Crnič, Luka. 2014. "Against a Dogma on NPI Licensing." In: Crnič, L. and U. Sauerland. *The Art and Craft of Semantics: A Festschrift for Irene Heim*, Vol. 1, MITWPL 70, pp. 117–145

Against a Dogma on NPI Licensing *

Luka Crnič

Abstract

Heim (1984) discusses some challenges for a simple theory of NPI licensing that treats NPIs as weak elements that are associates of covert *even*. The crux of these challenges is that NPIs and overt *even* with weak associates have different distributions. The conclusion that has been drawn in light of this difference is that the simple theory of NPI licensing is descriptively inadequate, a conclusion that has hardened into a dogma on NPI licensing. In this paper we argue that a careful scrutiny of the predictions of the simple theory of NPI licensing reveals that the data discussed by Heim are not in fact problematic for the simple theory. This is desirable given its many successes. However, Heim's challenges do turn out to be problematic for our understanding of the distribution of overt *even*. We outline possible ways of reconciling some of the problematic data with the standard assumptions about *even*.

Contents

*Special thanks to Gennaro Chierchia and Danny Fox for discussion and to Roni Katzir and Marie-Christine Meyer for comments on a previous version of the paper. Thanks also to the audiences of the McGill Pragmatics Workshop in May 2013 and From Grammar to Meaning Workshop at Vittoria-Gasteiz in September 2013. The paper expands on some of the discussion in Crnič (2014). I continue to be inspired by the depth and clarity of Irene Heim's work and I am grateful to her for her generosity and patience in conversation and advising over the years. This research was supported by the Israel Science Foundation (grant No. 1926/14).

1 A simple theory of NPI licensing

A major conceptual shift and step forward in our understanding of the restricted distribution of NPIs was made with the discovery that the necessary condition on their distribution can be described by reference to the monotonicity properties of the operators in the scope of which they occur (Fauconnier 1975, Ladusaw 1979) or, as argued for more recently, the environments in which they occur (e.g., Homer 2009, Gajewski 2011). The discovery consisted of the observation that if an NPI occurs in a constituent that is downward-entailing (DE) with respect to it, the NPI may be acceptable; however, if an NPI occurs only in environments that are upward-entailing (UE) with respect to it, it is not acceptable.[1] This observation has been standardly stated as in (1). (We focus on so-called weak NPIs like *any* and *ever* in this paper, see Krifka 1995 for classification, and refer to them simply as NPIs. See Section 7 for a brief discussion of minimizers, another class of NPIs.)

(1) NPI Licensing Condition
An NPI is acceptable only if it occurs in a downward-entailing environment.

Although the NPI Licensing Condition was indispensable for later advances in our understanding of NPIs, it is nonetheless 'merely descriptive.' A theory that would explain the distribution of NPIs – that is, a theory that would correctly predict the distribution of NPIs by relying solely on the meanings and syntactic properties of the items involved – was still needed. One such theory was considered and ultimately rejected by Heim (1984). The theory is alternative-based: it treats an NPI like *any* as an indefinite, defined in (2), that

[1]Entailment, downward-entailingness, and downward-entailing environments are defined in the following way (see e.g. von Fintel 1999, Gajewski 2011, Homer 2012, among others):

(i) Cross-categorial entailment ($\Rightarrow$)
  a. If p, q are truth-values, then $p \Rightarrow q$ iff $p = 0$ or $q = 1$.
  b. If f, g are operators of conjoinable type (that is, a type that ends in t) that take arguments of type α, then $f \Rightarrow g$ iff for all x of type α, $f(x) \Rightarrow g(x)$.

(ii) Downward-entailing function
A function f is DE iff for any x, y such that $x \Rightarrow y$, $f(y) \Rightarrow f(x)$.

(iii) Downward-entailing environment
A constituent X is DE with respect to a sub-constituent Y of type α iff replacing Y with a variable of type α and binding it by a λ-abstractor adjoined as a sister of X yields a DE function.

introduces alternatives that are logically stronger than the NPI, given in (3).[2]

(2) $[\![\textbf{any}]\!]^c = [\![\textbf{one}]\!]^c = \lambda P.\lambda Q.\ \exists x[P(x)\ \&\ Q(x)\ \&\ card(x) = 1]$

(3) $ALT(any) = ALT(one) = \{\lambda P.\lambda Q.\ \exists x[P(x)\ \&\ Q(x)\ \&\ card(x) = n] \mid n{\geq}1\}$

The alternatives introduced by NPIs eventually get utilized by covert *even* that associates with them, say, due to NPIs bearing an uninterpretable feature that must be checked by *even* (cf. Chierchia 2013). *Even* triggers a likelihood presupposition that its propositional argument is less likely than all the relevant alternatives relative to the context of use; it has vacuous assertive import (see Section 5 for a brief discussion of other facets of *even*). We represent the likelihood relation that features in the semantics of *even* with $<_c$ (that is, '$p<_c q$' stands for 'p is less likely than q in the context c') and assume that the relevant alternatives need to be defined in the context for the comparison of their likelihoods relative to that context to be possible.

(4) even(C)(p, w) is defined only if $\forall q \in C$: $p{\neq}q \rightarrow p<_c q$.
If defined, even(C)(p, w) = p(w).

A sentence with *even* counts as felicitous only if its presuppositions are satisfied in the context of the utterance of the sentence. If they are not satisfied, the hearer may try to fix the context so that they are satisfied, especially, that the likelihood presupposition triggered by *even* is satisfied. If the context is not or cannot be fixed in an appropriate way, the sentence is perceived as infelicitous.

We refer to the combination of the assumptions above as the simple theory of NPI licensing. As we will discuss in greater detail below, the simple theory amounts to NPIs like *any* being effectively analyzed as *even one* expressions, where *even* associates with *one*. (We use the term '*even one* expressions' in the following to refer to all configurations involving overt *even* that associates with a weak element in its immediate surface scope for ease of exposition.)

(5) Simple theory of NPI licensing
NPIs are weak elements that are associates of covert *even*.

The simple theory to a large extent accounts for, first, the distribution of NPIs in monotone environments[3] and, second, the context-dependent distribution of NPIs in certain non-monotone environments. We discuss these feats in the remainder of the section.

Monotone environments The distribution of NPIs in monotone environments, which is not context-dependent, is correctly captured by the simple

[2]We assume for simplicity that the alternatives to NPIs are numeral indefinites (cf. e.g. Lahiri 1998 on Hindi NPIs), though other choices are possible and may indeed be preferable (see esp. Krifka 1995, Chierchia 2013 on so-called domain alternatives). The discussion in the main text would be largely unaffected if we made a different choice.

[3]This ignores intervention effects in NPI licensing (see e.g. Linebarger 1987, Guerzoni 2006, Chierchia 2013). We pursue issues pertaining to intervention and the simple theory of NPI licensing elsewhere.

theory of NPI licensing. This follows from two properties of likelihood: (i) a proposition that is stronger than another proposition can be at most as likely as it and (ii) in case two propositions that stand in an entailment relation are not contextually equivalent in a context, the stronger proposition is less likely than the weaker proposition relative to that context.[4]

Our choices above for the meaning of NPIs and their alternatives, together with the property of likelihood in (i), yield the following correct prediction about the distribution of NPIs in UE environments:

(6) Prediction of the simple theory of NPI licensing (1 of 3)
An NPI is unacceptable if it occurs (only) in upward-entailing environments.

Namely, if an NPI in a specific sentence occurs only in constituents that are upward-entailing with respect to it, the alternatives it induces will be stronger than the meaning of the sentence with the NPI and thus at most as likely as it. Accordingly, the semantics of the sentence will be inconsistent: the presupposition of *even*, which will in these cases require stronger alternatives to be more likely than a weaker proposition, clashes with the property of likelihood in (i). This holds for any context in which the sentence with an NPI is uttered (of course, this presumes that there is at least one relevant alternative distinct from the prejacent). This is exemplified in (7). (In our representations of the likelihood presupposition, plain sentences stand for corresponding propositions. And if these sentences contain multiple scope-bearing elements, as in the examples with DE and non-monotone environments below, they should always be disambiguated to the surface scope reading.)

(7) a. *John read any book
b. even(C)(John read any book) is defined only if for all relevant n>1: John read one book $<_c$ John read n books. (inconsistent meaning)

As alluded to above, the source of the unacceptability of the sentence in (7) is the same as the source of the unacceptability of the parallel sentence in which the NPIs is replaced by an *even one* expression, given in (8). In fact, on our assumptions about NPIs provided in (2)-(3), the two sentences have a virtually identical structure and meaning. (We treat both covert and overt *even* as propositional operators for simplicity reasons, Rooth 1992a, and do not distinguish between them in our representations, though they do differ in their PF realization.)

(8) a. *John read even ONE book
b. even(C)(John read one$_F$ book) is defined only if for all relevant n>1: John read one book $<_c$ John read n books. (inconsistent meaning)

[4]Note that a logically stronger proposition need not be less likely than a logically weaker propositon relative to every context, in particular, a logically stronger proposition is not less likely than a logically weaker proposition relative to a context in which the two propositions are contextually equivalent.

In contrast, if an NPI occurs in a constituent that is DE with respect to it, the sentence has a consistent disambiguation. Specifically, if *even* that associates with the NPI is adjoined to the constituent that is DE with respect to the NPI, it will trigger a presupposition that is satisfied in any context in which the meaning of the prejacent of *even*, that is, the sister of *even* at LF, is not contextually equivalent with the relevant alternatives. Namely, in such a context, the prejacent asymmetrically contextually entails the relevant alternatives – and is thus more likely than them in that context according to the property of likelihood in (ii). This is exemplified in (10).

