may appear in the scope of "nobody", as

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indeed they do:

- (2) Nobody ate anything.

"Everybody", by contrast, is not DE, as witnessed by the invalidity of the following instance of strengthening its scope:

- (3) Everybody ate a green vegetable.
~~||~~ Everybody ate brussels sprouts.

And NPIs are accordingly bad in the scope of "everybody":

- (4)*Everybody ate anything.

Among the many environments that have been observed to typically admit NPIs are the antecedent clauses of conditionals.

- (5) If you put so much as a pinch of salt in this soup,
 I will throw it out.
 (6) If he has ever told a lie, he must go to confession.
 (7) If you had left any later, you would have missed the
 plane.
 (8) If John has stolen the least amount of money, Mary
 has probably noticed it.

If Ladusaw's analysis is to account for such examples, then it must be that "if" is a DE element. In other words, it must be that, whenever q is a stronger proposition than p (i.e. q entails p), (9) is a valid inference schema.

- (9) If p then r .
~~||~~ If q then r .

But is that so? There is one popular analysis of "if...then" that validates (9), namely the analysis which identifies it with the truthfunctional connective of material implication. However, serious objections have been raised against the assumption that all, or even a significant subset of, natural language conditionals can be so analyzed. And one of the most compelling objections has been precisely that many instances of the inference pattern (9) lack the intuitive validity that is expected of them under the material implication analysis.¹ Consider these examples:

- (10) If you put a pinch of salt in this soup, I will
 throw it out.
~~||~~ If you put a pinch of salt and another pound of
 leeks and some more water in this soup, I will
 throw it out.
 (11) If he has told a lie, he must go to confession.
~~||~~ If he has told a lie and shot himself right
 after, he must go to confession.

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- (12) If you had left later, you would have missed the plane.
 // If you had left later and the plane's departure had been delayed, you would have missed it.
- (13) If John has stolen money, Mary has probably noticed it.
 // If John has stolen money and replaced it by forged money, Mary has probably noticed it.

Whatever the correct analysis of conditionals is, it should be compatible with the invalidity of (10) - (13). But then it will not permit Ladusaw to maintain that the NPIs in (5) - (8) are licensed by a DE element taking scope over them.

2. NPI acceptability and limited DEness

If it isn't DEness that licenses the NPIs in the antecedents of conditionals, then what is it? Perhaps we can get a clue by considering some examples where NPIs in the antecedents of conditionals are not okay, and by asking ourselves what distinguishes those examples from the likes of (5) - (8). For instance, why is (17) odd in a way that (14) - (16) are not?

- (14) If you read the New York Times, you are well informed.
 (15) If you read the New York Times, you remain quite ignorant.
 (16) If you read any newspaper at all, you are well informed.
 (17) If you read any newspaper at all, you remain quite ignorant.

I am not saying that (17) has no natural uses. However, it does strike you as odd as long as you take certain commonsensical background assumptions for granted, namely assumptions that amount more or less to (18).

- (18) If using a set A of sources of information makes you well informed, and if B is a superset of A, then using B will also make you well informed.

(14), (15), and (16) are all felicitous in contexts where (18) is taken for granted, but (17) is strange. We may hypothesize that it is the presence of (18) among the background assumptions that licenses the NPI in (16) and rules it out in (17).

Before attempting a more general and more precise formulation of this hypothesis, let me comment on how close it remains to Ladusaw's original proposal. Notice that, with (18) as an additional premise, we can draw from (14) and (16) inferences like the following.

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(19) (14), (18)

‖ If you read the N.Y. Times and Le Monde, you are well informed.

(20) (16), (18)

‖ If you read two newspapers, you are well informed.²

These are instances of strengthening the antecedent, the same inference pattern whose general validity defines DENess. On the other hand, (18) does nothing to validate certain analogous inferences involving strengthenings of the antecedents of (15) or (17):

(21) (15), (18)

‖ If you read the N.Y. Times and Le Monde, you remain quite ignorant.

