

The landscape of EVEN items

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Abstract

This paper explores the role that the scalar properties and presuppositions of *even* play in creating polarity sensitive *even* meanings crosslinguistically (henceforth EVEN). We discuss the behavior of three lexically distinct EVEN items in Greek in positive, negative, and subjunctive sentences, and polar questions. These items are shown to be polarity sensitive, and a three-way distinction is posited between a positive polarity (*akomi ke*), a negative polarity (*oute*), and a ‘flexible scale’ *even* (*esto*) which does not introduce likelihood, but is associated with scales made salient by the context. The analysis to be proposed should be seen as a refinement of Rooth's original thesis that negative polarity is involved in the distribution and interpretation of English *even*. Importantly, the distributional restrictions of the EVEN items are shown to follow either from the distinct presuppositions of the items (positive polarity and flexible scale EVEN), or from their lexical featural specification (negative polarity EVEN), a result that squares neatly with the fact that ill-formedness is systematic pragmatic deviance in the former case but robust ungrammaticality in the latter. This result supports the by now widely accepted point that polarity dependencies are not of uniform nature, and that for a more accurate description of polarity phenomena we need to distinguish between presupposition failures (which are of pragmatic nature and can be fixed in certain contexts), and cases of uninterpretability—which yield ungrammaticality and cannot be fixed in any context (Giannakidou 2001).

By deriving the limited distribution or interpretation of polarity EVEN items from their lexical-semantic and pragmatic content, the scope theory of a uniform low-likelihood *even* (Karttunen and Peters 1979, Wilkinson 1996) loses much of its conceptual appeal. On the empirical side, it is noted that there *is* actually syntactic evidence for a wide scope low likelihood *even* in Greek—positive polarity *akomi ke*. This item, however, is shown to differ in distribution and presuppositions quite substantially from English *even*, covering the additional space of negative polarity and flexible scale EVENS. It is hard to see how we can correctly characterize this variable behavior of *even* without resorting to some sort of lexical ambiguity.

1. Background: English *even* and its Greek counterparts

The status of English *even* has been under debate since Karttunen and Peters 1979 (henceforth K&P). The problem is that, when construed with negation, *even* conveys a presupposition that does not follow from its contribution in positive sentences. To solve this problem, K&P posit scope ambiguity with respect to negation (see also Wilkinson 1996 for a recent revival of this approach); Rooth 1985, however, argues that the ambiguity is lexical: *even* has a negative polarity (NPI) incarnation which is licensed in the scope of negation.

To illustrate the basic problem, consider the occurrence of *even* in a positive sentence:

- (1) The Dean invited **even** Bill.
- (2) i. $x [x \text{ Bill } C(x) \text{ invited (Dean, } x)], \text{ and}$
ii. $x [x \text{ Bill } \text{likelihood (Dean inviting } x) > \text{likelihood (Dean inviting B.)}]$

Even does not affect the truth conditions of a positive sentence: sentence (1) asserts that the Dean invited Bill. *Even* contributes the presupposition (or *conventional implicature* in K&P's jargon) in (2): that there is a set of alternatives to x , the *even* phrase, that the context makes salient ($C(x)$; a condition that I will henceforth drop in the notation but continue assuming).¹ These alternatives are also ranked on a scale (Horn 1989, Kay 1990), which, according to K&P, is one of likelihood, and the value of the *even* phrase is the lowest, or near-lowest ranked element on that scale. Likelihood is a Horn possibility scale.

With negation this presupposition should survive because negation is a hole; but it does not. Instead of invited individuals, a negative sentence with *even* makes us think of individuals that the Dean did *not* invite; and Bill appears to no longer be the (near-)least likely person, but the (near-)most likely one:

- (3) The Dean didn't invite even Bill.
- (4) i. $x [x \text{ Bill } \neg (\text{Dean invited } x)]$
ii. $x [x \text{ Bill } \text{likelihood (Dean inviting Bill)} > \text{likelihood (Dean inviting } x)]$

¹ The alternatives are variables of type e because the focus of *even* is the nominal argument, but *even* can also target other constituents, e.g. adjectives, cardinality predicates, or verbs, generating in each case alternatives of the appropriate type. Throughout the paper I am using *even* and its counterparts with nominals to keep things simple for the comparison with the Greek items. It should be clear, however, that *The Dean didn't invite even Bill* is equivalent in terms of focal association with *The Dean didn't even invite Bill*. The Greek items to be discussed show a strong preference to attach to the nominal argument rather than the VP in this case.

Rooth (1985) proposed precisely this presupposition with negation; as a consequence, *even* is lexically ambiguous between a meaning with the presupposition in (2), and a negative polarity (NPI) incarnation with the presupposition in (4). Rooth's lexical meaning for NPI-*even* as a propositional operator with the presupposition just described is given below:

- (5) Presupposition of NPI *even* (Rooth 1985)
- a $p [C(p) \text{ not } (\neg p) \text{ p } \mathbf{a}]$, where \mathbf{a} = assertion
- b $p [[C(p) \text{ p } \mathbf{a}] \text{ likelihood } (\mathbf{a}) > \text{likelihood } (p)]$
 = the proposition created by the **even**-phrase is **the most likely** alternative

To avoid positing a lexical ambiguity, K&P and Wilkinson 1996 proposed instead that the ambiguity is scopal: *even* cannot be in the scope of negation, but must raise above it. In this analysis, the presupposition of non-NPI *even* looks identical to that of NPI-*even*:

- (6) i. $x [x \text{ Bill } \neg \text{invited } (\text{Dean}, x)]$
 ii. $x [x \text{ Bill } \text{likelihood } (\text{Dean not inviting } x) > \text{likelihood } (\text{Dean not inviting Bill})]$

This raising affords a reading equivalent to that of NPI-*even*. But there is a cost here too: we posit a special covert movement of *even* above negation, which is extraordinary for a number of reasons. First, because it doesn't happen overtly; and in current minimalist theorizing, where the status of covert movement is dubious, positing a covert movement rule just for *even* seems undesirable. Second, the movement rule is posited specifically for *even* (as opposed to other focus particles that are not subject to it; e.g. *only* and *also*, see Rullmann 1997, 2003 for emphasis on this). Third, the raising is obligatory. By limiting the scoping options of *even* with negation, and by saying that it *must* scope above it, we are in fact granting PPI-status to *even* (like e.g. the classical PPI *some* which must also scope above negation), and indeed by stipulation: why is the expected scope inside negation prohibited?

We will see in this paper that empirically the scope inside negation should not be ruled out, at least not long distance, as it surfaces indeed with *even*, and its counterparts in languages like Japanese (Yoshimura 2004). In Greek, long distance movement, overt or covert, of PPI-*akomi ke* will be shown to be prohibited, thus making evident that if we are to posit movement of an EVEN-item above negation, this movement will have to be of the familiar kind, and not entirely unconstrained (a point to which we return).

In the light of the above, it seems reasonable to conclude that opting for movement of *even* does not really prove a conceptually more attractive option than positing lexical ambiguity. Heim and Lahiri 2002 actually go as far as to suggest that the various implementations of the scope theory cannot really eliminate the polarity component in *even*, a conclusion very similar to

what I have just said: that positing movement above negation renders *even* a PPI. Given this choice between two “costly” options, it will be helpful to look at languages other than English. If we can adduce evidence that there are indeed lexical realizations of polarity *evers* in other languages, and that the relevant scopings of these items differ in a way derivable from their lexical content, then the polarity hypothesis is boosted, and an argument can be made along this line for English.² In this paper I claim that this is indeed the case.

In Greek there are (at least) three items that may be translated into English as *even*, only one of which can occur unproblematically in positive sentences:

(7)	a	I Maria efaje the Maria ate	akomi ke even	to pagoto. the ice cream.	(positive EVEN)
	b	*I Maria efaje the Maria ate	oute even	to pagoto. the ice cream	(NPI-EVEN)
	c	?#I Maria efaje the Maria ate	esto even	to pagoto. the ice cream	(flexible scale EVEN)

I use EVEN to refer to the crosslinguistic incarnations of *even* and distinguish them from English *even*. The expressions *oute* and *esto* resist positive sentences; they are both PIs in this sense, though there is a clear difference in status between the two, as we see. I use ‘?#’ to indicate systematic pragmatic deviance which is stronger than mere oddity, but still weaker than ungrammaticality. With negation, *oute* becomes good while *esto* remains bad; *akomi ke*, the positive EVEN, becomes unacceptable³:

² Though, of course, the existence of a lexical item in a language X is not automatically an argument for the existence of the corresponding item in a language Y. However, notice that in most cases where we are faced with such a dilemma, it turns out that we can indeed build arguments that there are two different lexical meanings, in some cases corresponding also to scope differences. A particularly illuminating parallelism involves *until* and negation. Karttunen 1977 posits lexical ambiguity, and Giannakidou 2002 presents novel arguments for it based on the fact that there exists a lexical distinction in Greek. In that case, it was not just the lexical distinction that supported the ambiguity thesis: it was actually shown that English lacks the wide scope negation reading posited by proponents of the scope ambiguity thesis (Mittwoch 1977). Very much in the same spirit, we see that we do not have sufficient evidence that English *even* moves out of negation. It is, then, the joint force of the lexical distinction crosslinguistically and the fact that *even* remains in the scope of negation, along with the substantial empirical differences between *even* and *akomi ke* that support the lexical ambiguity thesis.

³ The Greek data discussed in this paper were checked with a total of 14 native speakers of Greek, including myself, using an extensive questionnaire. I wish to thank my informants for their relatively uniform judgments. Most interestingly, some speakers actually starred instances of negation and *esto* like the ones I discuss here; however, all of the informants found them generally unacceptable.

- (8) a ?#I Maria dhen efaje **akomi ke** to pagoto. (positive EVEN)
 the Maria didn't eat even the ice cream.
- b I Maria dhen efaje **oute (kan)** to pagoto. (NPI-EVEN)
 the Maria didn't eat even the ice cream
- c ?#I Maria dhen efaje **esto** to pagoto. (flexible scale EVEN)
 the Maria didn't eat even the ice cream

Oute, as we see, can optionally occur with the particle *kan*. Comparing *oute* and *esto*, only *oute* is an NPI proper because it improves with negation, while *esto* remains bad. Comparable items are Dutch *eens*, German *mal* (Kurschner 1983: 121), and Spanish *ni* (Vallduvi 1994, Herburger 2003). *Akomi ke*, on the other hand, becomes odd in the scope of negation.