(9) Prediction of the simple NPI theory (2 of 3)
An NPI may be acceptable if it is in a downward-entailing environment.

(10) a. John didn't read any book.
b. even(C)(John didn't read any book) is defined only if for all relevant n>1: John didn't read one book $<_c$ John didn't read n books. (almost trivial meaning)

This explanation extends to parallel sentences in which NPIs are replaced with *even one* expressions if we assume that *even* may be construed as taking scope above negation at LF.

(11) a. John didn't read even ONE book.
b. even(C)(John didn't read one_F book) is defined only if for all relevant n>1: John didn't read one book $<_c$ John didn't read n books. (almost trivial meaning)

We refer to the meaning of *even* given in (4) coupled with the assumption that *even* may be construed at LF in a position different than its base position, the movement theory of *even*.[5]

(12) Movement theory of *even*
Even may undergo covert movement.

Non-monotone environments Linebarger (1980, 1987) observed that the NPI Licensing Condition in (1) is descriptively inadequate. One class of her counterexamples to it consists of NPIs occurring in the scope of non-monotone quantifiers of the form *exactly n NP*.

(13) Exactly two students in my class read any book.

Unlike NPIs in monotone environments, the acceptability of NPIs in these environments is context-dependent. For example, a variant of (13), which differs from (13) only in the numeral contained in the quantifier, is marked in typical contexts (say, in contexts in which my class consists of twenty-five students).

[5]For a detailed discussion of the movement theory of *even* the reader may consult Lahiri (1998) and, for example, Rooth (1985) and Schwarz (2000) for a discussion of some of its issues. We treat the movement of *even* as leaving no trace for simplicity (see e.g. Crnič 2014, footnote 8, for a discussion of a more realistic treatment).

(14) #Exactly twenty students in my class read any book.

Again, the distribution of NPIs in the scope of *exactly n NP* phrases is paralleled by the distribution of *even one* expressions in these environments:

(15) Exactly two students in my class read even ONE book.

(16) #Exactly twenty students in my class read even ONE book.

As in the case of monotone environments, the distribution of NPIs in non-monotone environments is correctly predicted by the simple theory of NPI licensing. Specifically, according to the simple theory, the presuppositions triggered by *even* are predicted to be consistent and context-dependent in the respective sentences. In particular, the presupposition of *even* in (13), provided in (17), is satisfied in contexts compatible with our expectations (or, similarly, contexts compatible with our shared assumptions can be easily accommodated to satisfy it). Since our shared expectation may be that all students in my class read at least one book and that few students read many books, it may well be less likely that exactly two students read at least one book (a proposition which greatly deviates from our expectation that all students read at least one book) than that exactly two students read, say, at least five books (a proposition which does not greatly deviate from our expectation that few students read at least five books).

(17) even(C)(exactly two students read any book) is defined only if for all relevant n>1: exactly two students read one book $<_c$ exactly two students read n books. (plausible meaning)

On the other hand, the presupposition of (14) is not satisfied in contexts compatible with our expectations (nor can it be easily accommodated). Since we expect few students to have read many books, then exactly twenty students reading, say, five books (a proposition which greatly deviates from our expectations) is not more likely than exactly twenty students reading at least one book (a proposition which is close to our expectations).

(18) even(C)(exactly twenty students read any book) is defined only if for all relevant n>1: exactly twenty students read one book $<_c$ exactly twenty students read n books. (implausible meaning)

Since the likelihood presupposition in (18) is not satisfied (nor can it be easily accommodated), the sentence is perceived as infelicitous. Identical reasoning applies to the examples with *even one* expressions in (15)-(16) if we assume the movement theory of *even* on which *even* may take matrix scope. (See Crnič 2014 for details and further discussion of NPIs and *even one* expressions in non-monotone environments.)

(19) Prediction of the simple NPI theory (3 of 3)
An NPI may be acceptable if it is in a non-monotone environment.

Let us summarize. The predictions of the simple theory of NPI licensing do not coincide exactly with the standard description of the distribution of NPIs, given in (1). More to the point, where the predictions of the simple theory of NPI licensing diverge from the standard description, it is the simple theory that turns out to be correct. Thus, the simple theory has much going for it: besides correctly deriving the distribution of NPIs in monotone environments and in at least certain non-monotone environments, it is also transparent with respect to how it provides understanding: the contribution of its core component, covert *even*, allows us to straightforwardly deduce the observed constraints on the distribution of NPIs – that is, *even* triggers an acceptable inference only if the use of an NPI yields a stronger (or, more generally, less likely) meaning than the use of an alternative expression (see Kadmon and Landman 1993 on the intuition that NPI licensing should be explained in terms of strengthening). If this were all there is to the distribution of NPIs, the achievements of the simple theory of NPI licensing could only be judged as overwhelming.

2 Two challenges for the simple theory

The simple theory of NPI licensing appears to face several challenges once one looks at a broader array of data. This has been argued by Heim (1984) who discusses a variety of examples in which the distribution of NPIs and that of *even one* expressions come apart.

Strawson DE environments While there is no contrast in felicity between the sentences containing *any* in (20), there is a contrast in felicity between the parallel sentences containing *even one* expressions in (21) (similar facts obtain in antecedents of conditionals, in generics, in restrictors of certain other quantifiers, and in plural definite descriptions). This is unexpected according to an analysis that effectively treats NPIs as *even one* expressions and that analyzes *even one* expressions as we have done above.

(20) a. Every student who read any book passed the exam.
b. Every student who read any book wore blue jeans.

(21) a. Every student who read even ONE book passed the exam.
b. #Every student who read even ONE book wore blue jeans.

As we will discuss in greater detail in the following section, the discrepancy in the behavior of NPIs and *even one* expressions occurs only in certain environments that are not strictly DE but rather Strawson DE, that is, constituents in which replacing weaker elements with stronger elements yields weaker meanings on the assumption that the meanings of the constituents with stronger elements are defined (see e.g. von Fintel 1999, Gajewski 2011)

Questions Heim notes that NPIs and *even one* expressions also differ with respect to the pragmatic effects that they give rise to in questions: while questions with *even one* expressions induce negative bias (that is, the speaker who utters the question in (22-b) is taken to expect the negative answer that John read no book), the questions with NPIs do not (see Han and Siegel 1997, Guerzoni 2004 for details and caveats).

(22) a. Did John read any book? (both yes and no answers are possible)
 b. Did John read even ONE book? (only no answer is possible)

Diagnosis In light of these two challenges, Heim concludes that the simple theory of NPI licensing cannot be maintained. Her diagnosis became part of the linguistic lore (cf. e.g. Lahiri 1998, Chierchia 2013, among many others).

(23) Heim's Diagnosis
The analysis of NPIs as weak elements that are associates of *even* cannot be maintained since their distribution differs from that of *even one* expressions.

The diagnosis appears to receive further support from the fact that there are expressions whose distribution, in contrast to that of NPIs like *any* and *ever*, is identical to the distribution of *even one* expressions and which may thus be more viable candidates for an analysis along the lines of the simple theory of NPI licensing. These expressions are the so-called minimizers like *budge an inch* and are also discussed by Heim (1984).

The plot The remainder of the paper is dedicated to a re-evaluation of Heim's diagnosis and the challenges that dissuaded Heim and others from adopting the simple theory of NPI licensing as a theory of NPIs like *any* and *ever*. Specifically, we will argue that a more careful scrutiny of the simple theory of NPI licensing reveals that the theory in fact correctly predicts the distribution of NPIs in the environments discussed above.

(24) Re-diagnosis
The analysis of NPIs as weak elements that are associates of *even* can be maintained even though their distribution differs from that of *even one* expressions.

This means that while the simple theory of NPI licensing provides an adequate treatment of NPIs, what we lack is an understanding of the distribution of *even one* expressions (and minimizers) in certain Strawson DE environments and in questions (see also Crnič 2014). Although we do hint at possible factors responsible for the unexpected distribution of *even one* expressions, the main goal of the paper is more modest: it is to argue that the skepticism triggered by the existence of a difference in the distribution of NPIs and *even one* expressions has been misplaced, at least on the assumption that (4) above is a sensible entry for an appropriately distributed covert *even*.

The paper has the following structure: We first address the problematic Strawson DE environments. Section 3 shows that while the pattern in (20) is expected on the simple theory of NPIs, the pattern in (21) is not on the standard assumptions about *even*. Section 4 shows that *even* exhibits unexpected behavior also when it associates with strong elements in the Strawson DE environments discussed by Heim. This behavior has been explained by relying on covert exhaustification. Section 5 shows that recourse to covert exhaustification can also resolve the observed issues for *even one* expressions. Section 6 looks at the distribution of NPIs in questions. We arrive at a similar conclusion as in Section 3: while the simple theory of NPI licensing may correctly predict that NPIs do not exhibit context-dependence in questions, the behavior of *even one* expressions is again unexpected. Section 7 concludes the paper by briefly looking at minimizers.

3 Strawson downward-entailing environments

NPIs do not exhibit context-dependent behavior in restrictors of universal and certain other quantifiers, in definite descriptions, in generics, and in antecedents of conditionals. In contrast, *even one* expressions do exhibit context-dependence in these environments. Consider the examples in (25) and (26) as responses to an inquiry about what different students are wearing: while sentences with NPIs are felicitous responses to such an inquiry (and its ilk), sentences with *even one* expressions are not, at least not in typical contexts.