(22) (17), (18)

‖ If you read two newspapers, you remain quite ignorant.

I suggest that the NPI in (16) is licensed because of the validity of (20), and that for the NPI in (17) to be licensed some inference from (17) to the conclusion of (22) would have to be valid. (This could happen if e.g. instead of (18) one were to presume that reading newspapers decreases information.)

My proposal is like Ladusaw's in that it ties the acceptability of NPIs to the validity of certain strengthening inferences. It differs from his in two ways. A first, fairly superficial and trivial, difference is that I don't require the relevant inferences to be valid out of context, as long as they are valid given whatever auxiliary premises are presupposed on the occasion of utterance. A second and more substantial difference is that I will not require that all strengthenings of the scope of the triggering element be valid, or even contextually valid, inferences. E.g. (23) need not follow from (16), and in fact may well be incompatible with the background assumptions, and still the NPI of (16) may be licensed.

(23) If you read a newspaper and you have a memory like a sieve, you are well informed.

In most natural utterance contexts for (16), (18) will be presupposed and the speaker will accordingly be committed to (20), but hardly to (23). This shows that, even relative to the context, the antecedent of (16) is not a DE environment and yet may contain an NPI. NPIs are already licensed by the sort of "limited DENess" that is reflected in the validity of (20).

Which exactly are the relevant strengthenings (like (20)) as opposed to the irrelevant ones (like (16) ‖ (23))? That appears to depend on what the NPI to be licensed is and where in the "if"-clause it appears. Here is a first attempt to single out precisely

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the inferences whose validity matters for the acceptability of a given NPI: Suppose you have a conditional "if X then Y", where X contains the NPI-occurrence A. Let $X[A/B]$ be just like X, except with A replaced by B. Let c be the set of presupposed background assumptions. Then A is licensed in "if X then Y" if for any B of the appropriate type:

$$(24) \quad c, X[A/B] \rightarrow X, \text{ If } X \text{ then } Y \\ \vdash \text{ If } X[A/B] \text{ then } Y$$

To apply this to examples like (5) through (8) and (16), we assume that "so much as x" means "at least x", "ever" means "(at least) once", "any newspaper (at all)" means "(at least) one newspaper", "any earlier" means "earlier", and "the least amount of" means "a non-null amount of". According to (24), then, the NPIs in (5) - (8) are appropriate because, and insofar as, we understand the speaker to also commit herself to things like these:

- (5') ...and if you put two pinches in, I will throw it out too.
 (6') ...and if he has told lies many times, he also must go.
 (7') ...and if you had left 15 minutes later, you would have missed it too.
 (8') ...and if he has stolen \$10, she is sure to have noticed.

Indeed, we would find it odd if (5) were continued as in (25), and the oddity has to do with the NPI, as shown by (26), which is okay.

- (25) If you put so much as a pinch of salt in this soup, I will throw it out. But if you put two pinches in, it will be fine.
 (26) If you put one pinch of salt in, I will throw it out, but if you put two in, it will be fine.

3. Limited DEness in generics and after "most"

The occurrence of NPIs inside generic NPs challenges Ladusaw's enterprise in much the same way as their occurrence in conditional clauses. The following examples show NPIs in generic bare plurals.

- (27) Students who have ever read anything about phrenology are intrigued by this kind of course.
 (28) Men with any sense avoid installment plans. (Safir 1982)

For Ladusaw's analysis to cover these, the common noun phrase (CNP) in a generic NP ought to be a DE environment, i.e. strengthening to a more informative CNP should always preserve the truth of the generic statement. Generics should be precisely like universally quantified NPs (e.g. with "every") in this respect. However,

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semanticists concerned with the truth conditions of generics have repeatedly observed that generic statements, unlike genuine universal quantifications, are not falsified by the mere existence of a few exceptions. Carlson (1977), to cite just one, says that a sentence like (29) is not falsified by the occasional invalid dog that has lost one or more of its legs.