We will see in the next section that *akomi ke* actually improves if raised past negation *overtly*, though the result is never impeccable. In this paper, we establish a number of additional empirical differences between *akomi ke*, and *even*, the joint force of which poses an additional challenge for the movement analysis of English *even*. Unlike *akomi ke*, *even* is fine in the scope of negation, as we saw, and need not overtly scope above it. Furthermore, unlike *akomi ke*, *even* will be shown to (a) remain fine in positive as well negative sentences when combined with the cardinality *one*; (b) be compatible with expressions of high-likelihood; and (c) show ambiguity between an additive meaning that does not produce negative bias in questions, and a non-additive one that creates bias. *Akomi ke* lacks the biased reading. This behavior seems extremely hard to reconcile with the unitary analysis of low-likelihood *even*. Crucially, in our discussion of the Greek *akomi ke* below we will try to derive the need for the scoping above negation from the presupposition of low-likelihood which is odd in the scope of negation. It will thus be the pragmatics of the item driving the movement, and the ensuing PPI-status, rather than the other way around, as it appears to be the case in the scope theory.

Esto looks like a curious PI—bad in both positive and negative sentences, while improving in polarity environments that are not negative, but nonveridical (Giannakidou 1998, 1999): e.g. questions, imperatives, subjunctives, protasis of conditionals, and with modal verbs. NPI *oute (kan)* is ungrammatical, as expected, without a negative licenser:

- (9) a Efajes **esto** to pagoto?
 Did you eat even (=at least) the ice-cream?
- b *Efajes **oute (kan)** to pagoto?
 Did you eat even the ice-cream?
- (10) a Fae **esto** to pagoto.
 Eat even (=at least) the ice-cream.
- b *Fae **oute (kan)** to pagoto.

Eat even the ice-cream.

(More examples will be given in section 4). Notice that *esto* receives a reading paraphrasable by *at least* that we revisit later, unlike *even* which always retains an additive meaning.

Finally, mere downward entailment is not sufficient for licensing:

- (11) ***To poli pende** pedhia efagan { **oute (kan)/esto** } to pagoto.
(?)At most five children ate even the ice-cream

The above data give crosslinguistic support for an extension of the polarity hypothesis, in line with related observations for Dutch (Rullmann 1997, Hoeksema and Rullmann 2001) and German (von Stechow 1991; Kurschner 1983; Heim and Lahiri 2002); I will not compare the data here, but see the references above for details. The relevant notion for the description of polarity environments including negation seems to be nonveridicality (Giannakidou 1998, 1999, 2001) and not DE, since DE cannot license NPI or flexible EVEN, as we just saw.

The fact that we find EVEN items (*akomi ke* and *esto*) that remain bad with negation is hard to reconcile with the scope theory. According to this theory, *akomi ke* as well as *esto* should be fine, but overtly scoping above negation. The observed deviance seems particularly problematic for proposals like Lahiri (1998), which employs an account of Hindi EVEN-containing PIs by using a single low likelihood EVEN. The evidence for NPI-EVEN removes much of the strength of the enterprise, as Lahiri himself acknowledges (Lahiri 1998: 85); and the fact that unambiguously low scalar EVENS, as the Greek items will turn out to be, are bad with negation, as well as with the cardinality predicate *one* under negation as we shall see later, adds considerably to the problem.

In this paper, I will try to go beyond the dilemma of lexical ambiguity versus movement of *even* by suggesting a lexical theory of EVEN (*even* included) in which the polarity status as well as the particular scopings or non-scopings of EVEN items crosslinguistically are determined by their lexical (syntactic-semantic, or pragmatic) specifications. In a language like Greek, where we have (at least) three distinct lexical entries for EVEN it is unquestionable that we need to posit three distinct meanings; and the relative scopings must then be made to follow from these meanings. For a language like English, it will be helpful to compare the single entry *even* with the overt realizations of the distinct lexical items, and then ask the question of whether the resulting empirical differences can be derived by scope alone. Most importantly, given that NPI, PPI and flexible scale EVEN scope differently wrt negation, we also need to ask the related question of what drives the distinct scopings. If we deny the lexical basis for the distinctions, it becomes difficult to see the scope variations as anything more than mere stipulations-- and in the bare scope theory they seem to remain just that.

The paper is organized as follows. In section 2, we discuss PPI EVEN-- *akomi ke*. We illustrate that this item is a low-likelihood EVEN which remains odd in the scope of negation, unless it can (marginally) scope above it. Its problematic status persists with negation and the cardinality predicate *one*, thus challenging Lahiri's 1998 proposal. In section 3, NPI-EVEN, *oute*, is shown to be a high scalar EVEN that has the presuppositions in Rooth 1985, and it is further argued that this item is subject to licensing in the syntactic sense: it contains an uninterpretable negative feature that must be checked against a negative head. This explains why illicit occurrences of *oute* are clear ungrammaticalities rather than systematic deviances, as we noted. PPI and NPI EVEN are also contrasted in long-distance contexts showing that they do not produce equivalent readings. In section 4, we identify a third lexical item EVEN, *esto*, which is polarity sensitive but still unacceptable with negation. The unacceptability with negation persists also when the item combines with the predicate *one*. The problem will be, with both *esto* and *akomi ke*, that these items cannot induce scale reversal with negation because they only associate with low scalar values. This result is problematic for Lahiri's 1998 analysis of Hindi PIs which contain what he analyzes as a low-likelihood EVEN plus *one*, and which are *good* under negation. Finally, *esto* will be shown to be responsible for negative bias in polar (yes/no) questions in section 5. Positive low likelihood *akomi ke*, unlike *esto* and *even*, will be shown to create no bias.

2 A low likelihood EVEN in Greek

Greek employs two lexically distinct expressions corresponding to what translates in English as *even* in positive and negative sentences respectively. Both expressions contain the conjunction *ke* which is typologically consistent with their status as focus particles (cf. Dutch *ook* in *ook maar*; Rullmann 1996, 1997, Hoeksema and Rullmann 2001; and German *auch* in *auch nur*, von Stechow 1991, Kurschner 1983). In a positive sentence, Greek uses *akomi* (or *akoma*) *ke* lit. 'still/yet and', for *even*:

- (12) O Janis dhiavase **akomi ke** tis *Sindaktikes Dhomes*.
 John read.3sg even the Syntactic Structures
 John read even *Syntactic Structures*.

Akomi ke, and likewise the particles to be discussed later on, attach to various constituents, e.g. nominal constituents, CPs, PPs and other adverbial phrases, and occasionally to verbs, but they do favor attachment to QPs, so I will be using these throughout. The sentence above has presuppositions that are in all respects equivalent to those of the English sentence in (1):

- (13) Presupposition of *akomi ke*
 $x [x \text{ Syntactic Structures read (John, x)}]$, and
 $x [x \text{ Syntactic Structures likelihood (John reading x)} >$
likelihood (John reading the **Syntactic Structures**)]

We can then adopt the K&P line for *akomi ke* : *akomi ke* associates with the lowest end of a likelihood scale, typically with the bottom element of it.

- (14) $[[\mathbf{akomi\ ke} (x) (P)]] = 1$ iff $P(x) = 1$; (assertion)
 $y [y \ x \ P(y)]$
 $y [y \ x \ \text{likelihood} (P(y)) > \text{likelihood} (P(x))]$ (presupposition)

The lexical entry for *akomi ke* is given below:

- (15) $[[\mathbf{akomi\ ke}]]: x \ P: y [y \ x \ C(y) \ P(y) \ y [y \ x \ \text{likelihood} (P(x)) >$
likelihood (P(y))]. P(x)

Now, with negation, *akomi ke* becomes unacceptable:

- (16) ?#O Janis **dhen** dhiavase **akomi ke** tis *Sindaktikes Dhomes*.
John not read.3sg even the Syntactic Structures
John didn't read even *Syntactic Structures*.

Notice the contrast with English *even*. In this sentence, *even* can indeed be interpreted, but with *Syntactic Structures* becoming the most likely thing to read (in the NPI-analysis), or the least likely thing not to read (in the scope theory of *even*). If the Greek item *akomi ke* were to move covertly above negation, then it should be able to receive this reading, and the sentence should be acceptable. But it can't. Conclusion: the covert raising of the scope theory is not applicable to *akomi ke*. Apparently this is a low likelihood item that gets interpreted where it is found.

What if we move *akomi ke* overtly above negation?

- (17) ? **Akomi ke** tis *Sindaktikes Dhomes* **dhen** dhiavase o Janis.
even the Syntactic Structures not read.3sg the John
? Even *Syntactic Structures* John didn't read.

Occasional overt scoping above negation helps improve *akomi ke*, though it does not make it impeccable.⁴ Now we get an expected reading that Syntactic Structures was the least likely thing not to read, e.g. it was the priority required reading in *Syntax 1*. Conclusion one: *akomi ke* must scope above negation overtly. Conclusion two: there is a contrast between a low-likelihood item like *akomi*, on the one hand, and *even*, on the other, in that the former must move overtly above negation, but the latter doesn't have to. In fact, overt movement of *even* above negation significantly deteriorates the item, as we see.

Akomi ke can then successfully be characterized as a PPI that must overtly escape the scope of negation. But what drives this need? The sentence with *akomi ke*, is after all truth conditionally equivalent to the one below, without a focus particle:

(18) John didn't read the least likely item.

This sentence is not odd, hence low-likelihood in itself cannot be problematic under negation. I will argue that what creates the problem is the very use of the focus particle together with the low scalar presupposition. Importantly, in the absence of such a particle, as in (18) no claim is made as to whether John read anything else. When we use a focus particle like *even*, however, we do so because we expect (= want to imply or implicate in neo-Griecian terms; Horn 1989) a stronger statement of universal negation. This is the intuition underlying the idea of scale reversal with negation, and which goes back to the early work on scalar predications (Fauconier 1975). It is the conflict between this expectation of a stronger statement due to the use of EVEN, on the one hand, and the weak assertion because of the low ranking, on the other, that creates the problem. Notice below that (18) becomes odd in English too if we add *even*:

(19) ?#John didn't read even the least likely item.

When EVEN associates with a high-scalar item, on the other hand, no problem arises, as we see in the next section with NPI-EVEN.