(25) a. Every student who read any book wore blue jeans.
b. #Every student who read even ONE book wore blue jeans.

(26) a. The students who read any book wore blue jeans.
b. #The students who read even ONE book wore blue jeans.

As stated earlier, the environments in which we appear to observe a discrepancy between NPIs and *even one* expressions are not strictly DE but rather Strawson DE.[6] For illustration, if it is true that the students who read one book wore blue jeans, it does not follow that it is true that the students who read two books wore blue jeans (which would be the case if the restrictor of a definite description would constitute a DE environment). But we may draw this conclusion on the assumption that there are students who read two books (which corresponds to the presupposition of the conclusion), as presented in

[6] Strawson DE environments are defined in the following way (cf. e.g. von Fintel 1999, Gajewski 2011):

(i) Strawson downward-entailing function
A function f is Strawson DE iff for any x, y such that $x \Rightarrow y$ and f(x) is defined, f(y) $\Rightarrow$ f(x).

(ii) Strawson downward-entailing environments
A constituent X is Strawson DE with respect to a sub-constituent Y of type α iff replacing Y with a variable of type α and binding it by a λ-abstractor adjoined as a sister of X yields a Strawson DE function.

(27). The same reasoning holds for parallel examples with universal quantifiers, antecedents of conditionals, etc. (see Barwise and Cooper 1981 for presuppositions of quantifiers and von Fintel 1999 for presuppositions of conditionals). (If not indicated otherwise, we will use the term 'Strawson DE environment' to refer exclusively to environments that are Strawson DE but not strictly DE for reasons of brevity.)

(27) a. The students who read one book wore blue jeans.
b. There are students who read two books.
c. ∴ The students who read two books wore blue jeans.

In the following, we turn to the predictions of, first, the simple theory of NPI licensing and, second, the movement theory of *even* with respect to the distribution of the respective expressions in Strawson DE environments.

Simple theory of NPI licensing On the simple theory of NPI licensing, the sentences in (28) in which an NPI is in the restrictor of a universal quantifier have construals on which covert *even* takes matrix scope and associates with the NPI in the restrictor of the universal quantifier. The likelihood presuppositions induced by *even* in these sentences are provided in (29).

(28) a. Every student who read any book passed the exam.
b. Every student who read any book wore blue jeans.

(29) a. even(C)(every student who read any book passed the exam) is defined only if for all relevant n>1: every student who read one book passed the exam $<_c$ every student who read n books passed the exam. (almost trivial meaning)
b. even(C)(every student who read any book wore blue jeans) is defined only if for all relevant n>1: every student who read one book wore blue jeans $<_c$ every student who read n books wore blue jeans. (almost trivial meaning)

Although not trivial, these presuppositions impose only weak constraints on the context, not least since in contexts in which the relevant alternatives in the domain of *even* in (29) are defined the prejacent of *even* contextually entails them and may thus well be less likely than them. For a concrete illustration, assume a natural context in which the relevant number of books is two and in which there are boys who read at least two books. If it is possible that there is a boy who read exactly one book and didn't wear blue jeans but boys who read two books wore blue jeans, which appears to be an innocuous possibility, the prejacent of *even* asymmetrically contextually entails the relevant alternatives and is thus less likely than them relative to this context. Thus, we see that types of assumptions required to make the presuppositions like (29) true either hold in typical contexts or are readily accommodatable.

This is a welcome prediction of the simple theory of NPI licensing: if *even* that associates with an NPI gives rise to a likelihood presupposition that is almost trivial, the expectation is that the occurrence of the NPI will be felicitous and appear context-independent. This is precisely what we observe with occurrences of NPIs in Strawson DE environments.

(30) Diagnosis (NPIs in Strawson DE environments)
The simple theory of NPI licensing makes the correct prediction that the interpretation of NPIs in Strawson DE environments should lead to almost trivial (readily accommodatable) likelihood presuppositions.

Movement theory of *even* Unlike in the case of NPIs, *even one* expressions exhibit context-dependence in certain Strawson DE environments, that is, in restrictors of universal and certain other quantifiers, in definite descriptions, in generics, and in antecedents of conditionals, as exemplified in (31).

(31) a. Every student who read even ONE book passed the exam.
b. #Every student who read even ONE book wore blue jeans.

On the movement theory of *even*, the sentences in (31) have two disambiguations. On the first one, *even* is interpreted in the embedded clause and triggers an inconsistent presupposition. On the second one, *even* is interpreted at the matrix level by undergoing covert movement at LF. And on this disambiguation its import is identical to the import of covert *even* in the parallel examples with NPIs discussed above, namely, we have assumed that an NPI like *any* denotes a weak element corresponding to *one* and its alternatives are other numeral quantifiers, say, *two, three*, etc.

(32) a. even(C)(every student who read one$_F$ book passed the exam) is defined only if for all relevant n>1: every student who read one book passed the exam < every student who read n books passed the exam. (almost trivial meaning)
b. even(C)(every student who read one$_F$ book wore blue jeans) is defined only if for all relevant n>1: every student who read one book wore blue jeans < every student who read n books wore blue jeans. (almost trivial meaning)

As we have discussed above, the likelihood presuppositions in (32) are consistent and almost trivial. Accordingly, both occurrences of *even one* in (31) should be felicitous and exhibit no context-dependence. This prediction is incorrect.[7]

(33) Diagnosis (*even one* expressions in Strawson DE environments)
The movement theory of *even* makes the incorrect prediction that the intepretation of *even one* expressions in Strawson DE environments should lead to almost trivial (readily accommodatable) likelihood presuppositions.

[7]The data in (31) is problematic not only for the movement theory of *even* but for all existing approaches to *even one* expressions, e.g., for Rooth's (1985) ambiguity theory of *even* (see Schwarz 2000 for discussion).

Let us summarize. Although the distributions of NPIs and *even one* expressions is indistinguishable in many environments, and predicted to be such by the simple theory of NPI licensing and the movement theory of *even*, respectively,

(34) Parallel behavior of NPIs and *even one* expressions
  i. Non-monotone environments (as expected)
  ii. DE environments (as expected)

they come apart in certain Strawson DE environments, specifically, in restrictors of universal and certain other quantifiers, in definite descriptions, in generics, and in antecedents of conditionals.

(35) Distinct behavior of NPIs and *even one* expressions
  i. Certain Strawson DE environments
  (NPIs as expected, *even one* expressions unexpected)

We have argued that the distribution of NPIs is in these environments just as one would expect it to be on the simple theory of NPI licensing, pace Heim (1984). However, the movement theory of *even*, or any other theory of *even* for that matter (see footnote 7), makes false predictions with respect to the distribution of *even one* expressions in certain Strawson DE environments: it predicts that *even one* expressions should be felicitous in these environments, more or less independently of the context in which they are used. Accordingly, although Heim's challenge with respect to Strawson DE environments is legitimate, it affects our understanding of overt *even* and *even one* expressions rather than our understanding of NPIs.

(30) Diagnosis (NPIs in Strawson DE environments)
The simple theory of NPI licensing makes the correct prediction that the interpretation of NPIs in Strawson DE environments should lead to almost trivial (readily accommodatable) likelihood presuppositions.

(33) Diagnosis (*even one* expressions in Strawson DE environments)
The movement theory of *even* makes the incorrect prediction that the intepretation of *even one* expressions in Strawson DE environments should lead to almost trivial (readily accommodatable) likelihood presuppositions.

We have thus achieved the primary goal of the paper relating to Heim's first challenge. In the following section, we discuss another puzzle pertaining to the distribution of *even*. We will put forward that its resolution will gain us traction on the puzzle of the distribution of *even one* expressions just rehearsed by, specifically, raising the possibility that the alternatives that overt *even* quantifies over in the puzzling examples are not quite those that we have assumed so far.

4 A puzzle of *even* with strong associates

There is another, perhaps at first sight unrelated, puzzle pertaining to the distribution of *even* whose associates are in certain Strawson DE environments, specifically, whose associates are in precisely the environments that turned out to be problematic for the existing analyses of *even one* expressions. The puzzle is illustrated by the contrast in (36) where matrix *even* associates with a strong element *all* in the restrictor of a definite description, a Strawson DE environment. (Parallel examples can be constructed with universal and other Strawson DE quantifiers, with generics, and with conditionals. See Crnič 2013 for details.)

(36) a. Even the students who read ALL of the books failed the exam.
b. #Even the students who read ALL of the books wore blue jeans.

This pattern is unexpected on the standard assumptions about the interpretation of plural definite descriptions and the standard assumptions about the semantics of *even*. All else being equal, the likelihood presupposition triggered by *even* should be contradictory in both sentences in (36): in any context in which the prejacents of *even* in (36) can be used they are contextually entailed by all of their alternatives – and so both sentences should be infelicitous. For example, the domain of *even* in the sentence in (36-a) consists of, say, the alternative proposition that the students who read some of the books failed the exam (that is, a focus alternative to the prejacent of *even* in which, roughly, *some* replaces *all*). In a context in which the prejacent of *even* in (36-a) can be used, that is, in a context in which there are students who read all of the books, this alternative contextually entails the prejacent of *even*.

(37) a. The students who read some of the books failed the exam.
b. There are students who read all of the books.
c. $\therefore$ The students who read all of the books failed the exam.

Accordingly, in such a context, the prejacent of *even* cannot be less likely than the relevant alternatives, in contradiction to the likelihood presupposition triggered by *even*. And so the sentence in (36-a) should be infelicitous. (We assume in the remainder of the paper that *all* only has *some* as an alternative for brevity.)