(29) Dogs have four legs.

Another way of expressing this observation is to say that (29) fails to entail (30).

(30) Dogs that have been in accidents involving chain saws have four legs.

The invalid inference (29) \nVdash (30) is of course an instance of strengthening the CNP, i.e. of the inference pattern whose validity defines DEness.

I propose exactly the same remedy that appeared to resolve the dilemma in the case of conditionals: Not any old strengthening of the CNP needs to be valid to license the NPIs in (27) and (28). It suffices that the speaker can be understood to imply the truth of statements like (27') and (28'), which are obtained by strengthening the CNPs of (27) and (28) only along the scales determined by the NPIs under consideration.

(27') Students who have read articles on phrenology on a few occasions are intrigued by this kind of course.
 (28') Men with an average amount of good sense avoid installment plans.

If this is the right way of looking at the acceptability of (27) and (28), then utterances like (31) below should be accordingly infelicitous, at least under normal assumptions about the correlation between effort and success.

(31) Students who make any effort at all (still) don't pass this test.

Another interesting case in this connection is that of "most" NPs. "Most" is not a DE determiner, since inferences like (32) are invalid.

(32) Most women marry in their early twenties.
 \nVdash Most women with academic careers marry in their early twenties.

Ladusaw welcomes this fact, as it accounts for his judgment concerning (33):

(33) *Most students who had ever read anything about

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phrenology attended the lecture.

On the other hand, Safir (1982) cites (34).

(34) Most men with any brains eat rutabagas.

I do not claim to understand what is going on here. But it may be a relevant observation that normal uses of (34) go along with the presumption of limited DEness: One wouldn't utter (34) without also believing that most men with average intelligence eat rutabagas. Where common background assumptions conflict with such limited DEness, sentences with "most" exhibit a strangeness reminiscent of that in (31):

(35) Most mountaineers with any experience (still) need a guide for this tour.

This leaves (33) unaccounted for. (Notice also that the NPIs it contains make it ineligible for an explanation along the lines of the next section.)

4. NPIs with inherent "even"

So far I have, in effect, liberalized Ladusaw's licensing condition for NPIs so as to admit them in more environments than he could predict. The next group of examples creates the opposite kind of problem: NPIs that Ladusaw definitely predicts to appear are not in fact acceptable. Linebarger (1980) contrasts (36) with (37).

(36) Every restaurant that charges so much as a dime for iceberg lettuce ought to be closed down.

(37) ?? Every restaurant that charges so much as a dime for iceberg lettuce actually has four stars in the handbook.

Both should be good, regardless of whether we take Ladusaw's original analysis or one amended as I have suggested. For note that "every" is DE in the strict sense required by Ladusaw, and a fortiori in the limited sense required by me. Given that "so much as a dime" means "at least a dime" (i.e. "a dime or more"), it is inescapable that whatever holds for every restaurant that charges so much as a dime for iceberg lettuce will also hold for every one that charges 11 or more cents, the latter being a subset of the former.

Intuitively, the pertinent difference between (36) and (37) is that the predicate in (36) is something that applies to restaurants because they charge a dime or more for iceberg lettuce (we understand that that's why they ought to be closed down), whereas the predicate in (37) just happens to apply to those restaurants,

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without regard to, or even in spite of, what they charge for iceberg lettuce. Somehow there seems to be another necessary condition on NPI acceptability in universal statements, namely that the generalization therein reported be a necessary, not just an accidental, generalization.

A closer look at the facts suggests that this additional requirement applies only to a subset of NPIs, including "so much as", but excluding "any" and "ever". The following accidental generalizations are perfectly acceptable:

- (38) Every restaurant that I have ever gone to happens to have four stars in the handbook.
- (39) Every restaurant that advertises in any of these papers happens to have four stars in the handbook.

