Is there *any* licensing in non-DE contexts? An experimental study

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We investigate experimentally to what extent readers of sentences containing weak negative polarity items (henceforth wNPIs) in non-downward entailing (non-DE) environments make assumptions about the context. Such reasoning is predicted by a number of theories of polarity licensing. These theories share the idea that wNPIs are licit in a non-DE environment only under specific contextual circumstances. They differ in the properties of the relevant contextual circumstances, giving rise to different predictions. Our experiments test these predictions.

Background. Following Linebarger (1987), it is widely acknowledged that not all occurrences of weak NPIs are occurrences in downward entailing (DE) environments. Among the well-known exceptions are non-monotonic quantifiers, as in (1).

(1) Exactly two of the boxes have anything in them.

Broadly, three approaches to such sentences exist in the literature. On the one hand, cases like (1) could be seen as exceptional in that they are are not actual cases of NPI licensing. Giannakidou (2006) proposes that NPIs are only licensed in non-veridical environments. Since *anything* in (1) is in a veridical environment, this is not an example of *licensing*, but rather of the application of a *rescuing* mechanism: some (but not all) weak NPIs can be rescued by the contextual presence of a parallel sentence that would license the NPI. (For instance, *not many boxes had anything in them* for (1)). Diametrically opposed to this proposal is that of Cnrič (2016), who analyses cases like (1) in terms of a proper licensing mechanism. Crnič argues that wNPIs such as *any* trigger scalar alternatives (roughly: *anything* $\supset$ *two things* $\supset$ *three things* etc.). Such weak scalar items can be licensed by a covert (weak) *even*: that is, wNPIs in non-monotone environments are associates of covert *even*, and are felicitous only if the prejacent of *even* is less likely than any of the alternatives. In other words, (1) is felicitous if it is less likely that exactly two boxes have one thing in them than that exactly two boxes have two things in them. As Crnič shows, this is the case whenever there is the conditional expectation that more boxes have something in them. Finally, Barker (2018) proposes that wNPIs are *scope licensed*: they are items that signal they have narrow scope relative to some other operator. The consequence of scope licensing is that wNPIs are licensed only in non-upward entailing contexts, since in upward entailing contexts wide-scope construals entail the narrow-scope ones. Barker further assumes that scope-licensing needs to be supplemented with contextual constraints. That is, for Barker scope licensing is a necessary yet not a sufficient constraint, but he does not commit to any specific set of such constraints. These three approaches make different predictions, which we tested in two experiments.

Experiment 1. We showed participants (N=42) sentences like (2), where Q stands for one of *at least n*, *at most n*, *exactly n* and *between n and m* (conditions ATLEAST, ATMOST, EXACT, BETW, respecively) and the sentence either contained a DP headed by *any* or the corresponding bare plural (conditions NPI and BARE, respectively).

(2) I didn't expect this, but Q products had (ANY) artificial sweeteners in them.

We asked participants to decide what the writer of (2) expected: whether they expected more products to have artificial sweeteners (HIEXP) or fewer (LOEXP). The **predictions**

are as follows: For Giannakidou (2006), contextual licensing (i.e. *rescuing*) is a general option, available in any veridical environment, and so we expect to find more HIEXP responses for NPI conditions except for NPI+ATMOST (since there the wNPI is already licensed by non-veridicality). Crnič (2016) argues that licensing by covert *even* takes place in non-upward entailing contexts (because the semantic condition on *even*-licensing cannot be fulfilled in an upward entailing context) and so predicts a difference in responses between NPI+ATLEAST on the one hand and NPI+EXACT and NPI+BETW on the other. From Barker's theory it follows that upward entailing contexts cannot host wNPIs. In that sense, his predictions are similar to Crnič. However, since Barker takes scope-licensing only to be a necessary condition, there could be variation in the extent to which scope-licensing quantifiers need contextual reasoning to allow the NPI.

In this experiment (as well as experiment 2 below), we conducted a mixed-effects logistic regression analysis on participants' categorical responses (reference levels: BARE and ATMOST) and obtained the following **results**: The difference between BARE and NPI was found to be significantly bigger for BETW than for ATMOST (interaction effect NPI:BETW: $t = -2.55, p < .05$), but this effect was not significant for EXACT or ATLEAST. This is at odds with Giannakidou's or Crnič's predictions, but compatible with Barker assuming that *exactly* does not need contextual reasoning to license wNPIs, but *between* does.

Experiment 2. We also conducted an acceptability experiment that asked participants (N=36) to judge the acceptability of the sentences that formed the second conjunct of the target sentences of experiment 1. The conditions were the same as in experiment 1 and we asked participants to indicate whether the sentences were acceptable sentences of English or not. **Predictions**: Giannakidou's approach predicts a difference between ATMOST and the other quantifiers - the only condition where the wNPI doesn't need *rescuing*. According to Crnič, one expects a difference between ATLEAST on the one hand and EXACT and BETW on the other hand, since only non-upward entailing environments allow licensing by covert *even*. For Barker, the predictions are more variable: while ATLEAST is predicted to differ from ATMOST, the non-monotonic quantifiers could go either way, depending on whether they need contextual licensing on top of scope-licensing.

Results: Participants judged the difference in acceptability between BARE and NPI to be greater for ATLEAST and for BETWEEN than for ATMOST (respective interaction effects: NPI:ATLEAST: $t = -3.03, p < .01$, NPI:BETW: $t = -2.75, p < .01$), but this effect did not reach significance for EXACT. That is, participants found ATLEAST and BETW, but not EXACT, to be significantly less acceptable than ATMOST. Again, these findings seem consistent only with Barker's predictions, with *at least* being a bad licensor, *exactly* being a good licensor on its own, and *between* being in need of contextual licensing.

Conclusion. DE contexts are the paradigmatic environment for wNPIs, which is successfully captured by NPI licensing theories. wNPIs beyond DE contexts are understood to a far lesser degree. Theories diverge in their predictions outside the DE realm, while the relevant data has been scarce. We distilled the predictions of three NPI licensing theories and conducted an experimental study to assess them.The interaction effect in exp1 for BETW*ATMOST supports what the three theories have in common: wNPIs are governed (at least in part) by contextual factors. The lack of such an effect for EXACTLY, as well as the discrepancy between BETW and EXACTLY in experiment 2 is only in line with Barker's (2018) proposal, though not in a particularly enlightening way. It could be, of course, that our experiments were simply not sensitive enough to pick up effects for *exactly* quantifiers, similar to those for *between*. We are currently running a third experiment, a self-paced reading study, that aims to clarify the status of *exactly*.

References. Barker, C. (2018, to appear). Negative polarity as scope marking. *Linguistics & Philosophy.* **Crnič, L. (2014).** *Natural Language Semantics*, 22, 169–217. **Giannakidou, A. (2006).** *Language*, 82, 575–603. **Linebarger, M.C. (1987)**. *Linguistics & Philosophy*, 10, 325–387.