(38) even(C)(the students who read all_{F} of the books failed the exam) is defined only if the students who read all of the books failed the exam $<_c$ the students who read some of the books failed the exam. (inconsistent meaning)

Covert exhaustification The puzzle posed by examples like (36-a) can be resolved by recourse to covert exhaustification: the sentences are acceptable because the alternatives are not in fact those assumed above. For example, in (36-a), the proposition that the boys who read (at least) some of the books failed the exam is not a relevant alternative, but the proposition that the boys who read some but not all of the books failed the exam is one. And these alternatives, which need not be contextually stronger than the prejacent, may be more likely than the prejacent. We elaborate on this proposal in the following (but see Crnič 2013 for details and further discussion).

Covert exhaustification is an operation in grammar that has been argued to be responsible for the computation of scalar implicatures (see e.g. Krifka 1995, Landman 1998, Fox 2007, Chierchia 2013 for discussion of scalar implicatures as a grammatical phenomenon). It is induced by the operator *exh* that, simplistically, takes a proposition and a set of alternatives as its arguments and conveys that the proposition is true and that every alternative in the set that is not entailed by the proposition is false:

(39) $\mathrm{exh(C)(p, w) = p(w)}$ & $\forall \mathrm{q} \in \mathrm{C}$: $\mathrm{p} \not\Rightarrow \mathrm{q} \rightarrow \neg \mathrm{q(w)}$

Accordingly, the sentence in (40) construed with a covert exhaustification operator whose domain consists of the alternatives induced by the scalar item *some* has the meaning provided in (41). This meaning entails the scalar implicature of the sentence: that John did not read all books.

(40) John read some books. $\rightsquigarrow$ John didn't read all books.

(41) exh(C)(John read some books, w) = 1 iff John read some books in w & $\forall$q $\in$ {John read some books, John read all books}: John read some books $\not\Rightarrow$ q $\rightarrow$ $\neg$q(w) iff John read some books in w & John didn't read all books in w.

Just like other operators in grammar, *exh* can be embedded, in principle also in the scope of *even*. In (36), the use of embedded *exh* that associates with the focused element that is also the associate of *even* allows the sentences to have consistent interpretations. Their representations are provided in (42) and (43) where both *even* and *exh* associate with *all*. (Throughout the paper, our tacit assumptions about embedded exhaustification are (i) that *exh* associates only with the associate of *even*, (ii) that *exh* does not use up alternatives, and (iii) that *exh* is not in the immediate scope of *even*. See Crnič 2013 for discussion of these assumptions and their relevance.)

(42) a. Even the students who read ALL of the books failed the exam.

b. [even(C') [[the students$_{\mathrm{x}}$ [exh(C) x read all$_{\mathrm{F}}$ of the books]] failed the exam]]

multiple association

(43) a. #Even the students who read ALL of the books wore blue jeans.

b. [even(C') [[the students$_{\mathrm{x}}$ [exh(C) x read all$_{\mathrm{F}}$ of the books]] wore blue jeans]]

multiple association

The meanings of these structures are consistent because the alternatives to the prejacent of *even* need not contextually entail the prejacent due to the non-monotone nature of covert exhaustification. In fact, the prejacent of *even* may now even contextually entail the alternatives. For example, the domain of *even* in (42) consists of propositions corresponding to the sentences in (44). It may well be that the prejacent, provided in (44-a), contextually entails the relevant alternative, corresponding to (44-b).

(44) a. The students who read all of the books failed the exam.
b. The students who read some but not all of the books failed the exam.

Be that as it may, in typical contexts, in which the number of books you read correlates positively with the likelihood of you passing the exam, it holds that the likelihood of the students who read all of the books failing the exam is lower than that of the students who read some but not all of the books failing the exam (if there are such students). This means that the likelihood presupposition triggered by *even* in (42-b), given in (45), is not only consistent but is easily satisfied in such contexts (or can be easily accommodated) and so the sentence in (36-a) is predicted to be felicitous on the construal with embedded exhaustification.

(45) even(C')(the students $\mathrm{wh_x}$ (exh(C)(x read $\mathrm{all_F}$ of the books)) failed the exam) is defined only if the students who read all of the books failed the exam $<_c$ the students who read some but not all of the books failed the exam. (plausible meaning)

Although the likelihood presupposition triggered in (43-b) is consistent, it is not satisfied in contexts in which there is no correlation between the number of books you read and the likelihood of you wearing blue jeans, which arguably includes typical contexts. So, we have no basis on which to compare the likelihoods of the propositions that the students who read all of the books wore blue jeans and that the students who read some but not all of the books wore blue jeans. To obtain such a basis and for the likelihood presupposition to be satisfied with respect to this basis, we would need to accommodate the assumption that the number of books you read is correlated positively with the likelihood of you wearing blue jeans, which is an odd assumption.

(46) even(C')(the students $\mathrm{wh_x}$ (exh(C)(x read $\mathrm{all_F}$ of the books)) wore blue jeans) is defined only if the students who read all of the books wore blue jeans $<_c$ the students who read some but not all of the books wore blue jeans. (implausible meaning)

The difference in acceptability of the sentences in (36) can thus be explained by recourse to covert exhaustification. If covert exhaustification is applied in the scope of *even* in these sentences, *even* triggers a likelihood presupposition that is consistent and may be satisfied. Moreover, we have shown that the likelihood presupposition of the felicitous sentence is indeed satisfied in typical contexts, while that of the infelicitous sentence is not. Thus, we can conclude that embedded exhaustification is possible in the scope of *even* and may in fact rescue otherwise unacceptable occurrences of *even*:

(47) Condition on exhaustification (version 1 of 3)
Covert exhaustification may apply in the scope of *even*.

Apparent absence of exhaustification However, covert exhaustification does not appear to be able to rescue occurrences of matrix *even* that associate with strong elements in DE environments:

(48) a. #John, an extremely dilligent student, even didn't read ALL of the books.
b. #John failed the exam even without reading ALL of the books.

The infelicity of these sentences is unexpected given our proposal above: exhaustification in the scope of negation and the preposition *without*, respectively, would lead to consistent, context-dependent presuppositions, for example, that John not reading all of the books is less likely than John not reading just some of the books, given in (49). This presupposition may be satisfied in contexts in which John is known to be a dilligent, hard-working student.

(49) even(C')(not (exh(C)(John read all_F of the books))) is defined only if John didn't read all of the books $<_c$ John didn't read some but not all of the books. (plausible meaning)

There is a well-known fact about the distribution of *exh* in DE environments: embedded scalar implicatures tend to be unavailable (or, at least, less robust) in them than in some other environments, in particular, in certain Strawson DE environments (see e.g., Horn 1989, Levinson 2000, Fox and Spector 2009).

(50) Exhaustification in DE environments
Covert exhaustification is not readily available in DE environments.

We suggest that this independent, poorly understood fact about the distribution of *exh* is the source of the apparent inability (or, at least, difficulty) of *exh* to rescue occurrences of matrix *even* that associates with strong elements in DE environments. Accordingly, we slightly modify our descriptive generalization about the distribution of *exh* in the scope of *even*:

(51) Condition on exhaustification (version 2 of 3)
Covert exhaustification may apply in the scope of *even* (if it can apply).

Let us summarize. Although the distribution of matrix *even* that associates with strong elements is to a large extent correctly predicted by our assumptions about *even*,[8] there are some environments for which our assumptions about

[8]We have not discussed pertinent examples of strong associates of matrix *even* in non-monotone environments, though they can be easily constructed. For example, imagine a class

even yield false predictions – they yield false predictions if the strong associates of *even* are in certain Strawson DE environments like restrictors of universal quantifiers, definite descriptions, etc.

(52) Expected behavior of matrix *even* with embedded strong associates
  i. Non-monotone environments (context-dependent)
  ii. DE environments (infelicitous)

(53) Unxpected behavior of matrix *even* with embedded strong associates
  i. Certain Strawson DE environments
  (context-dependent, predicted to be infelicitous)

We have shown that an invocation of embedded exhaustification allows us to account for the unexpected behavior.[9] The proposal predicts that we will find felicitous sentences in which matrix *even* associates with strong elements in DE environments as well, which is not borne out. We have tentatively ascribed the inability (or difficulty) of *exh* to rescue these cases to an independent constraint on the distribution of *exh* in DE environments.

We now return to the puzzle of context-dependence of *even one* expressions in certain Strawson DE environments. We argue that the resolution of the puzzle of *even* with strong associates, developed in this section, can be extended to *even one* expressions, specifically, by treating their context-dependence as a side-effect of embedded exhaustification. Although embedded exhaustification appears not to be a rescue mechanism in these cases, unlike in the present section, we suggest that, contrary to these initial appearances, it may nonetheless be such a mechanism.

5 A puzzle of *even* with weak associates

If the sentences in (31), repeated below,

---

of twelve students in which two extremely diligent student always do all of their homework but no other student tends to do any of their homework. On these assumptions, the sentence in (i-a) is judged as a felicitous description of an unusual day at school, while the sentence in (i-b) is judged as an infelictous description of a usual day at school. It can be shown that while the likelihood presupposition of (i-a) is satisfied in the context just described, the likelihood presupposition of (i-b) is not, accounting for the contrast between the sentences.

(i) a. Today it's even the case that exactly ten of the twelve students did ALL of their homework.
  b. #Today it's even the case that exactly two of the twelve students did ALL of their homework.