Patterning with "so much as", we find the so-called "quantificational superlatives" and NPI uses of indefinites as in "say a word" or "bat an eyelash". The following examples have the marginal status of (37) (disregarding any literal, non-NPI, readings that they may permit).

- (40) Yesterday I ran into every cook with the least bit of taste.
- (41) Everyone who ate a single bite was actually wearing bluejeans.

I don't know anything from which it would follow that certain NPIs behave like "any" and "ever", whereas others behave like those in (37), (40), and (41). But I do have a proposal as to what the distinctive property of the latter group consists in. Following Schmerling (1971), I assume that all the NPIs in that group are semantically equivalent to expressions containing the word "even". E.g. "so much as a dime" is equivalent to "even so much as a dime", "the least bit of taste" to "even the least bit of taste", and so on, while "any" and "ever" are not equivalent to "even one" and "even once". It remains to show how, with recourse to this stipulation, the deviance of (37), (40), and (41) can be deduced from familiar semantic properties of "even".

A rough characterization of the meaning of "even" will have to suffice here.³ "Even" has no effect on the truth conditions of a sentence (e.g. "Even George was there" is true just in case "George was there" is true), but it contributes a twofold conventional implicature: (i) that the sentence is also true for some things other than the denotation of the focus constituent (in the example at hand, that "x was there" is also true for some $x \neq$ George), and (ii) that among all the things that are taken to verify the sentence, the denotation of the focus is the least expected to do so (here: that George is the least likely to have been there among all the people presumed to have been there).

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This yields the following predictions for a sentence like "Every restaurant that charges even so much as a dime for iceberg lettuce ought to be closed down": The sentence implies that there are values other than one dime for x which make "Every restaurant that charges x for iceberg lettuce ought to be closed down" true; and furthermore that one dime is less expected than those other values to make it true. In fact, this implicature will be uncontroversial in all ordinary speech contexts, where people take for granted that prices above some limit make the continued existence of a restaurant undesirable, and the higher the prices, the more unsurprising the undesirability. Compare this with the implicature that "even" imposes on a sentence like "Every restaurant that charges even so much as a dime for iceberg lettuce actually has four stars." This implies not only that for some $x \neq 10\text{¢}$ it is true that every restaurant charging x has four stars, but moreover that the verifying values for x are ranked in terms of how highly expected they are to verify the sentence, in such a way that 10¢ ranks at the bottom of the scale. But the presumption of such a ranking is at odds with our understanding that, whatever the value of x , the generalization holds at best accidentally and is equally unexpected to hold for one value and for the next. I suggest that this explains the oddity of such sentences, and that the explanation carries over to (37), (40), and (41) where I assume an invisible "even".

If NPIs really fall into two groups according to whether or not they are obligatorily associated with the characteristic implicatures of "even", we expect to discover further contrasts between the two groups. Consider the following four questions.

- (42) Which of these people has ever fixed your car?
- (43) Which of these people has fixed any of your cars?
- (44) Which of these people has given you so much as a dime?
- (45) Which of these people has the least bit of taste?

It has been observed that the appearance of NPIs in questions often makes them unsuitable as plain unbiased requests for information and instead conveys that the speaker expects a negative answer. But not all NPIs seem to be alike in this respect. Among the four questions above, (44) and (45) must by all means be rhetorical, whereas (42) and (43) can also be understood as neutral. While I have no account of this contrast, it seems to follow the same dividing line that had to be drawn above, with non-rhetorical readings available only for those NPIs that don't incorporate "even".

FOOTNOTES

¹See e.g. Adams (1975) and Lewis (1973), as well as Kratzer (1981), whose examples I have adapted here for my purposes.

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²I am assuming here that "any newspaper at all" is equivalent to "(at least) one newspaper", i.e. that "any" is a cardinality determiner like "one", "two", "many", etcetera. This may not do full justice especially to the "any" that goes with singular count nouns, which perhaps has less to do with amount than with quality.

³For clarification, see Horn (1969), Karttunen and Karttunen (1976), and elsewhere.

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