Another way of formulating this is Krifka's (1995) **Scal.Assert** operator. This operator is inserted whenever we have a focus structure, and its semantic impact is that "all propositions that are semantically stronger than the proposition made are negated" (Krifka 1995: 224):

(20) **Scal.Assert** (<B, F, A>) (c) = (Krifka 1995: 31b)
 $\{i \ c \mid i \ B(F) \ \underline{\neg \ F' \ A \ [[c \ B(F')] \ [c \ B(F)] \ i \ B(F')]} \}$

⁴ The lack of full acceptance must be due to the fact that Greek routinely uses *oute* with negation and, since the two readings are equivalent under local negation, the use of NPI-EVEN renders the use of *akomi ke* marked.

where $\langle B, F, A \rangle$ is a focus structure with B as the background, F the foreground (a polarity item, or an item in focus), and A is a set of alternatives to F of type identical to F but excluding F itself.

Scal.Assert triggers a condition on the use of scalar items that says that such items will be felicitous only if their assertion $B(F)$ is at least as strong as any of the alternatives. Strength is defined on inclusion, and allows inference from the more general to the more specific information. It is obvious that **Scal.Assert** is an attempt to "semanticize" the usual quantity implicature we otherwise get purely pragmatically in the neo-Gricean terms I just mentioned. I will remain neutral as to whether we want to talk about this inference (i.e. the underlined negative conjunct of (20) in pragmatic or more representationalist terms like in Krifka, and use both jargons as rough equivalents.

In a sentence without a PI or a focus item there is no universal negative quantity implicature-- or, in Krifka's terms, **Scal.Assert** is not inserted-- thus no problem arises. However, when *akomi ke* is used, we have the expectation of the stronger (negated) statement, namely that John read nothing at all. The low likelihood of *akomi ke* then creates the problem inside negation because of the need for universal negation triggered by the focal structure. This explains the need for overt scoping for *akomi ke* above negation, and its PPI status. The problem will resurface again with *esto* in section 4, confirming that it is in general the impossibility to create scale reversal with low ranking EVEN that creates the problem.

Before moving on, it is important to note two things. First, *akomi ke* seems to be really worse with non-local negation, as illustrated below:

- (21) a ??/* O Janis dhen ipe oti o pritanis kalese akomi ke tin katharistria.
 ?John didn't say that the Dean invited even the cleaning lady.
 b * [Akomi ke tin katharistria]_i o Janis dhen ipe oti o pritanis kalese t_i.
 * [Even the cleaning lady]_i John didn't say that the Dean invited t_i.

In (21a) *akomi ke* is in an indicative complement, judged as pretty bad⁵; the corresponding English sentence, however, is judged better by native English speakers, though its overt movement is still prohibited, as we see in (21b) . The impossibility of overt preposing in (21b) suggests that both *akomi ke* and *even* cannot raise overtly long distance above negation.

In this connection, it will be useful to consider an EVEN item in Japanese that can indeed scope below negation in the non-local context--*sae* :

⁵ *Akomi ke* is fine, however, in subjunctive *na* complements, as we see in section 3.1. Subjunctive complements are the Greek equivalents to restructuring and infinitival domains (as Greek lacks infinitives), hence they are expected to be more transparent for long distance dependencies.

- (22) Keiko-wa [Akira-ga MAKARESUTAA DAIGAKU-sae ukatta]-to shira-nakatta.
 Keiko-top Akira-nom Macalester college-SAE-comp enter know-didn't
 “Keiko didn't know that Akira got into even Macalester college.”

According to Yoshimura 2004 (from which the data are drawn), this sentence has the presuppositions derived by the narrow scope reading:

- (23) Narrow scope ($\neg > -sae$)
 a. There was some college other than Macalester college that Akira passed/entered.
 b. Macalester college was the least likely college for Akira to pass/enter.

One appropriate context for this reading is where Macalester is understood to be a very difficult college and it's implied that Akira is not smart enough to be admitted to; Keiko happened not to know that Akira managed to get into Macalester. The presuppositions above are appropriate in this context, and are exactly the ones found in a local positive sentence projected now to the entire sentence. Crucially, *-sae* is just like English *even* in being a single item that is used in positive *and* negative sentences, while at the same time providing a case where a narrow scope reading with negation *is* possible.

- (24) Akira-ga **Mary-sae** sasowa-**nakatta**.
 Akira.nom Mary.even invite.didn't
 “Akira did not invite even Mary.”

Sae, then, illustrates that we need not exclude the narrow scope reading with non-local negation, as required by the scope theory—and we will find this to be relevant again when we consider negative bias in questions in section 5 (where it is shown that, unlike *even*, *-sae* in fact does *not* create negative bias). If the English sentences (22) and (21a) can be made to have a narrow scope reading equivalent to the Japanese one (which seems not impossible according to my informants), then we must acknowledge narrow scope for *even* with non-local negation. The question then will be why even why *even* can remain in the scope of negation long distance, *pace* K&P's predictions, but still need to move above it locally in this account.

The second thing to note is that there are instances of *akomi ke* which are unacceptable even in positive sentences. These are cases where *akomi* appears with the cardinality *one*:

- (25) ?#Akomi ke ENAS fititis irthe.
 ??Even ONE student arrived.

The unacceptability extends to English, as we see, and must be due to the fact that *one* is the most likely and not the least likely cardinality-- *one* is entailed by every other cardinality. Note crucially that the incompatibility of positive EVEN with *one* persists with negation, even if *akomi ke* appears overtly above it, or raises to such a position:

- (26) a ?#Akomi ke ENAS fititis dhen irthe.
 even one student didn't arrive.
 b Oute ENAS fititis dhen irthe.
 Not even one student arrived.

- (27) ?#Akomi ke enan fititi dhen idha.
 even one student I didn't see.

The low scalar presupposition remains problematic with negation as well as affirmation, as we see. It is in fact more likely that one student came, or did not come than more than one, because *one* is the weakest cardinality, i.e. entailed by every other numeral.

- (28) a # n [n **one** n students arrived] n [n **one**
 likelihood (n students arriving) > likelihood (one student arriving)]
 b # n [n **one** it is not the case that n students arrived] n [n **one**
 likelihood (n students not arriving) > likelihood (one student not arriving)]

Hence it makes no difference whether we have negation of affirmation: *akomi ke ena* will be odd in either case. Instead, we see that the NPI *oute* must be used (26b). This suggests that we still need NPI-EVEN to explain these cases, and runs counter to Lahiri's (1998) claim that a low likelihood EVEN improves with *one* under negation. In our discussion of *esto* in section 4 it will be further demonstrated that the low-scalar *esto* also remains bad with *one* under negation, thus allowing the generalization that there is a fundamental incompatibility between *one* and low-scalar EVEN that cannot be repaired under negation.

Crucially, DE quantifiers also do not help improve *akomi ke ena*. As we see below, *akomi ke ena* 'even one' remains odd in the scope of *to poli pende fitites* 'at most five students';

- (29) * To poli pende fitites aghorasan akomi ke ena vivlio.
 ? At most five students bought even one book.

(We notice that *even one* in English is also odd). The non-improvement here clearly indicates that DE is neither a necessary nor a sufficient condition for the occurrence of EVEN ONE, contrary to what is predicted by Lahiri.

To sum up, we saw in this section that Greek provides evidence for a PPI EVEN, *akomi ke*. This item must indeed scope above negation locally, which explains its PPI-status; and it prefers to do so overtly. If *akomi ke* cannot move above negation, the sentence becomes problematic (either deviant, with local negation, or straightforwardly ungrammatical with long-distance movement). Crucially, the movement of PPI-EVEN above negation is not unconstrained, as expected by the original movement analysis; rather, it was shown to be prohibited across the tensed clause boundary, suggesting that it is a movement of the familiar kind. Given the fact that, unlike *akomi ke*, *even* is fine with local negation and indeed compatible with *one* under negation, we are forced to conclude that *even* cannot be a PPI, and need not raise above negation. Indeed, when it does so overtly, the result is ungrammatical, as suggested by (21b). Finally, we found the oddity of *akomi ke* plus ONE to not be fixed with negation and DE quantifiers, a fact arguing against Lahiri's idea that negation and DE are necessary and sufficient conditions for the licensing of EVEN-ONE PIs crosslinguistically.

We are now ready to visit NPI-EVEN.

3 A high scalar negative polarity EVEN

In this section we identify *oute* as a high-scalar NPI-EVEN. We establish first its property to associate with high scalar values (section 3.1.), and then propose in section 3.2. that *oute* is actually syntactically licensed via agreement (e.g. Agree in the sense of Chomsky 2000) with a negative head. This will explain its very restricted distribution to negative and antiveridical contexts only, as well as the fact that when illicit, *oute* is in fact ungrammatical and not unacceptable in the pragmatic sense we have been talking about so far with respect to *akomi ke* and local negation or *one*. Finally, an argument by Wilkinson is discussed against NPI-*even* which turns out to be an argument *for* it in section 3.3.

3.1 The scalar property of *oute*

For EVEN with negation, Greek employs *oute*, literally *not-and* (*ou* being a sentential negative morpheme in Ancient Greek), with the optional addition of *kan* lit. *and-if* (*ke an*), which later will turn out to be another instance of EVEN.

(30) O Janis **dhen** dhiavase **akomi ke** tis *Sindaktikes Dhomes*.
the John not read.3sg even the Syntactic Structures
John didn't read even *Syntactic Structures*.

(31) * O Janis dhiavase **akomi ke** tis *Sindaktikes Dhomes*.
the John read.3sg even the Syntactic Structures

Oute kan itself contains a morphological negative feature— *ou*. We observed that *oute (kan)* is licensed only with negation and antiveridical operators, e.g. *without*, and not simply DE or nonveridical; hence it is a proper NPI (for additional data, see Giannakidou 1997):

(32) a O Janis efije xoris na milisi oute kan me tin Maria.
John left without talking even to Mary.
b *{Liji fitites/to poli pende fitites}milisan oute kan me ti Maria.
?{Few students/at most five students} talked even to Mary.

So Greek lexically supports Rooth's NPI-*even*. Apart from the lexical distinction, evidence that we are dealing with an item that contributes the top-of-the scale presupposition, and not the bottom-of-the-scale one of positive *even*, comes from sentences like (33) below:

(33) # O pritanis dhen proskalese **oute (kan)** tin katharistria.
the dean not invited even the cleaning lady
The Dean did not invite even the cleaning lady.

The cleaning lady is not the most likely person for a Dean to invite, so (33) is odd, suggesting that *oute* associates not with the least likely, but with the most likely alternative. In further support of this, notice the contrast below:

(34) a # I Maria dhen akouse **oute (kan)** ton paramikro thorivo.
Maria didn't hear even the faintest sound.
b I Maria dhen akouse **oute (kan)** ton dinatotero thorivo.
Maria didn't hear even the loudest sound.