[9] Of course, an invocation of covert exhaustification also has its costs. For example, it raises non-trivial issues for our understanding of unembedded occurrences of *even one* expressions: if covert exhaustification were to occur in the scope of *even* in sentences with unembedded *even one* expressions, the likelihood presupposition triggered by *even* would be contingent rather than contradictory, and thus the occurrence of an *even one* expression may be felicitous. We touch on this and related issues in Crnič (2013) and plan to develop a fuller treatment of them elsewhere. In this paper, we will pretend that they do not exist.

(31) a. Every student who read even ONE book passed the exam.
b. #Every student who read even ONE book wore blue jeans.

are parsed with embedded *exh* and with *even* taking matrix scope, given in (54), their meanings will correspond to those of the sentences in (55). Namely, the import of embedded exhaustification that associates with the weak element *one* parallels the import of *exactly*.

(54) a. [even(C') [everyone wh_x [exh(C) x read one_F book] passed the exam]]
b. [even(C') [everyone wh_x [exh(C) x read one_F book] wore blue jeans]]

(55) a. Every student who even read exactly ONE book passed the exam.
b. #Every student who even read exactly ONE book wore blue jeans.

The movement theory of *even* can explain the contrast between the sentences in (55) (and would thus be able to explain the contrast between the sentences in (31) if they obligatorily had the parses in (54)). If *even* is construed as taking matrix scope, the presuppositions of the two sentences are the following:[10]

(56) a. even(C')(everyone who read exactly one_F book passed the exam) is defined only if for all relevant n>1: everyone who read exactly one book passed the exam $<_c$ everyone who read exactly n books passed the exam. (plausible meaning)
b. even(C')(everyone who read exactly one_F book wore blue jeans) is defined only if for all relevant n>1: everyone who read exactly one book wore blue jeans $<_c$ everyone who read exactly n books wore blue jeans. (implausible meaning)

These presuppositions are consistent. However, they are not both satisfied in typical contexts. On the one hand, in typical contexts, in which the number of books you read is positively correlated with the likelihood of you passing the exam, it is true that everyone who read exactly one book passing the exam is less likely than everyone who read, say, exactly five books passing the exam. This means that the likelihood presupposition in (56-a) is satisfied in such contexts. On the other hand, for it to hold that everyone who read exactly one book wore blue jeans is less likely than everyone who read, say, exactly five books wore blue jeans it would have to hold that the number of books you read is positively correlated with the likelihood of you wearing blue jeans. Since this is not typically the case, the likelihood presupposition in (56-b) is not satisfied in typical contexts. Thus, if we were to assume that the sentences in (31)

[10] In line with footnote 9, we are pretending that we understand why the sentences in (55) are parsed with *even* taking matrix scope rather it than being interpreted in the embedded clause above *exh* (note that if *even* were interpreted in this configuration in the two sentences, we would get consistent likelihood presuppositions in the sentences but we would not be able to explain their contrast in felicity). We suggest that whatever explains the infelicity of unembedded *even one* expressions is arguably also behind the observed disambiguation of the sentences in (55).

are parsed as in (54) (whose likelihood presuppositions are identical to those provided in (56)), we would correctly predict the observed contrast in felicity between them. We will suggest below that they indeed have the parses with embedded exhaustification, which we will attempt to motivate by relying on an independent requirement on the distribution focus-sensitive expressions.

Absence of context-dependence If no covert exhaustification applies in the scope of *even* in (Strawson) DE environments, its likelihood presupposition may be almost trivial, as we discussed in Section 3. This appears to be the case in sentences where the weak associate of *even* is in a DE environment. For example, if exhaustification would apply in the scope of *even* in the examples in (57), we would expect them to be infelicitous in typical contexts, specifically, in contexts in which we expect John to eat many cookies.

(57) a. John, a notorious lover of cookies, didn't eat even ONE cookie.
b. John, a notorious lover of cookies, went to bed without eating even ONE cookie.

In such contexts, the likelihood presuppositions of the sentences on the parses with embedded exhaustification, exemplified in (58), are infelicitous.

(58) even(C')(not (exh(C)(John ate one_F cookie))) is defined only if for all relevant n>1: John didn't eat exactly one cookie $<_c$ John didn't eat exactly n cookies. (implausible meaning)

Since the sentences in (57) (and their ilk) are felicitous, we have to assume that we do not have embedded exhaustification in the scope of *even* in these examples.

Obligatory exhaustification We have seen that the distributional pattern of *even one* expressions mirrors what we observed in the preceding section with respect to the behavior of *even* that associates with strong elements, summarized in (52)-(53), where unexpected behavior was also found only with associates of *even* in certain Strawson DE environments.[11]

(59) Expected behavior of *even one* expressions
i. Non-monotone environments (context-dependent behavior)
ii. DE environments (context-independent behavior)

(60) Unexpected behavior of *even one* expressions
i. Certain Strawson DE environments
(context-dependent behavior)

And we have shown that this unexpected behavior can be captured by relying on embedded exhaustification (recall our discussion of (54)–(56)), which may

[11]Recall that non-monotone environments have been discussed in Section 1 where it was shown that the movement theory of *even* can adequately account for the distribution of *even one* expressions in them without invoking exhaustification.

be absent in cases in which we find expected behavior of *even one* expressions. However, for this account of the distribution of *even one* expressions in certain Strawson DE environments to be descriptively adequate, we need to assume that embedded exhaustification is obligatory in these environments (and absent or optional in other environments). This means that we need to reformulate our descriptive condition on the distribution of *exh* in the scope of *even* from it being an optional, rescuing, operation (to the extent it can apply)

(51) Condition on exhaustification (version 2 of 3)
Covert exhaustification may apply in the scope of *even* (if it can apply).

to it being an obligatory operation (to the extent it can apply):

(61) Condition on exhaustification (version 3 of 3)
Covert exhaustification must apply in the scope of *even* (if it can apply).

Although this condition may allow us to capture the observed behavior of *even one* expressions, a satisfactory theory of the distribution of *even* should aim at the deeper question of why *exh* should be obligatory in the pertinent environments and at most optional in other environments. While we cannot answer this question completely here, we allude to one possible line of explanation according to which all observed applications of *exh* in the scope of *even* turn out to be rescuing operations.

Motivating obligatory exhaustification We propose to derive the obligatory exhaustification of *even one* expressions in certain Strawson DE environments from an economy principle that prohibits vacuous occurrences of (overt and covert) focus-sensitive expressions (cf. e.g. Crnič 2011b, Spector 2013).

(62) Principle of non-vacuity
An occurrence of a focus-sensitive expression is felicitous only if its semantic import is non-vacuous or if it is required on structural grounds.

We propose that the semantic import of a focus-sensitive expression is non-vacuous if there are contexts in which the alternatives over which the expression quantifies are defined and the structure to which it is adjoined to can be used but does not contextually entail the meaning of the structure with *even*.

(63) Non-vacuous semantic import
An occurrence of a focus-sensitive expression, F, has non-vacuous import with respect to its argument S and a set of alternatives C if there is a context c in which S can be used and in which the alternatives in C are defined such that $\mathrm{S} \not\Rightarrow_{\mathrm{c}} \mathrm{F(C)(S)}$.

To be able to explore the consequences of the principle of non-vacuity, we need to first specify when an expression can be used in a context. One important factor in determining whether an expression can be used in a context is the principle of Maximize Presupposition (cf. Heim 1991, Percus 2006, Sauerland

2006, Singh 2011, among others). For example, the fact the sentence in (64) cannot be used is explained by it having an alternative, given in (65), that is contextually equivalent with it but triggers a stronger presupposition than it, namely, that there is a unique sun.

(64) #A sun is shining.

(65) The sun is shining.

Maximize Presupposition, stated in (66), dictates that if there is a contextually equivalent alternative to an expression that is presuppositionally stronger than the expression and can be used in the context, then it has to be used instead of the expression. In the case of (64) and (65), this means that you have to use the alternative in (65) rather than the alternative in (64).

(66) Maximize Presupposition
If S and S' are contextually equivalent alternatives, and the presuppositions of S asymmetrically entail those of S' and are satisfied in the context, then you must use S.

Maximize Presupposition has appreciable consequences for the use of Strawson DE operators. For concreteness, we will zoom in on universal quantifiers used in our examples, though the conclusions we reach extend to other Strawson DE operators. For example, Maximize Presupposition dictates that for any context in which *Every student who read one book VP* can be used and in which, say, the alternative *Every student who read two books VP* is defined, where *VP* stands for an arbitrary VP, it has to hold that *Every student who read one book VP* asymmetrically contextually entails *Every student who read two books VP*.

(67) a. Every student who read one book VP.
b. Every student who read two books VP.

If this were not the case, the two alternatives would be contextually equivalent and Maximize Presupposition would require the use of the alternative with the stronger presupposition, *Every student who read two books VP*, instead of *Every student who read one book VP*.

(68) a. Presupposition of (67-a): There are students who read one book.
b. Presupposition of (67-b): There are students who read two books.

An illustration of this is provided in (69) where the relevant alternatives are contextually equivalent and so the alternative with the stronger scalar item must be used.[12]

(69) [For someone to be admitted to the elite school they had to either read

[12] Note that this reasoning may also constitute an alternative derivation of infelicitous examples discussed by Magri (2011) in which a weak complement of a Strawson DE operator is contextually equivalent to its alternatives. An investigation of the relation of the proposal sketched here to Magri's proposal is left for another occasion.

at least two books or write at least two essays on their intellectual influences:]

a. #Every student who read one book did well.
b. Every student who read two books did well.