The superlative designates either the lowest or the highest element in the loudness scale. *Oute* is odd with the superlative of the lowest end, suggesting that it can only associate with high values. We can thus assume safely that *oute* has the content that Rooth proposed for NPI-*even*.

- (35) $[[\text{NOT } \text{oute } \text{kan } (x) (P)]] = 1 \text{ iff } \neg P(x) = 1;$ (assertion)
 $y [y \ x \ C(y) \ \neg P(y)]$
 $y [y \ x \ \text{likelihood } (P(x)) > \text{likelihood } (P(y))]$ (presupposition)

Association with the highest element allows the universal negation of every lower value, the typical interpretation of such sentences. Association with the highest element also makes the combination with *one* (*oute kan ena* ‘not even ONE’) possible with negation, as noted in (26), since *one* is the most likely cardinality. The lexical entry for *oute* (*kan*) is the following:

- (36) $[[\text{oute } (\text{kan})]] = x \ P: y [y \ x \ C(y) \ \neg P(y)] \ y [y \ x \ (\text{likelihood } (P(x) > \text{likelihood } (P(y))). P(x)$

Just like *akomi ke*, here *oute* is defined here not as a propositional operator (as in Rooth 1985), but as a function from individuals *x* to predicates *P*, inducing a scalar ordering of *x* on *P* that is the reverse of that induced by *akomi ke*. In both cases, the ordering is lexically driven, and the scopal properties of the two EVENS-- *oute* inside the scope of negation, but *akomi ke* outside of it-- follow from their lexical properties.

Another crucial difference that follows from the distinct presuppositions of *oute* and *akomi ke* as described here is illustrated below:

- (37) a. I logokrisia dhen epetrepse sto Jani na diavasi **oute kan** tis *Sindaktikes Domes*.
 The censorship committee did not allow John to read even *Syntactic Structures*.
 b. I logokrisia dhen epetrepse sto Jani na diavasi **akomi ke** tis *Sindaktikes Domes*.
 The censorship committee did not allow John to read even *Syntactic Structures*.

(*Akomi ke* is fine in the above sentence long distance because it is found in a subjunctive complement.). These examples reproduce a contrast noted originally by Rooth. He observed that NPI-*even* is good in a context where John didn't manage to read other books besides *Syntactic Structures* not because the censorship committee prevented him from doing so, but because the library happened (for some reason or other) to not have these books. This is precisely the context that makes *oute* felicitous. The sentence with *akomi ke* is infelicitous in this context; instead, it requires one where the censorship committee prevented John from reading *Syntactic Structures* as well as other books, in accordance with what we said, i.e. that *akomi ke* must scope above negation. This empirical contrast confirms Rooth's hypothesis, and indicates further that the scalar presupposition assigned to *even* with negation by the scope

theory, i.e. the lowest value on a negatively specified scale, is not identical to that of NPI-*even*, which lexically associates with top elements of positive scales.

3.2 The syntax of *oute kan*

The distinctive characteristic of *oute* is that it must be in a local relationship to negation—a feature that it shares with other NPIs in Greek (Tsimpli and Roussou 1996; Giannakidou 1997, 2000). It is not licensed long distance, generally, unless it is found in the complement of verbs that are known to be transparent for NPI-licensing (and other long-distance dependencies), e.g., restructuring (i.e. infinitival-like) verbs, as we just saw:

- (38) ?? Dhen ipa oti o Janis diavase **oute kan** tis *Sindatikes Dhomes*.
?? I didn't say that John read even *Syntactic Structures*.
- (39) Dhen tu epetrepisan na diavasi **oute kan** tis *Sindaktikes Dhomes*.
They didn't let him read even *Syntactic Structures*.

The impossibility of long-distance licensing can be taken to indicate a dependency to negation subject to phases (Chomsky 2000; 2001), *modulo* the restructuring effects, however they are to be captured. The in-situ licensing suggests that *oute (kan)* remains in the scope of negation, and it is clear from the examples that it does not have to move overtly. If we implement this locality restriction in terms of Chomsky's (2000) Agree relation, we can posit an uninterpretable negative feature on *oute*: [uNeg]. *Ou* is plausibly the realization of this feature. This feature of NPI-EVEN agrees with the (interpretable) negative feature of sentential negation *dhen*. Agree can only occur within a phase, hence *oute* cannot be licensed through a second TP boundary. With neg-raising or restructuring verbs no additional TP intervenes (these domains lack tense), hence we remain within the same phase and long-distance licensing is enabled.

Not ... oute then, may be treated as a clear case of negative concord, in the sense of agreement between two expressions 'containing' negation. If *oute* is preverbal, negation can even be dropped (though it does not have to, Giannakidou 1997):

- (40) *Oute kan ti Maria (dhen) proskalese o pritanis*.
Not even Maria did the dean invite.

As noted in Giannakidou 1997, 1998, 2000, Greek does not usually exhibit such preverbal vs. post-verbal differences, typical of Romance; *oute* is, as far as I know, the only such case, again supporting the idea that we are dealing with agreement of negative features. The analysis in terms of Agree can be seen as a minimalist reformulation of the 'neg-criterion' (Haegeman and

Zanuttini 1991, Zanuttini 1991).⁶ (For the preverbal cases like (40) one would have to adopt the type of explanation given for such cases in Romance.). We can summarize the analysis in the licensing condition below:

- (41) Licensing condition of *oute*
- (i) *Oute* is grammatical in a sentence S iff it is licensed by an antiveridical operator α in S; and
 - (ii) Licensing is an Agree relation between the uninterpretable [uNeg] feature of *oute* and the interpretable [Neg] feature of α in S.

Since *oute* itself contains a negative feature, the need to be licensed by negation is reduced to a feature matching relation between a probe and a goal, which explains why failure of licensing is a clear case of ungrammaticality with *oute*. The non-extension of licensing contexts to DE or nonveridicality follows: there is no negative feature in those cases. Hence, licensing of *oute*, and its limited distribution to negative and antiveridical contexts follows from its lexical specification. As the high scalar properties of *oute* are fully compatible with negation, they require no further discussion.

3.3 EVEN attaching to the verb: no argument against NPI-even

We close this section with a comment on an alleged argument for the scope theory presented in Wilkinson 1996, based on *even* attaching to the inflected verb (Rooth's original *Infl-even*). When we look at Greek, we see that *oute* cannot be used this way without a local higher negation:

- | | | | |
|------|---|----------------------|-------------------------------|
| (42) | a | *Metaniosa pu aniksa | oute kan to vivlio. |
| | b | Metaniosa pu aniksa | kan to vivlio. |
| | | I regret that | I even opened the book. |
| | | I regret that | I so much as opened the book. |

Instead, bare *kan* in used appearing here in a factive complement without higher negation. *Kan* can be paraphrased with *so much as* (identified as a PI in Linebarger 1980, Heim 1984). Other Greek NPIs, just like *oute*, are also blocked in this context, e.g. minimizers:

⁶ It is important to note that *oute* differs from other Greek NPIs, e.g. n-words, which do not contain a negative feature (since, unlike *oute*, they are not morphologically negative), and which are licensed as quantifiers in a position higher than negation (Giannakidou 2000). *Oute kan*, however, is similar to minimizers, e.g. *dhen ipa leksi* 'I didn't say (not even) a word' which can be analyzed as containing a covert *oute* (*kan*). This is reminiscent of Heim's 1984 claim that minimizers in English contain a silent *even*. More on this in section 5.

- (43) *Lipame pou ipa leksi.
 ?I am sorry that I said a word.⁷

Clearly, we are not dealing with NPI-EVEN in (42). This point is worth emphasizing because it voids Wilkinson's assimilation of this *even* to NPI-*even* and the ensuing argument for the scope theory that is claimed to arise from this reduction; see Rullmann (1997: 58-61) for additional convincing discussion of why Wilkinson's argument would not work anyway. The acceptability of *even* in this example actually suggests that it is an instance of *even* inside the scope of negation, and not outside of it, on a par with what we observed earlier in (21) and (22).

Note, finally, that the existential presupposition of bare *kan* in (42) is as in (42')

- (42') There other things that I did with the book, i.e. read it, photo-copied it, etc..

This is consistent with the presupposition of positive *even* in the English sentence described by Wilkinson. So, bare *kan* seems to combine the existential presupposition of positive *even* with the top-of-the-scale one of NPI-EVEN (which explains why it is compatible with it):

- (44) [[Metaniosa pu aniksa **kan** to vivlio/ I regret that I **so much as** opened the book]] = 1
 iff I opened the book ; (assertion)
 Q [Q **open the book** I Q-ed the book]
 Q [Q **open the book** likelihood (**I open the book**)> likelihood (I Q-ed the book)]
 (presupposition)

This combination is predicted by the typology of EVEN items that I have in mind, and I will get to it in a minute. *So much as* seems to be the analogue to bare *kan* in English. *Kan* and *so much as* are PIs but not NPIs, they are thus fine with negation, and in non-negative polarity contexts, e.g. negative factive verbs, like in the example under discussion, questions, and conditionals:

- (45) The solicitor didn't so much as flinch. (Elizabeth George, *Playing for the Ashes*, p 452)
 (46) I hadn't so much as missed a teeth-cleaning. (episode of 'Sex and the City')
 (Thanks to Jack Hoeksema for providing these examples.).

⁷ There is a systematic difference between Greek and English minimizers, observed elsewhere (Giannakidou 1997, 1999), in that the former are strict NPIs appearing only with antiveridical licensers, whereas the latter have a much freer distribution, hence the difference here in status between the English and Greek minimizer.

- (47) a Aniksēs **kan** to vivlio?
 Did you even open the book?
 (= Did you **so much as** open the book?)
- b An me kitaksis **kan**, tha se skotoso.
 If you {**so much as/even**} look at me, I'll kill you.

So much as favors V attachment, so structurally also it is like *kan*. The presupposition of these items is fine with negation because they are high-scalar, just like the presupposition of NPI *oute*, and unlike the low scalar *akomi ke*, which as we saw remained problematic with negation. I will not discuss *kan* and *so much as* in any more detail in this paper, but I hope their existence makes clear that the family of EVEN meaning has legitimate members that do not include just the word *even*. In the discussion of *esto* in section 5 we will identify one other member of the EVEN family for English: *in the least*.

Before moving on, let me offer a few comments on the *akomi ke-oute* alternation regarding another plausible description of it. It may seem appealing to treat the lexical opposition as a case of allomorphy. For example, one could argue that there is one basic lexical item meaning EVEN with the semantics we have assigned to *akomi ke*, and assume further that this expression can be optionally associated with a negative feature. When this happens, EVEN is pronounced *oute*; if there is no association with a negative feature, the expression is pronounced *akomi ke*.

There are reasons to be cautious about going this route. For one thing, there are additional instantiations of EVEN that we would still need to allow for: *kan*, that we just discussed, and *esto*. Second, allomorphy typically comes with strict complementarity, which we do not have in this case; recall the fact that *akomi ke* can be good with negation, e.g. if it appears overtly above it. Given this case, and assuming, as we do, that for *oute* to check its negative feature it must be raised to Spec, NegP (i.e. another version of implementing agreement), we end up with free optionality after movement: we predict that we can either insert *akomi ke* or *oute* with negation, which doesn't capture the fact that the choice is not really free, and that the use of *akomi ke* with negation is marginal. *Akomi ke* is 'rescued', so to speak, by negation (recall that is never absolutely impeccable), whereas *oute* is licensed by it.

Nevertheless, one would indeed like to be able to bring about a sense of unitary source of the alternation *akomi ke-oute kan, kan, and esto*, and the analysis I am pursuing offers the following way. What is common in the various instances of EVEN is a family of possible presuppositions depending on whether we have a positive or a negative condition on the alternatives, and a low or high scalar ordering. Immediately, just looking at likelihood scales, the four possibilities below arise, where x is the meaning of the EVEN constituent:

- (48) Existential presuppositions
- a $y [y \ x \ P(y)]$ (positive existential)
- b $y [y \ x \ \neg P(y)]$ (negative existential)
- (49) Scalar presuppositions
- a $y [y \ x \ \text{likelihood}(P(y)) > \text{likelihood}(P(x))]$ (bottom-of-scale)
- b $y [y \ x \ \text{likelihood}(P(x)) > \text{likelihood}(P(y))]$ (top-of-scale)

These propositions can combine in four distinct ways in order to produce presuppositions for EVEN expressions, deriving also possibly distinct lexical items within and across languages. If we now additionally consider the possibility of non-likelihood scales that will be needed for *esto*, as I will suggest next, we also predict the existence of a non-likelihood low scalar item with negative condition on alternatives. The four lexicalizations that we find in Greek are summarized in Table 1:

Table 1: Combinatorics of presuppositions as realized in Greek

<i>Scalar</i> \ <i>Existential</i>	positive	negative
bottom-of-scale	<i>akomi ke</i>	<i>esto</i>
top-of-scale	<i>kan</i>	<i>oute (kan)</i>

At the same time, we are also making the predictions of a high-scalar variant of *esto*, as well as a low-scalar counterpart that will associate with a positive existential presupposition. Hence we may expect to find across languages lexical realizations of these meanings too, a task that I will not undertake in this paper. Here I will be simply content with suggesting that viewing things this way offers a viable way of talking about a common core in the various lexicalizations of EVEN that we observe-- and indeed, makes us *expect* them.

Next, we turn to flexible scale EVEN.

4 Flexible scale EVEN

In this section we identify an instance of EVEN that associates not with likelihood (like PPI and NPI EVENS), but depends on the context to provide a salient scale. The lexical realization of this meaning is the expression *esto*, which I call flexible scale EVEN.

4.1 Distribution

Esto attaches to various categories, just like the other EVENS, and in many cases it is paraphrasable by *at least*, which is not polarity sensitive, as we see:

(50) ?#O Janis dhiavase **esto** tis *Sindaktikes Dhomes*.
 the John read.3sg even the Syntactic Structures
 John read even *Syntactic Structures*.

(51) O Janis dhiavase **toulaxiston** tis *Sindaktikes Dhomes*.
 the John read.3sg at least the Syntactic Structures
 John didn't read even *Syntactic Structures*.

The limited distribution of *esto* has escaped attention so far—and let me repeat that the ill-formedness in a positive context is a weaker effect not akin to ungrammaticality, and which can actually be fixed as we shall see shortly. Addition of conjunction *ke* is possible (see Kalokerinos 1997 for some comments on what may determine the choice to use *ke* or not; I will not address this issue here).

Esto, as we saw, is unacceptable in a positive sentence. But unlike *oute*, *esto* does not improve with negation:

- (52) a ?#Esto (ke) i Maria dhen ipe kalimera.
 (Not even Mary said hello.)
 b ?# Esto (ke) ENAS fititis dhen ipe kalimera.
 even one student not said hello
 (Even one student didn't say hello.)

It is not a matter of surface c-command here; although certainly the fact that *esto* is unacceptable in a position higher than negation suggests that it cannot be given scope above negation. In other words, *esto* cannot be a wide scope *even*. In the examples below, where *esto* modifies a post-negation object NP it is equally unacceptable. The well-formed version is with *oute*:

(53) ?# O Janis dhen milise esto (ke) me tin Maria.
 (John didn't talk to at least/even Mary.)

(54) O Janis dhen milise oute me tin Maria.
 John didn't talk even to Mary.

Esto remains unacceptable with DE quantifiers; I illustrate here by using *in the least* in the English translation, a point I will come back to in section 5:

- (55) ?# To poli pende fitites diavasan esto (ke) tis *Sindaktikes Dhomes*.
 ??At most five students in the least read *Syntactic Structures*.
- (56) ?#LIII fitites diavasan esto (ke) tis *Sindaktikes Dhomes*.
 ??Few students in the least read *Syntactic Structures*.

Esto is also good in the nonveridical restriction of a universal quantifier, i.e. it is good in the restriction of the determiner meaning *every* but not in the restriction of determiners meaning *each* or *both*. This is seen in the examples below (parallel to the ones in Linebarger 1980 and Heim 1984 which use *so much as*, kept in the translation):

- (57) **Kathe estiatorio** [pu xreoni **esto ke mia draxmi** ja ena potiri nero] xriazete ena kalo mathima apo tin eforia.
 Every restaurant [that charges {so much as/even} a cent for a glass of tap-water] needs a good lesson from the IRS.
- (58) * **To kathe estiatorio** [pu xreoni esto ke mia draxmi ja ena potiri nero] xriazete ena kalo mathima apo tin eforia.
 * **Each restaurant** [that charges {so much as/even} a cent for a glass of tap-water] needs a good lesson from the IRS.
- (59) * **Ke ta dhio estiatoria** [pu xreonun esto ke mia draxmi ja ena potiri nero] xriazonde ena kalo mathima apo tin eforia.
 * **Both restaurants** [that charge {so much as/even} a cent for a glass of tap-water] need a good lesson from the IRS.

Esto and *so much as* are unacceptable in the restrictions of *each/both*, which are veridical, agreeing completely with the pattern observed with more familiar PIs like *kanenas* and *any*; see Giannakidou 1997, 1999 for data and discussion, from which the examples below are drawn.

- (60) a Every student who saw anything should report to the police.
 b *Each student who saw anything should report to the police.
 c *Both students who saw anything should report to the police.

Besides nonveridical determiner restrictions, *esto* is accepted in other nonveridical contexts like subjunctive clauses, questions, conditionals, imperatives, the scope of modal verbs, and directive

propositional attitudes. These are illustrated below, where for the sake of completeness, I also indicate that the NPI *oute* is ungrammatical.

Yes/no questions

- (61) a Tu exis milisi **esto ke mia** fora?
Have you talked to him even once?
b * Tu exis milisi **oute kan mia** fora?

Wh-questions

- (62) a Pjos tu exi milisi **esto ke mia** fora?
Who has talked to him even once?
b * Pjos tu exi milisi **oute kan mia** fora?

Conditionals

- (63) a An diavasis **esto ke mia** selida ap' afto to vivlio, kati tha mathis.
If you read even one page from this book, you will learn something.
b * An diavasis **oute kan mia** selida ap' afto to vivlio, kati tha mathis.
(64) a An diavasis **esto ke tus Chicago Sun Times**, kati tha mathis.⁸
If you read even the Chicago Sun Times, you will learn something.
b * An diavasis **oute kan tus Chicago Sun Times**, kati tha mathis.

Subjunctives

- (65) a Na lisis **esto** to provlima 1.
(Please) solve {even/at least} Problem 1.
b * Na lisis **oute (kan)** to provlima 1.

Modal verb

- (66) a **Esto ke ena atomo** bori na sikosi afto to trapezi.
Even one person can lift this table.
b ***Oute kan ena atomo** bori na sikosi afto to trapezi.

Habituals

- (67) a Erxete stis sinandisis, **esto ke me kathisterisi**.
He comes to the meetings, even though with delay.
b *Erxete stis sinandisis, **oute kan me kathisterisi**.

⁸ For readers unfamiliar with the Chicago newspapers, the *Chicago Sun Times* is a sensationalist tabloid.

Directive intensional verb

- (68) a **Tha ithela** na mou egrafe **esto ke mia leksi**.
?I would like it if he wrote to me **even one** word.
b ***Tha ithela** na mou egrafe **oute kan mia** leksi.

The crucial contrast in this final case is with epistemic verbs like *believe* or *remember*, which block completely *esto ke*, just like they block any andother PIs in general (Giannakidou 1999):

- (69) a ***Thimithika** pu mou egrapse **esto ke mia leksi**.
*I remember that he wrote to me even one word.
b ***Pistevo** oti mou egrapse **esto ke mia leksi**.
*I believe that he wrote to me even one word.

It is thus confirmed that the licensing pattern of *esto* follows that of weaker PIs like *kanenas* 'any' and is regulated by nonveridicality. It is also important to note that many of the above examples contain *esto* with *ena*, the Greek counterpart to 'one'. The fact that *esto (ke) ena* appears in nonveridical contexts that have nothing to do with negation or DE runs counter to Lahiri's 1998 idea that negation and DE are all that is needed to improve *even ONE* construals with polarity items. Obviously, this is not the case, and we have reached a similar conclusion earlier in our discussion of *akomi ke ena* (section 2). Worse, just like *akomi ke*, negation and DE actually make *esto (ke) ena* unacceptable (more on this in 4.3). The improvement with nonveridicality (which is also observed with the parallel Hindi *bhii*-PIs, that motivated Lahiri's proposal, and which are good in examples such as the above) seems to be entirely missed in Lahiri's account.