A consequence of this for the likelihood relation between the two alternatives, *Every student who read one book VP* and *Every student who read two books VP*, in a context in which both alternatives are defined is that the former alternative (that every student who read one book VPs) is less likely than the latter alternative (that every student who read two books VPs). Now, we have assumed that the sentences in (31), repeated below, must be construed with *even* taking matrix scope to have consistent meanings, provided in (71).

(31) a. Every student who read even ONE book passed the exam.
b. #Every student who read even ONE book wore blue jeans.

(70) a. [even(C) [every student who read one_{F} book passed the exam]]
b. [even(C) [every student who read one_{F} book wore blue jeans]]

However, given our discussion just now, the occurrences of *even* in (70) will be semantically vacuous: in any context in which the prejacent of *even* can be used and in which relevant alternatives to it are defined, it holds that the prejacent of *even* contextually entails the meaning of the sentence with *even* (they already have the same assertive import and the likelihood presupposition follows from the fact that the prejacent can be used in the respective context):

(71) For any context c in which *Every student who read one book VP* can be used and in which the relevant alternatives in C are defined the following holds: every student who read one book VP $\Rightarrow_{c}$ even(C)(every student who read one_{F} book VP).

Since *even* is not required on any structural grounds in the sentences in (31), this means that the sentences cannot have parses that would allow them to be context-independent, in particular, the parses entertained in (70) – at least not without violating the principle of non-vacuity.

(72) a. Every student who read even ONE book passed the exam.
b. #[even(C) [every student who read one_{F} book passed the exam]]

(73) a. #Every student who read even ONE book wore blue jeans.
b. #[even(C) [every student who read one_{F} book wore blue jeans]]

We can avoid a violation of the principle of non-vacuity in the sentences in (31) by using covert exhaustification. Specifically, on a parse on which *Every student who read one book VP* is generated with an embedded *exh* that associates with the focused element the sentences readily satisfy the principle of non-vacuity: on this construal the focused element is in a non-monotone environment and, accordingly, the alternatives it induces will be mutually independent in many contexts in which they are defined.

(74) a. Every student who read even ONE book passed the exam.
b. [even(C') [every student wh_x [exh(C) x read one_F book] passed the exam]]

(75) a. #Every student who read even ONE book wore blue jeans.
b. [even(C') [every student wh_x [exh(C) x read one_F book] wore blue jeans]]

And as we have discussed extensively in the preceding paragraphs, the parses along the lines of (74)-(75) yield precisely the observed context-dependence that *even one* expressions exhibit in certain Strawson DE environments.

The reasoning described above does not extend to DE environments, that is, the principles of grammar do not conspire to necessitate embedded exhaustification in the scope of *even* if *even one* expressions occur in DE environments. The crucial difference between DE and Strawson DE environments lies in the fact that the latter but not the former are presuppositional. Acordingly, Maximize Presupposition does not constrain when a specific alternative induced by a focused element in a DE environment can or cannot be used. For example, it does not require us to select one of the alternatives in (76) when they are contextually equivalent.[13]

(76) [Whenever John eats a cookie, he eats the whole box of cookies:]
a. John didn't eat one cookie.
b. John didn't eat two cookies, etc.

Accordingly, there are contexts in which the two alternatives in (76) are contextually equivalent but still the first alternative can be used. Clearly, in such contexts, the sentence *John didn't eat one cookie* does not contextually entail *John didn't eat even one cookie* – this is due to the fact the presupposition of *even* is not satisfied in this context, namely, the prejacent of *even* is ex hypothesi contextually equivalent to the relevant alternative and thus cannot be less likely than it. This means that we are not required to exhaustify *even one* expressions in DE environments because *even* is semantically non-vacuous in these cases. For example, the sentence in (77-a) may have the structure in (77-b)

(77) a. John didn't eat even ONE cookie.
b. [even(C) [not [John ate one_F cookie]]]

and trigger a likelihood presupposition that is almost trivial (e.g., it is satisfied in any context in which it is possible that John ate exactly one cookie). Accordingly, *even one* expressions are not predicted to exhibit context-dependence in DE environments.

(78) even(C)(John didn't eat one_F cookie) is defined only if for all relevant n>1: John didn't eat one cookie $<_c$ John didn't eat n cookies. (almost

[13]The relation of this reasoning to Magri (2011) is again pertinent but will not be explored here (see footnote 12).

trivial meaning)

Obligatory exhaustification and NPIs Since NPIs do not induce context-dependence in Strawson DE environments, it must hold that embedded exhaustification need not apply to them in these environments. This is admitted by the principle of non-vacuity since that structures with NPIs are ill-formed if they lack *even* (recall the assumption that NPIs bear uninterpretable features that need to be checked by *even*). This means that the following structures, on which *even* has a vacuous semantic contribution, are licit because the presence of *even* is required on structural grounds. And this explains the difference in context-dependence between *even one* expressions and NPIs in Strawson DE environments – only with the former expressions is embedded exhaustification mandated by independent principles in grammar.

(79) a. Every student who read any book passed the exam.
b. [even(C') [every student who read one_{F} book passed the exam]]

(80) a. Every student who read any book wore blue jeans.
b. [even(C') [every student who read one_{F} book wore blue jeans]]

Additive inferences We have seen that if we rely on embedded exhaustification in certain Strawson DE environments, we can correctly capture the context-dependence of *even one* expressions. In the remainder of the section we discuss an obvious issue with this proposal: the predicted assertive meanings of the sentences on the parses with embedded exhaustification are too weak. For example, if the following sentence is parsed with *even* taking matrix scope and *exh* taking embedded scope, both associating with the focused element,

(81) a. Everyone who read even ONE book passed the exam.
b. [even(C') [everyone wh_{x} [exh(C) x read one_{F} book] passed the exam]]

the assertive meaning of the sentence is that everyone who read exactly one book passed the exam. This meaning is weaker than what the sentence actually conveys, namely, that everyone who read any number of books passed the exam.

We tentatively ascribe this stronger meaning to the elusive additive inference accompanying scalar particles like *even*. For example, a sentence like (82-a) gives rise to the inference in (82-b) or perhaps the inference in (82-c), which have been called 'additive inferences' (see e.g. Karttunen and Peters 1979 on the existential formulation and van Rooy 2003 on the universal formulation).

(82) a. John read even SYNTACTIC STRUCTURES.
b. John read some relevant book other than Syntactic Structures.
c. John read all revant books other than Syntactic Structures.

In the case of the sentence in (81) on the construal with embedded exhaustification, these inferences would correspond to those in (83), which brings us closer to the desired meaning, especially, if we adopt the universal formulation of the additive inference.

(83) a. Everyone who read even ONE book passed the exam.
b. For some n>1: everyone who read exactly n books passed the exam.
c. For all n>1: everyone who read exactly n books passed the exam.

The nature of these inferences has been disputed, specifically, it is controversial whether they should be analyzed as presuppositional or arising from pragmatic reasoning (see e.g. Rullmann 1997, Guerzoni 2003, Crnič 2011a, Wagner 2013 for discussion). Since an adequate investigation of this question is beyond the scope of this paper, we content ourselves with the stipulation that the additive inferences, no matter whether they are represented in grammar or derived pragmatically, are responsible for the observed strong meanings of the sentences under discussion.

Let us summarize. While the distribution of NPIs in non-monotone, DE and Strawson DE environments was shown to be correctly captured by the simple theory of NPI licensing, the movement theory of *even* runs into empirical problems with occurrences of *even one* expressions in certain Strawson DE environments. We suggested that the distribution of overt *even* in these environments is partly determined by obligatory covert exhaustification, building on some insights from our discussion of *even* with strong associates in Section 4. We sketched how the obligatoriness of *exh* in Strawson DE (but not DE) environments may spring from an independent constraint on focus-sensitive expressions, the principle of non-vacuity.

In the following section we turn to the distribution of NPIs and *even one* expressions in questions. While the former expressions largely do not exhibit context-dependence, the latter expressions do, in the form of negative bias. This is unexpected on the existing approaches to questions if combined with the current approaches to NPIs and *even*, including but not only the simple theory of NPI licensing and the movement theory of *even*. On some approaches to questions neither NPIs nor *even one* expressions are predicted to induce context-dependence (negative bias). Given these approaches, we may capture the distribution of *even one* expressions by employing a similar strategy that we put forward in this section: an additional mechanism forces context-dependence of *even one* expressions.

6 A puzzle about questions

Heim's second challenge for the simple theory of NPI licensing relates to the fact that NPIs and *even one* expressions exhibit distinct behavior in questions, exemplified in (22), repeated below. This difference has been taken to be problematic for the simple theory of NPI licensing.

(22) a. Did John read any book? (both yes and no answers are possible)
b. Did John read even ONE book? (only no answer is possible)

Whether this is a correct diagnosis depends on our assumptions about syntax and semantics of questions. There are two main types of approaches to how the behavior of NPIs and *even one* expressions should be captured in questions. They have been developed by focusing on different subsets of the phenomena under discussion in this paper, specifically, by either focusing only on *even one* expressions (esp. Guerzoni 2004) or by focusing only on NPIs (esp. Nicolae 2013, Guerzoni and Sharvit 2014). While these narrow foci have been justified by the assumptions and goals of the respective authors,[14] the approaches can be shown to either systematically under- or overgenerate once one takes into account both NPIs and *even one* expressions. More to the point, independently of what theory of NPI licensing one assumes, we show in the following that one type of approach to questions predicts that both NPIs and *even one* expressions should trigger negative bias in questions, while the other type of approach predicts that neither NPIs nor *even one* expressions should.