In the nonveridical contexts *esto* shares its distribution with *akomi ke*. We compare the two in section 5 when we consider negative bias in questions (where we see that only *esto* does so). But first, we are going to ask the question: what accounts for the distribution and status of *esto*? Which means: what accounts for the oddity under both negation and affirmation, and the sensitivity to nonveridical contexts other than negation?

4.2. The presupposition of *esto*

The key idea is that *esto*, unlike the other EVENs which associate with likelihood, is flexible with respect to the scale it ranks alternatives on. *Esto* does not introduce a scale itself, the way likelihood EVENs do, but relies on the context to make a scale salient. This property makes its

distribution more variable than that of likelihood-EVENs, with significant repercussions in certain cases, e.g. with negation and questions, as we shall see. Apart from this difference in the nature of the scale, *esto*'s ordering is similar to that of positive *EVEN*: it associates with the lowest element(s):

- (70) $[[\text{esto (ke)} (x) (P)]] = 1$ iff $P(x) = 1$; (assertion)
 $\exists y [y \neq x \wedge C(y) \wedge \neg P(y)]$
 $Q_{\text{scalar}} [C(Q) \wedge \exists y [y \neq x \wedge Q(y) > Q(x)]]$ (presupposition)

(71) Lexical entry for *esto (ke)*:

$$[[\text{esto (ke)}]] = \lambda x \lambda P: \exists y [y \neq x \wedge C(y) \wedge \neg P(y)] \wedge Q_{\text{scalar}} [C(Q) \wedge \exists y [y \neq x \wedge Q(y) > Q(x)]]. P(x)$$

The scalar presupposition is reminiscent of *akomi ke*, comprising a bottom-of-scale condition; but *esto* combines this bottom-of-scale condition with the negative existential presupposition of *oute*. The negative presupposition of *esto* and *oute* is very much like the assertion of *only* (Horn 1996), though of course it is slightly weaker (it doesn't say that *nobody other than x P*, but that *there are y other than x that not P*):

- (72) Only John ate a vegetable.
Presupposes: Someone ate a vegetable. (Horn 1996)
Asserts: Nobody other than John ate a vegetable.

So in terms of format, *esto* looks a bit like the converse of *only* which comes with a positive presupposition but a universal negative assertion in a positive sentence. The link to *only* is a fact consistent with crosslinguistic practice to employ equivalents of *only* for PI-EVENs (e.g. German *nur* in *auch nur*). But why is this combination bad in positive sentences?

To see why, consider first the non-PI with a similar meaning, *at least*, which is good:

- (73) I Maria dhiavase **tulaxiston** to arthro tis Heim.
the Maria read. 3past.3sg at least Heim's article
Maria read at least Heim's article.

In standard neo-Gricean reasoning (Horn 1972,1989), *at least P* does not imply that you read *only P* (or *exactly P*), but it can certainly *implicate* it, as in the sentence above. When this happens, crucially, *at least* associates with a top-of-scale element: Heim's article was among the

most expected or desired by the speaker to be read. The sentence asserts that some person read the most expected item, and implicates that nothing else was read.

In the absence of a scalar item altogether, again we have a well-formed sentence, but this time lacking the implicature of universal negation that is licensed with the scalar *at least*:

- (74) I Maria dhiavase to arthro tis Heim.
 the Maria read. 3past.3sg Heim's article
 Maria read Heim's article.

Hence the use of a scalar item is decisive in allowing a defeasible inference of universal negation, as well as for ranking the NP along some dimension. Importantly, the stronger statement of universal negation is licensed when the scalar item places the NP on the higher end of the scale. This is reminiscent of the pattern we observed earlier in the discussion of *akomi ke* and *oute* under negation. But here the question is why is *esto* bad-- *akomi ke* is, after all, good in a positive sentence despite the fact that it is low scalar.

The key to understanding the oddity of *esto* in a positive sentence, and its contrast with *akomi ke*, lies in the form of their existential presupposition. Unlike *akomi ke*, *esto* requires the context to settle a negative proposition-- the one that arises only as an implicature with *at least*. The status of the negative proposition as a *presupposition* of *esto* must be responsible for its deviance. The reason for this is that such a strong statement cannot be assumed to be readily satisfied, or accommodated, in a neutral or discourse initial context. Importantly, if the preceding context makes such an inference (or something close to it) part of the common ground (i.e. part of the mutual knowledge of the speakers prior to the assertion), as in the case below, *esto* improves, and can be used roughly as an equivalent to *toulaxiston* 'at least':

- (75) Speaker A: Pali i Maria dhen proetimastike ja to mathima.
 Mary isn't prepaperd for class again.
 Speaker B: ?Ma dhiavase **esto** to arthro tis Heim.
 but read. 3past.3sg at least Heim's article
 But at least she read Heim's article.

Here, the assertion of Speaker A, together with the presupposition of *pali* 'again', set up an assumption that Maria often does not prepare for class, which of course can be understood in this context as not having done the readings for the particular class at issue. This clearly facilitates the use of *esto* in Speaker B's assertion, as we see. (The slight markedness is probably due to the fact that *toulaxiston* is what is expected to be normally used in this case; recall the non-impeccability of *akomi ke* above negation.).

In other words, in a positive sentence a problematic assertion is created because of the difficulty in satisfying the negative existential presupposition of *esto*. Recall again that I am talking about unacceptability here and not ungrammaticality, as the effect is much weaker, and can indeed be improved if the context can be manipulated in a way to facilitate accommodation of the negative presupposition.

Let us see now why *esto* is unacceptable with negation.

4.3 Flexible scale EVEN and negation

Consider an example with negation:

- (76) ?#O Janis dhen diavase esto (ke) tis iposimiosis.
 #John didn't read even the endnotes.

Notice also that if instead of *the endnotes* we have *the title*, *esto* improves (without becoming impeccable, however, since with negation *oute* is the expected option):

- (77) ?O Janis dhen diavase esto (ke) ton titlo.
 John didn't read even the title.

According to our analysis, *esto* carries the following presupposition, for (76):

- (78) i. Assertion: John didn't read the endnotes.
 ii. Presupposition:
 $x [x \text{ endnotes} \neg \text{John read } x]$
 $x [x \text{ endnotes} \text{ expected-to-read } (x) > \text{ expected-to-read } (\text{endnotes})]$

The existential as well as the scalar conjunct conditions are met in a negative sentence. But why then is the sentence bad? The problem here is the low-scalar conjunct; and it is the problem we noticed earlier with *akomi ke* in section 2. The sentence says that John didn't read the least expected items, but this assertion is awkward because of the use of the focus particle, which wants to associate with a high scalar value in order to trigger scale reversal and allow a univesal negative statement. Or, in Krifka's terms, because the scalar particle lexically inserts **Scal.Assert**, thereby making it part of the LF of the sentence to require the well-defined negative conjunct, below undelined:

- (79) **Scal.Assert** (<B, F, A>) (c) = (Krifka 1995: 31b)
 $\{i \ c \ | \ i \ B(F) \ \neg \ F' \ A \ [[c \ B(F')] \ [c \ B(F)] \ i \ B(F')] \}$

where $\langle B, F, A \rangle$ is a focus structure with B as the background, F the foreground (a polarity item, or an item in focus), and A, a set of alternatives to F of type identical to F but excluding F itself.

Scal.Assert is, as we mentioned in section 2, an introduction to the semantics of a condition on scalar items that says that such items will be felicitous only if their assertion B(F) is at least as strong as any of the alternatives. Here the assertion is that *John didn't read the least expected item*; clearly this is the weakest proposition among the alternatives, Scal.Assert is not satisfied, and the sentence is ill-formed.

Again, remember that there would be no problem had no focus particle been used:

(80) John didn't read the endnotes.

This bare assertion does not say anything about having, or not having, read anything else, since in the absence of focus we have no alternatives. However, when a scalar particle is used with negation, for the sentence to be fully informative we expect a stronger statement, namely that John read nothing at all, i.e. a statement that would be consistent with scale reversal. Association with a higher value, as in the case with NPI-EVEN, produces such a case. But the low values of *esto* and *akomi ke* do not enable scale reversal and full informativity that would come with it, thus making them incompatible with negation. Luckily, *akomi ke* can escape the scope of negation and improve. *Esto*, however, is trapped inside it and cannot be 'rescued', unless scale reversal, or something equivalent to it, can be licensed independently in the context.

It is this that happens in the following two cases. Consider first, *esto* associating with a bottom-of-the-scale superlative.

- (81) a I Maria dhen akouse **esto ke** ton paramikro thorivo.
Maria didn't hear even the faintest sound.
b # I Maria dhen akouse **oute kan** ton paramikro thorivo.
Maria didn't hear even the faintest sound.
- (82) a ?# I Maria dhen akouse **esto ke** ton dinatotero thorivo.
Maria didn't hear even the loudest sound.
b I Maria dhen akouse **oute kan** ton dinatotero thorivo.
Maria didn't hear even the loudest sound.

Such cases were noted in Fauconnier (1975), and recently discussed in Hoeksema and Rullmann 2001. The observation is that *even* appears with superlatives of the absolute top or

absolute bottom of the scale. In either case, no sound is heard. This is so because the negation of the top-most element entails the negation of any other element in the scale, by scale reversal; the negation of the bottom element, on the other hand, can only yield no sound if no sound was there in the first place. It is argued that in this case the existential presupposition is lacking.

As we see in the examples above, Greek disambiguates the two cases by using *oute* for the top-of-the-scale superlative, and *esto* for the bottom-of-the scale one. As indicated in (81), when the bottom-most element is negated *esto* is fine, and indeed required: *oute* is not possible—thus supporting further the idea that this item associates with the top of the scale. In (82), on the other hand, we observe that when the top-most element is negated *oute* is good but *esto* is bad. But why is *esto* good with the bottom of scale superlative? The answer is: because the existential presupposition is lacking. This means that no scale is created, or that there are no alternatives to F (the superlative), hence, although a focus particle is used, no <B,F,A> structure is actually created.

The second case is our sentence (77) with "the title" instead of "the footnotes", which improved with *esto*. What I believe is responsible for this improvement is that *esto* has shifted to a scale of *likelihood to ignore*:

- (83) i. Assertion: John didn't read the title
 ii. Presupposition:
 x [x **title** ¬ John read x]
 x [x **title** likelihood to ignore(x) > likelihood to ignore (title)]

This combination produces an assertion very close to the one with NPI-even, since the least likely thing to ignore is the most likely thing to read, thus the improvement. Our explanation of the oddity of the low-scalar EVEN with negation is therefore confirmed, and a further prediction is made and borne out: that a low value on a context-provided scale will occasionally be able to rescue low-scale EVEN if it produces, by reversal of entailment, a high value on a likelihood scale, thus rendering the presupposition of *esto* (almost) equivalent to that of NPI-EVEN. This explains why in such cases the readings with *esto* and NPI *oute* feel identical.

These cases clearly suggest that in the scale flexibility of *esto* we must allow for the, admittedly marginal, possibility of *esto* picking up a scale of likelihood too. This is what happened above with *the title*. Obviously, this is expected under the idea that *esto* will pick up a (=any) context salient scale; in fact what has to be answered is why *esto* doesn't pick up likelihood scales more often. I am not going to give an answer more exciting here than simply saying that the existence of the other likelihood EVENS obviously affects the conventionalization of *esto* with likelihood. If the speaker intends to make a point about likelihood, Greek is generous enough to supply her with not one, but two EVEN items that have

the ability to introduce likelihood readily, one for affirmation (*akomi ke*) and one for negation (*oute*). *Esto*, then, is doomed to always be the marked choice with likelihood.

Finally, it is worth noting that *esto*, just like *akomi ke* remains bad with negation also when combined with the cardinality ONE. I illustrate below, including all EVENs for clarity:

- (84) a ?#Dhen idha **akomi ke ENAN** fititi.
 I didn't see even one student.
- b ?# Dhen idha **esto ke ENAN** fititi.
 I didn't see so much as one student.
- c Dhen idha **oute kan ENAN** fititi.
 I didn't see even one student.

(Some of my informants actually starred *a, b*). Here we are witnessing the problem that we have noticed a few times already: negation apparently can't fix the unacceptability of the bottom-of-scale presupposition that arises because of an ill-defined scalar assertion, i.e. an assertion that cannot induce scale reversal. Recall from section 2, crucially, that (overt or covert) scoping of positive *akomi ke* doesn't allow improvement in this case, a fact that obviously runs counter to Lahiri's (1998) prediction, but which follows in our account from the fact that ONE is just the most likely predicate (thus clashing with *akomi ke* which is low-likelihood). The only way to explain why an NPI containing *even* is perfect with negation must appeal to NPI-EVEN, obviously. In our analysis, the oddity of the bottom-of-scale inference with negation seems to follow straightforwardly with *esto*:

- (85) *Esto ke ena*
 n [n **one** ¬ (I saw n students)]
 n [n **one** expected-to-see (n students) > expected-to-see (one student)]

There is nothing wrong in placing *one* at the bottom of the speaker expectation scale, if the speaker actually expected to see more than one student in the given context. What goes wrong here is pretty much what went wrong in the general cases of *esto* and negation that we noted earlier: the sentence merely asserts that the speaker did not see the least expected number of students (one student), but because *one* is the weakest amount, we have infelicity due to the conditions of PI-use that are triggered by the insertion of **Scal.Assert**.

Hence we have seen a lot of support that what excludes *esto* in positive and negative sentences is its presupposition. The negative conjunct remains problematic with affirmation because it is hard to accommodate, and the low scalar *one* creates a conflict with negation

because the low value cannot create scale reversal (nor can *esto* switch to high-likelihood in order to achieve this result). This conflict renders *esto* also incompatible with ONE under negation, this time questioning the more general applicability of Lahiri's 1998 idea that low scalar EVEN with ONE improves with negation. We saw that this is not the case with either low-likelihood (*akomi ke*) or with *esto*. In nonveridical contexts the low scalar presuppositions of both *akomi ke* and *esto* are unproblematic, and the items can therefore be used felicitously. I discuss below in detail the case of the subjunctive.

4.4 Nonveridical contexts

It is easy to show that nonveridical contexts are consistent with the presupposition and scalar structure of *esto*. Consider a request, where the low-scalar *akomi ke* is also acceptable:

- (86) a Na lisis **esto to provlima 1.** (Problem 1 is the easiest)
 (Please) solve {even/at least} Problem 1.
 b Na lisis **akomi ke to Provlima 1.** (Problem 1 is the hardest)

- (87) *Esto*
 x [x Problem 1 \neg (you solve x)]
 x [x Problem 1 **difficult** (x) > **difficult** (Problem 1)]

Here *esto* ranks alternatives on a difficulty scale. The sentence presupposes that the speaker considers Problem 1 to be the least difficult to solve, and presumes that the addressee won't be able to solve any problems other than this one; so they'd be happy to see just that one problem solved. We will call this the *at least* reading. Of course, the least difficult problem is in fact the easiest one, hence the flavor of easiness that Problem 1 acquires in this context.

Akomi ke presupposes a different context producing the opposite effects: Problem 1 now seems to be the hardest one, and the request seems to be about solving *also* this problem:

- (88) *Akomi ke*
 x [x Problem 1 solve (you, x)]
 x [x Problem 1 **likelihood** (you solving x) > **likelihood** (you solving Problem 1)]

Here the context imposes an excess of problem solving. The addressee is now taken to be somebody smart, who would be able to solve, *in addition to* the problems they are solving, also the least likely problem to solve, which is, of course, the most difficult one. We will call this purely additive reading the *also* reading. Hence, the contrast with *esto* in terms of the status of Problem 1 as the easiest or the hardest problem is a result of the fact that likelihood and

difficulty have reverse entailments. This fact will be significant when we discuss negative bias in questions.

Note that in case *akomi ke* is forced to associate with a high-likelihood item, it becomes odd. We witnessed this in the case of *one* already, but we also see it in the sentence below:

- (89) ?? Na lisis **akomi ke to efkolotero provlima.**
 (Please) solve even (= at least/*also) the easiest problem.

(The * and ?? go to the *scalar* additive meaning; a non scalar additive meaning 'too' is still OK, but it lacks the scalarity, which is the reason why it is fine). The easiest problem ranks HIGH on the likelihood scale, and this rules out low-likelihood EVEN. In English, although *even* is admitted, it only receives the *at least* reading; but in Greek, the incompatibility of *akomi ke* with high values produces ill-formedness since this item unambiguously associates with only low likelihood. (Recall that this also is the reason why *akomi ke ena* 'even ONE' is impossible with both negation and affirmation).

To sum up, nonveridical contexts are consistent with the low-scalar presuppositions of both *esto* and *akomi ke*; but here *esto* and PPI *akomi ke* exhibit two distinct readings: the *at least* reading (*esto*) and the *also* reading (PPI). *Even* seems to be ambiguous in allowing both; with high-likelihood only the PPI *also* reading is licensed. This contrast between the *even-at least* and *even-also* readings is generally visible in the other contexts in which both items are admitted, but I will not illustrate in full here. I now turn to illustrate with questions, where we can see that negative bias is licensed only with the *at least/esto* reading.

5 Polar questions: negative bias revisited

The literature offers two observations: first, questions with *even*, and *even*-containing PIs (*strong* NPIs known as *minimizers*, e.g. *lift a finger*, *sleep a wink*) express negative bias (Ladusaw 1979 among others):

- (90) a Did Beatrix lift a finger to help?
 Expected answer: No, she didn't.
 b Have you talked to him even once?
 Expected answer: No, you didn't.

Negative bias surfaces in what counts as an expected answer: negative propositions are expected. But the bias is a conversational implicature: we can still answer the questions positively without contradiction (see also Guerzoni 2004). The second observation is that the

bias is due to the fact that strong NPIs contain *even* (Linebarger 1980, Heim 1984), and that this *even* is associated with minimal amount, thus making the NPI itself denoting minimal amount. In a different vein, Wilkinson 1996 and Guerzoni 2004 argue that the *even* involved in negative bias is one that denotes low *likelihood*. We see in this section that the Greek facts are a problem for this latter assumption (an earlier version of the argument can be found in Giannakidou 2003). We will confirm indeed that the original intuition that negative bias arises with expressions of minimal amount is correct, and extend it to include in general lower ranking elements on a contextually defined scale other than likelihood. The EVEN meaning we will need, then, will be that of *esto*. English *even* will show ambiguity between *esto* and the true low-likelihood *akomi ke*, which, crucially, yields no bias.

First, consider that, crosslinguistically, an overt *even* in a declarative negative sentence may, and in some cases must, occur with bias inducing minimizers, e.g. in Catalan, Spanish (Vallduvi 1994; Herburger 2003), or Greek. This EVEN is the NPI-one (see Vallduvi 1994 and Herburger 2003 for the NPI status of *ni*):

- (91) a No va dir *(**ni**) paraula en tota la tarda. Catalan
 b No dijo (**ni**) palabra en toda la tarde. Spanish
 c Dhen ipe (**oute**) mia leksi oli nixta. Greek
 He did not say even a word all evening

Crucially, these NPI-EVENs are disallowed in questions, suggesting that negative bias cannot be derived from NPI-EVEN:

- (92) a *Ipe **oute mia** leksi? (Greek)
 Did he say even one word?
 b *Va dir **ni** paraula en tota la tarda? (Catalan)
 c *Dijo (**ni**) palabra en toda la tarde? (Spanish)

The ungrammaticality follows from the NPI status of *oute* and *ni*, and challenges arguments that try to assimilate wide scope and NPI-EVEN in questions (Guerzoni 2004). In questions, *esto* and *akomi ke* are the items to be used; negative bias, crucially, arises only with *esto*.

5.1 EVEN with minimal amount

Consider first the case of EVEN with an expression denoting a minimal amount:

- (93) a Tu exis milisi **esto ke mia** fora?
 b ?#Tu exis milisi **akomi ke mia** fora?
 Have you talked to him even once? Expected biased answer: No.

Interestingly, *akomi ke* is unacceptable with minimal frequency *once*, which we expect given our account. The low likelihood of *akomi ke* conflicts with the high likelihood of the minimal frequency ONE, since ONE is the weakest, hence the most likely predicate (it is entailed by any other cardinality):

(94) n [n **once** you talked to him (n)] n [n **once** likelihood (talking to him n times)] > likelihood (talking to him **once**) (*akomi ke*)

Let me point out again that this fact is problematic for Lahiri's (1998) account of the occurrence of Hindi *EVEN-one* PIs in questions. According to Lahiri, the Hindi *bhii* that participates in the formation of these PIs is a low-likelihood one, but what the Greek facts have shown consistently in this paper is that a true low likelihood EVEN, *akomi ke*, actually remains *unacceptable* with a high likelihood predicate like ONE. The explanation for why *bhii*-items are good in questions must therefore look elsewhere for an EVEN meaning that is in fact compatible with *one* in questions-- *esto*.