If these latter approaches to questions are adopted, on which no bias is predicted, the simple theory of NPI licensing would correctly capture the data (NPIs do not induce bias) but the movement theory of *even* would not (*even one* expressions do induce bias). Of course, this mirrors the position we found ourselves in when looking at NPIs and *even one* expressions in certain Strawson DE environments, namely, it leaves us with an incomplete understanding of the behavior or overt *even*. But recall that we were able to make steps towards a more complete understanding of the distribution of *even one* expressions in certain Strawson DE environments. While we believe that a similar strategy could be pursued in the case of questions, we will not be as ambitious in this section. (We abstract away as much as possible from the technical details of the approaches in the following and focus solely on yes/no questions for reasons of simplicity. See also Crnič 2014 for discussion.)

Answers to questions approach The first type of approach can be found in the work of Guerzoni (2003, 2004), who focused on the distribution of *even one* expressions (and minimizers) in questions. She derives the bias that *even one* expressions induce in questions like (84-a) from them having structures that yield meanings like the one given in (84-b), which is a set containing the positive and the negative answer to the question in (84-a). As discussed in Section 1, only the negative answer, corresponding to *John didn't read even one book*, is consistent. This explains the negative bias induced by *even one* expressions in questions – only the negative answer to the question is admitted in the context.

(84) a. Did John read even one book?
b. {#even(C)(John read one_F book), even(C')(John did not read one_F

[14]On the one hand, Guerzoni (2004) does not discuss the distribution of NPIs in questions and, accordingly, makes no assumptions about the mechanisms involved in their licensing and interpretation. On the other hand, Nicolae (2013) and Guerzoni and Sharvit (2014) either assume that *even* is not involved in NPI licensing or they make no assumptions about the mechanisms involved in NPI licensing (and rely solely on the NPI Licensing Condition), respectively.

book)}

(negative bias is predicted)

However, extending this analysis of questions with *even one* expressions to questions with NPIs, we are faced with a conundrum: any approach to NPIs that derives their unacceptability in UE environments from them giving rise to inconsistent meanings (e.g., by treating them as weak associates of *even*) will make the false prediction that only negative answers should be acceptable to questions containing NPIs.[15] This is schematically represented in (85-b) where M is a place-holder for the relevant NPI licensing mechanism, say, *even*, represented in (85-c).

(85) a. Did John read any book?
b. {#M(John read any book), M(John didn't read any book)}
c. {#even(C)(John read one$_{\mathrm{F}}$ book), even(C')(John didn't read one$_{\mathrm{F}}$ book)}

(negative bias is predicted)

Environments in questions approach The second type of approach can be found in the recent work of Nicolae (2013) and Guerzoni and Sharvit (2014), who focused on the distribution of NPIs in questions. On this type of approach, there is an environment in questions that is (Strawson) DE and in which an NPI may felicitously occur. This is schematically represented in (86) where OP is a place-holder for an operator that induces a Strawson DE environment.

(86) a. Did John read any book?
b. $[\text{Q} \ldots \underbrace{[\text{OP [John read any book]]}}_{\text{(Strawson) DE environment}}]$

While the approaches of Nicolae and Guerzoni & Sharvit differ with respect to the nature of the operator that induces the (Strawson) DE environment as well as in other details, they both in principle allow for the mechanism responsible for NPI licensing, say, covert *even*, to scope above the operator. The same holds for *even* that occurs in *even one* expressions.

(87) a. [Q ... [M [OP [John read any book]]]]
b. [Q ... [even(C) [OP [John read one$_{\mathrm{F}}$ book]]]] (negative bias is not predicted)

The likelihood presupposition triggered by *even* in such a configuration, in which *even* and its weak associate are separated by a (Strawson) DE operator, depends on the nature of the intervening operator. For example, if the operator is negation, as assumed by Guerzoni and Sharvit (2014), the likelihood presupposition triggered by *even* will be almost trivial, as discussed in Section 1. Accordingly,

[15] This prediction can of course be avoided by assuming that NPIs in questions are licensed by operators other than those that license them in declarative sentences (see e.g. Krifka 1995).

we have no grounds on such an approach to assume that either NPIs or *even one* expressions should trigger negative bias in questions.

But since our conclusions are based on a significant simplification of the existing approaches, perhaps to the extent that we omitted an aspect of them that might deliver negative bias, let us be a bit more explicit about one of these approaches, Guerzoni & Sharvit's approach, which they develop in their contribution to this volume. They propose that polarity questions have structures along the lines of (88) where the positive and the negative answer to the question are both represented in the syntax of the question, conjoined by a covert disjunctive operator. Besides covert disjunction, the disjunct corresponding to the negative answer also contains potentially covert negation. The meaning of the structure given in (88-b) is the set of propositions that are either identical to the positive answer or identical to the negative answer, and true in the world of evaluation; we provide the set of answers to the question in (88-c). (This is still a simplification of Guerzoni & Sharvit's proposal. The reader is referred to their paper for details.)

(88) a. Did John arrive?
b. [Q ~~[John arrived]~~ OR [NOT [John arrived]]]
c. {John arrived, John didn't arrive}

Since we are not pronouncing the entire structure in (88-b), some of it must be elided (we represent ellipsis by striking through the elided phrase; the choice of whether the first or the second occurrence of the phrase is elided is arbitrary in (88)). As always, ellipsis must be constrained.[16] A standard candidate for the constraint is the following (see e.g. Rooth 1992b, Heim 1996):

(89) Constraint on ellipsis
A constituent α may be elided if it is contained in a constituent β that contrasts with an antecedent constituent β' (where β contrasts with β' if and only if the meaning of β' is in the focus value of β).

In (88), the elided constituent indeed contrasts with the antecedent, *John arrived*: namely, the meaning of *John arrived* is contained in the singleton focus value of the elided constituent, a set that contains the proposition denoted by *John arrived*.

We now turn to questions containing *even one* expressions. Given our simplistic assumptions about syntax of *even*, a question with an *even one* expression like (90-a) may have the structure in (90-b) in which the first disjunct does not contain *even* and can be elided: namely, its singelton focus value contains, trivially, the meaning of the antecedent phrase, *John read one book*, and thus contrasts with it. In this configuration, *even* triggers a likelihood presupposition that is almost trivial, as discussed in Section 1. This means that both the positive and the negative answer to the question in (90-a) are predicted to be

[16]We set aside here important questions about what heads or structures allow for ellipsis and whether similar ellipsis is available in declarative sentences. The reader is referred to Guerzoni and Sharvit (2014) for discussion.

legitimate.

(90) a. Did John read even ONE book?
b. [Q ~~[John read one book]~~ OR [even(C) [NOT [John read one$_F$ book]]]]
c. {John read one book, even(C)(John didn't read one book)}
(negative bias is not predicted)

In response, Guerzoni & Sharvit may argue that (90) does not contain constituents that appropriately contrast and that ellipsis is thus not licensed. Since they do not want the sentence in (90-a) to be ungrammatical, it must then have a different parse on which ellipsis is licensed and on which it induces negative bias. A candidate for such a parse is provided in (91) (cf. Guerzoni and Sharvit 2014, footnote 18). This parse would induce negative bias: only the second disjunct, corresponding to the negative answer, has a consistent interpretation and so the question denotes the set of propositions containing just one consistent element – the negative answer.

(91) a. Did John read even ONE book?
b. [Q ~~[even(C) [John read one book]]~~ OR [even(C') [NOT [John read one$_F$ book]]]]
c. {#even(C)(John read one$_F$ book), even(C')(John didn't read one$_F$ book)}
(negative bias is predicted)

However, it is clear that the ellipsis represented in (91) does not obey the constraint on ellipsis: there is no antecedent whose meaning is in the singleton focus value of the elided object (in fact, if there were such an antecedent, the question would not have a felicitous answer at all). To allow (and force) parses like (91), a constraint on ellipsis that is different from the standard one in (89) needs to be provided. Until then we have to assume that the theory does not capture negative bias induced by *even one* expressions in questions. This concludes our discussion of Guerzoni & Sharvit's proposal.

We are at an impasse: depending on the theory of questions, we either predict negative bias across the board or we predict no negative bias.

(92) Predictions of extant approaches to NPIs and *even* in questions
a. Answers to questions approach: negative bias for NPIs and *even one* expressions.
b. Environments in questions approach: no bias for NPIs and *even one* expressions.

While it is not obvious how to avoid generating bias on the Answers to questions approach, there is a striking parallelism between the challenge facing the Environments in questions approach and the challenge we faced with Strawson DE environments. Namely, in both cases, the simple theory of NPI licensing yields the correct prediction that NPIs should not induce any context-dependence (that is, negative bias in the case of questions).

(93) Diagnosis (NPIs in questions)
On the Environments in questions approach, the simple theory of NPI licensing makes the correct prediction that NPIs should induce almost trivial (readily accommodatable) likelihood presuppositions in questions.

And, in both cases, the movement theory of *even* fails to predict that *even one* expressions induce context-dependence (negative bias). This is expected given that NPIs and *even one* expressions are analyzed identically.

(94) Diagnosis (*even one* expressions in questions)
On the Environments in questions approach, the movement theory of *even* makes the false prediction that *even one* expressions should induce almost trivial (readily accommodatable) likelihood presuppositions in questions.

Our resolution of the puzzle of *even one* expressions in Strawson DE environments was to rely on a further mechanism, obligatory covert exhaustification. On the Environments in questions approach, an analogous strategy could be employed in questions as well to derive negative bias: a further mechanism could be active with *even one* expressions and in combination with *even* yield negative bias. This is a task that we cannot adequately pursue here.