Generally, the prediction is that the combination of positive EVEN with inherently high likelihood items will be problematic; and we confirm again that this is the case.

(95) ?# Boris na prosthesis **akomi ke 1 + 1?** 'Can you add even 1+1?'
(This addition is the easiest one to do, hence the MOST likely).

But *esto* is fine with high likelihood, as long as it scores low on the context given scale:

(96) Boris na prosthesis **esto 1 + 1?** 'Can you add even 1+1?'
(This addition is the least difficult one to do).

Likewise for the frequency *once* in the case of (93a):

(97) n [n **once** ¬ (you talked to him n times)] n [n **once** **frequent** (n-times) > **frequent** (once)] (*esto*)

This explains the use of *esto* with the cardinality predicate *one*. Hence, we have to conclude that a low-likelihood *even-- akomi ke--* cannot be responsible for negative bias in questions with expressions of minimal amount. What we need is low ranking on a scale other than likelihood, and this is possible only with *esto*. This conclusion clearly indicates that negative bias with EVEN in questions cannot be due to low-likelihood. This result, as I said, challenges Lahiri's

attempt to account for EVEN-ONE containing PIs in questions by appealing to low likelihood, since the unambiguous low likelihood *akomi ke* is actually impossible with ONE.

5.2. Variable likelihood

With predicates of variable likelihood, both *esto* and *akomi ke* are fine. But notice the difference in interpretation.

- (98) a Elises **esto to Provlima 1?** (Problem 1 is the easiest; negative bias)
 Did you solve even (*at least*) Problem 1?
- b Elises **akomi ke to Provlima 1?** (Problem 1 is the hardest; no bias)
 Did you solve even (*also*) Problem 1?

Akomi ke has only the expected *also* reading:

- (99) $x [x \text{ Problem 1 you solved } x] \quad x [x \text{ Problem 1 likelihood (you solve } x) > \text{likelihood (you solve Problem 1)}]$
 = Problem 1 is the least likely one to solve (hence the most difficult one).

This presupposition does not create negative bias: The speaker assumes that other problems were solved. Additionally, because *akomi ke* must pick out the least likely element, Problem 1 must be the hardest one. This describes correctly the conditions under which a polar question with *akomi ke* can be used. Notice that if we force *akomi ke* to combine with high likelihood, the result will be unacceptable, in accordance with what has been observed so far:

- (100) ?#Elises **akomi ke to efkolotero provlima?**
 Did you solve even (= also) the easiest problem?

This is odd, because the easiest problem is the most likely one to solve. With *esto*, on the other hand, we have the following presupposition:

- (101) $x [x \text{ Problem 1 } \neg \text{ (you solved } x)]$
 $x [x \text{ Problem 1 difficult } (x) > \text{difficult (Problem 1)}] \quad (esto)$

This presupposition creates negative bias: the speaker assumes that there are other problems besides Problem 1 that were not solved; and if Problem 1 is the least difficult one, then the question is about whether *at least* the least difficult problem is solved, hence the bias.

As expected, *esto* will be impossible with *the most difficult problem* exactly because of a conflict with its scalar presupposition:

(102) ?#Elises **esto to diskolotero provlima?**

Did you solve even (in the least) the most difficult problem?

As an overall conclusion, then, we can say that the behavior of EVEN-items in questions supports the polarity hypothesis in its entirety. The low likelihood EVEN of the scope theory actually predicts no bias, and this is in fact what we have seen with Greek *akomi ke*.

It will be helpful in this connection to consider again the Japanese particle *-sae*:

(103) Akira –wa **mondai 2-sae** toita no? (Yoshimura 2004: (23))

Akira.top problem 2.even solved Q

Did Akira solve even (=also) Problem 2?

As noted in Yoshimura (2004), Japanese is unlike Greek, but like English, in employing one EVEN in positive and negative sentences. But unlike *even*, in questions, *-sae* does *not* create negative bias:

(104) i. There are other problems besides problem 2 that Akira **solved**. Positive (no bias)

ii. Problem 2 is the **least likely** problem for Akira to solve.

Consequence: Problem 2 is a difficult one.

Japanese *sae* is just like *akomi ke*: it is only compatible with the context (104), consistent with the *also* reading of positive low-likelihood. Hence, we have again evidence that negative bias is not derivable from the low-likelihood of positive EVEN.

The behavior of English *even* in questions suggests that *even*, unlike *akomi ke* and *sae*, is in fact ambiguous between a reading with negative bias (akin to *esto/at least*) and an additive reading without bias (akin to *akomi ke/also*). An unambiguous analogue of the *esto* reading can be identified in the item *in the least*, which is a V modifier in English:

(105) a Did you in the least solve the easiest problem?

b # Did you in the least solve the hardest problem?

Just like *esto*, then, *in the least* cannot be associated with high scalar values.

To sum up, the behavior of EVEN items in questions seems to be entirely predictable by the refined polarity analysis I have been arguing for. Negative bias is derived by the

presupposition of minimal amount or low ranking at a scale other than likelihood that comes with *esto*, along with a negative existential presupposition that is also part of the contribution of this item. Crucially, low likelihood yields no bias in questions, but contributes the expected additive meaning that low likelihood items contribute in positive contexts in general.

6 Conclusion

The main point of this paper was to show that the scalar properties of what can be identified as an *even* meaning in English and crosslinguistically are quite complex, certainly much more than can be predicted by the single low-likelihood *even* posited by Karttunen and Peters' original analysis. This result can be seen as directly supporting earlier observations (Horn 1989, Kay 1990) that we need a more refined theory of the kinds of scales *even* can associate with.

In trying to go beyond the traditional dilemma of scope versus lexical ambiguity of *even*, I proposed that, in the larger crosslinguistic picture (English included), instead of talking about a unitary low likelihood EVEN, it is preferable to delimit a family of possible presuppositions of EVEN depending on the scale depicted (likelihood or not), how the scale is structured by EVEN (high scalar versus low scalar EVEN), and whether there is a negative condition of the alternatives or not. These options allow for a number of possibilities, some of which may be lexicalized within and across languages. We have identified four such lexicalizations in Greek: *akomi ke*, which is indeed a low likelihood EVEN that must scope above negation (thus its status as a positive polarity item); *oute*, which is a well-behaved high-scalar negative polarity item (NPI) licensed in the scope of negation; flexible scale EVEN, *esto*, which is a low-scalar polarity EVEN, defined not on likelihood but on a contextually specified scale; and *kan* which is a high scalar likelihood EVEN that comes with a positive existence presupposition (unlike NPI *oute* whose high scalar value comes with a negative existence statement. Because of their high scalar values both *oute* and *kan* were shown to be fine in the scope of negation). Additionally, English was shown to offer distinct lexicalizations of two of the meanings we found in Greek in the forms of *in the least* (*esto*) and *so much as* (*kan*).

An important part of the discussion was devoted to showing that the presuppositions of the EVEN items, as well as their lexical featural specification (NPI-*oute*), are necessary in order to motivate their scopal behavior. This is an important conceptual point, as it shows that polarity status is lexically driven rather than stipulated (as is the case in the bare scope theory where raising of *even* above negation is merely stipulated). The scalar presupposition of bottom-of-scale EVENS (positive as well as flexible scale) was shown to remain problematic in the scope of negation because of a clash between the assertion with a bottom of scale item, and the expectation of a stronger statement (i.e. with scale reversal) induced by the use of the scalar particle. In the case of low-likelihood EVEN (*akomi ke*) the problem can be fixed by *overt*

raising above negation-- though, as I pointed out, this is more of a 'rescuing' operation rather than actual sanctioning (hence the relative markedness of such cases wrt NPI *oute*). But raising is not an option available for *esto* which therefore remains ill-formed inside the scope negation.

Crucially, even after overt raising above negation, low likelihood *akomi ke* is incompatible with the cardinality predicate ONE. Likewise, low scalar *esto* does not improve with ONE under negation. These facts challenge the utility of bottom-of-the-scale inferences in explaining the distribution of EVEN-*one* PIs that are actually *impeccable* in the scope of negation (Lahiri 1998). Additionally, the fact that *akomi ke ena* and *esto (ke) ena* 'EVEN ONE' appear in nonveridical contexts, while remaining problematic with negation and downward entailment runs counter to Lahiri's idea that negation and downward entailment are necessary and sufficient conditions for improvement of EVEN ONE PI-construals. Obviously, this is not the case with the EVEN items we discussed here; and worse, negation and DE actually make *esto (ke) ena* and *akomi ke ena* unacceptable, as we have seen consistently. The improvement with nonveridicality (which is also observed with the Hindi *bhii*-PIs discussed by Lahiri) seems to be entirely missed in Lahiri's account.

Rooth's original idea, then, about the role of polarity in EVEN was shown to have far-reaching consequences. At the same time, as I said, by deriving the (in)compatibility with negation from the lexical content of the relevant polarity expressions, we made one step forward compared to earlier approaches, which stipulated PI-hood as a mysterious composition-external property of PIs. One final question remains: How is *even* to be analyzed in this framework? Are we to say that English *even* is an ambiguous item, or would it still be possible to use the low likelihood analysis to account for its distribution?

The low likelihood and raising analysis of the scope theory renders *even* a PPI. However, there are important empirical differences between the true PPI-EVEN *akomi ke*, which we identified here, and *even* that cannot be glossed over. For example, *akomi ke* (a) is odd in the surface scope of negation, locally as well as long distance; (b) remains odd in positive as well negative sentences when combined with the cardinality *one*; (c) is incompatible with expressions of high-likelihood in general; and (d) retains an additive meaning that does not produce negative bias in questions. These are all properties expected from an unambiguous wide scope low-likelihood EVEN, as we have seen. But *even* exhibits the exact opposite behavior: (a) it is unproblematic in the surface scope of negation, also with the predicate *one*, (b) it remains inside the scope of negation across tensed boundaries; (c) it combines with expressions of variable likelihood; and (d) is ambiguous in questions between the additive meaning of *akomi ke*, and one that produces negative bias which renders *even* equivalent to *esto*. These asymmetries obviously suggest that *even* covers the additional space of NPI-EVEN and flexible scale *esto*, and I cannot see how we can correctly characterize this variable behavior in a non-stipulative way without resorting to some sort of lexical ambiguity.

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