Let us summarize. We have shown that if we couple the existing approaches to NPIs and *even one* expressions in questions with the simple theory of NPI licensing and the movement theory of *even*, we falsely predict that NPIs and *even one* expressions should behave alike in questions: either all of them should induce negative bias or none of them should. While the analyses of questions on which neither NPIs nor *even one* expressions would induce negative bias on their own, which is a desirable result for NPIs, could perhaps be enriched to derive the observed negative bias with *even one* expressions, a serious pursuit of this was deferred to another occasion.

7 Conclusion and outlook

The main goal of the paper was modest: it was to show that some challenges raised by Heim (1984) – which build on the differences between the distribution of NPIs and *even one* expressions in certain Strawson DE environments and in questions – are not in fact challenges for the simple theory of NPI licensing, that is, a theory that treats NPIs as weak elements that are associates of covert *even*. We indicated that, instead, they challenge our understanding of the distribution of overt *even* (see Crnič 2014 for some previous discussion). While we sketched a possible explanation of the behavior of *even one* expressions in certain Strawson DE environments, we left it entirely to future research how to properly capture the differences between NPIs and *even one* expressions in questions.

Heim (1984) discusses another challenge for the theories of NPI licensing: the distribution of NPIs like *any* and *ever* differs from that of minimizers like *lift a finger*. Specifically, the distribution of minimizers parallels that of *even one* expressions rather than that of *any* and *ever*: minimizers exhibit context-dependence in certain Strawson DE environments

(95) a. Every boy who did anything was rewarded.
b. Every boy who lifted a finger was rewarded.
c. Every boy who did even ONE thing was rewarded.

(96) a. Every boy who did anything wore blue jeans.
b. #Every boy who lifted a finger wore blue jeans.
c. #Every boy who did even ONE thing wore blue jeans.

and induce negative bias in questions (cf. e.g. Lahiri 1998, Guerzoni 2004, Chierchia 2013).

(97) a. Did John do anything to help? (both yes and no answers are possible)
b. Did John do even ONE thing to help? (only no answer is possible)
c. Did John lift a finger to help? (only no answer is possible)

An adequate theory of NPI licensing should account for this variation among different polarity elements. We showed that the context-dependent distribution of *even one* expressions in Strawson DE environments can be explained by invoking a further grammatical operation, obligatory covert exhaustification, and suggested that a similar move may be possible for explaining their negative bias in questions. This strategy could be extended to minimizers, whose distribution parallels that of *even one* expressions, by having them invoke the same operations that *even one* expressions invoke (but that NPIs like *any* do not invoke). While it may be incumbent on the advocates of the simple theory of NPI licensing to eventually provide a less sketchy explanation of this variation as well as a treatment of many other issues in NPI licensing (see Chierchia 2013 for an overview), this is not incumbent on us, at least given our modest goals in this paper.

Finally, a thorough vindication of the movement theory of *even* would require, first, an articulation of the principles we alluded to in this paper in greater detail; second, a proper treatment of several issues we only touched upon (in particular, the nature of the additive inference); and, third, a demonstration that the resulting theory coheres with the standard grammatical principles. Obviously, we were in no position to complete such daunting tasks in this paper.

References

Barwise, Jon, and Robin Cooper. 1981. Generalized quantifiers and natural language. *Linguistics and Philosophy* 4:159–219.

Chierchia, Gennaro. 2013. *Logic in grammar*. Oxford: Oxford University Press.

Crnič, Luka. 2011a. Getting *even*. Doctoral Dissertation, MIT.

Crnič, Luka. 2011b. On the meaning and distribution of concessive scalar particles. In *Proceedings of NELS 41*, ed. N. LaCara, L. Fainleib, and Y. Park.

Crnič, Luka. 2013. Focus particles and embedded exhaustification. *Journal of Semantics* 30:533–558.

Crnič, Luka. 2014. Non-Monotonicity in NPI Licensing. *Natural Language Semantics* 22:169–217.

Fauconnier, Gilles. 1975. Pragmatic scales and logical structure. *Linguistic Inquiry* 6:353–375.

von Fintel, Kai. 1999. NPI licensing, Strawson entailment, and context dependency. *Journal of Semantics* 16:97–148.

Fox, Danny. 2007. Free choice and the theory of scalar implicatures. In *Presupposition and Implicature in Compositional Semantics*, ed. Uli Sauerland and Penka Stateva, 71–120. Basingstoke: Palgrave Macmillan.

Fox, Danny, and Benjamin Spector. 2009. Economy and Embedded Exhaustification. Handout from a talk at Cornell., MIT & ENS.

Gajewski, Jon. 2011. Licensing strong NPIs. *Natural Language Semantics* 19:109–148.

Guerzoni, Elena. 2003. Why *even* ask? On the pragmatics of questions and the semantics of answers. Doctoral Dissertation, MIT.

Guerzoni, Elena. 2004. *Even*-NPIs in yes/no questions. *Natural Language Semantics* 12:319–343.

Guerzoni, Elena. 2006. Intervention effects on NPIs and feature movement: towards a unified account of intervention. *Natural Language Semantics* 14:359–398.

Guerzoni, Elena, and Yael Sharvit. 2014. Whether or not anything but not whether anything or not. In *The art and craft of semantics*, ed. L. Crnič and U. Sauerland. Cambride, MA: MIT Working Papers in Linguistics.

Han, Chung-Hye, and Laura Siegel. 1997. Syntactic and semantic conditions on NPI licensing in questions. In *Proceedings of the WCCFL 15*, ed. B. Agbayani and S.-W. Tang, 177–191. Stanford, CA: CSLI Publications.

Heim, Irene. 1984. A note on negative polarity and downward entailingness. In *Proceedings of NELS*, Vol. 14, 98–107. Amherst, MA: GLSA Publications.

Heim, Irene. 1991. Artikel und definitheit. In *Semantik: Ein internationales handbuch der zeitgenossichen forschung*, ed. Dieter Wunderlich Arnim von Stechow, 487–535. Mouton de Gruyter.

Heim, Irene. 1996. Lecture notes on ellipsis. Lecture notes, MIT.

Homer, Vincent. 2009. Disruption of npi licensing: the case of presuppositions. In *Proceeding of SALT 18*, ed. T. Friedmann and S. Ito. Ithaca, NY: CLC Publications.

Homer, Vincent. 2012. Domains of polarity items. Accepted for publication by *Journal of Semantics*.

Horn, Larry R. 1989. *A natural history of negation*. Chicago: University of Chicago Press.

Kadmon, Nirit, and Fred Landman. 1993. *Any*. *Linguistics and Philosophy* 16:353–422.

Karttunen, Lauri, and Stanley Peters. 1979. Conventional implicature. In *Syntax and semantics*, ed. C.-K. Oh and D. A. Dinneen, Vol. 11, 1–56. Academic Press.

Krifka, Manfred. 1995. The semantics and pragmatics of weak and strong polarity items. *Linguistic Analysis* 25:209–257.

Ladusaw, William. 1979. Polarity Sensitivity as Inherent Scope Relations. Doctoral Dissertation, University of Texas, Austin.

Lahiri, Utpal. 1998. Focus and negative polarity in Hindi. *Natural Language Semantics* 6:57–123.

Landman, Fred. 1998. Plurals and maximalization. In *Events and grammar*, ed. Susan Rothstein, 237–271. Dordrecht: Kluwer.

Levinson, Stephen. 2000. *Presumptive meanings: the theory of generalized conversational implicature*. MIT Press.

Linebarger, Marcia C. 1980. The Grammar of Negative Polarity. Doctoral Dissertation, MIT.

Linebarger, Marcia C. 1987. Negative polarity and grammatical representation. *Linguistics and Philosophy* 10:325–387.

Magri, Giorgio. 2011. Another argument for embedded scalar implicatures based on oddness in downward entailing environments. *Semantics and Pragmatics* 4:1–51.

Nicolae, Andreea. 2013. Any questions? Polarity as a window into the structure of questions. Doctoral Dissertation, Harvard University.

Percus, Orin. 2006. Antipresuppositions. In *Theoretical and empirical studies of reference and anaphora: Toward the establishment of generative grammar as an empirical science*, ed. A. Ueyama, 52–73. Japan Society for the Promotion of Science.

Rooth, Mats. 1985. Association with focus. Doctoral Dissertation, University of Massachusetts, Amherst.

Rooth, Mats. 1992a. A theory of focus interpretation. *Natural Language Semantics* 1:75–116.

Rooth, Mats. 1992b. Ellipsis redundancy and reduction redundancy. In *Proceedings of the Stuttgart Ellipsis Workshop*, ed. Steve Berman and Arild Hestvik.

van Rooy, Robert. 2003. Negative polarity items in questions: strength as relevance. *Journal of Semantics* 20:239–274.

Rullmann, Hotze. 1997. *Even*, polarity, and scope. *Papers in experimental and theoretical linguistics* 4:40–64.

Sauerland, Uli. 2006. Implicated presuppositions. Manuscript, ZAS, Berlin.

Schwarz, Bernhard. 2000. Notes on *even*. Manunscript, University of Stuttgart.

Singh, Raj. 2011. Maximize presupposition! and local contexts. *Journal of Semantics* 19:149–168.

Spector, Benjamin. 2013. Global positive polarity items and obligatory exhaustivity. Manuscript, CNRS.

Wagner, Michael. 2013. Additivity and the syntax of *even*. Manuscript, McGill University.