POLY and a novel NPI analysis[*]

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Περίληψη

Το δεσμευμένο μόρφημα πολυ- *παρουσιάζει κατανομή πολικότητας. Αντίθετα με το ελεύθερο μόρφημα* πολύ, *το δεσμευμένο* πολυ- *λειτουργεί ως Στοιχείο Αρνητικής Πολικότητας και σύμφωνα με τη Θεωρίας της Μη-Αληθειακότητας (Giannakidou 1994, 1997 και επομ.) εμφανίζεται μόνο σε αντι-αληθειακά περιβάλλοντα. Υποστηρίζω ότι η νομιμοποίηση πολικότητας του* πολυ- *συμβαίνει συντακτικά ως σχέση συμφωνίας μεταξύ του μη-ερμηνεύσιμου [uNeg] χαρακτηριστικού του και του ερμηνεύσιμου [Neg] χαρακτηριστικού του αντι-αληθειακού τελεστή. Η διαφορά στη σημασία του ελεύθερου* πολύ *και του δεσμευμένου* πολυ- *αποτυπώνεται στις ξεχωριστές σημασιολογικές δηλώσεις του κάθε στοιχείου.*

Λέξεις-κλειδιά: Στοιχείο Αρνητικής Πολικότητας, άρνηση, πολύ, μη-αληθειακότητα, τροποποιητής βαθμού

1   Introduction

The free morpheme *poly* 'much/a lot' belongs to the category of adverbs of degree that do not show restricted distribution.

(1)   a. I   Ioanna dhen kimithike **poly** xthes vradi.
        the Joanne not   slept.3sg a-lot last   night
        'Joanne didn't sleep a lot last night'
    b. I   Ioanna kimithike **poly** xthes vradi.
        the Joanne slept.3sg much last   night
        'Joanne slept a lot last night'

Regarding the degree of Joanne's sleeping, what the speaker implies by uttering (1a) is that she didn't slept adequately, but not a lot, as she did in (1b). In other words, the degree of Joanne's sleeping in (1a) is less than a lot.

Like the free *poly* 'a lot/much', its bound counterpart, the item *poly-* 'much', is also used as a degree modifier.

(2)   a. I   Ioanna dhen **poly**-kimithike xthes vradi.
        the Joanne not   much-slept.3sg last   night
        'Joanne didn't sleep much last night'

b. *I   Ioanna **poly**-kimithike xthes vradi.
   the Joanne much-slept.3sg last   night
   Lit: 'Joanne slept much last night.'

However, its distribution is restricted only to negative contexts, as the ungrammaticality of the affirmative sentence in (2b) shows, proving that it is a Negative Polarity Item (NPI). In addition, by uttering (2a), what the speaker conveys is that Joanne slept only a little, contrary to (1a), where Joanne slept adequately.

That the morphologically constructed modification of verbs with the bound element *poly-* 'much' is licit only under the scope of negation has drawn some attention to the Greek literature (Delveroudi and Vassilaki 1999; Efthimiou and Gavriilidou 2003; Ralli 2004; Dimela and Melissaropoulou 2009). Focusing on the phonological, semantic and structural properties of the element, it has been pointed out that this bound element combines only with verbal bases in negative sentences to form compounds being used as first constituents. Here, I will go one step further arguing that *poly-* is a strong NPI only being licensed by the antiveridical negation and *xoris* 'without' clauses, as opposed to its free counterpart *poly*.

This study addresses two main research questions: a) why is the bound *poly-* 'much', but not its free form *poly* 'a lot/ much', an NPI? In other words, why does *poly-* appear only in negative sentences, as opposed to *poly*, which appears both in negative and affirmative environments, and b) why is the meaning of the bound *poly-* different from that of the free *poly*? In other words, why does *poly-* mean 'a little' but not 'adequately', as the free morpheme does? The research is based on the *(Non)veridicality Theory of Polarity* (Giannakidou 1994, 1997; 1998; 2001 *et seq*.), which accounts for elements exhibiting restrictions on their licensing environments, as the English *anyone* and the Greek *kanénas*, and places no categorial restrictions on the items showing NPI behavior.

The paper is organized as follows: in Section 2, I argue that the bound degree modifier *poly-* 'much' is a strong NPI. In section 3, I show that *poly-* is associated with strong licensing (3.1), and I claim that its licensing is accomplished syntactically due to its uninterpretable [*uNeg*] (3.2). In section 4, I answer the question how the meaning of *poly-* differs from the meaning of *poly* by giving the semantics of each element. Section 5 concludes.

2   *Poly-* as a strong NPI

The framework followed in this research is the *(Non)veridicality Theory of Polarity* (Giannakidou 1994; 1997; 1998; 2001 *et seq*.) that captures a) the environments in which NPIs appear, and b) the distinction between different kinds of NPIs. Under this theory, Giannakidou provides a semantic account for the distribution of NPIs, i.e. for all the environments under which the property of (non)veridicality is applied. She defines (non)*veridicality* is a semantic property and NPIs as linguistic expressions sensitive to it:

(3)   *Veridicality and Nonveridicality*   (Giannakidou 2002: 33)

i. A propositional operator F is veridical iff Fp entails p: $Fp \Rightarrow p$; otherwise, F is nonveridical.
ii. A nonveridical operator F is antiveridical iff Fp entails *not p*: $Fp \Rightarrow \neg p$

(4) *Polarity item* (Giannakidou 2001: 669)
A linguistic expression α is a polarity item iff:
i. The distribution of α is limited by sensitivity to some semantic property β of the context of appearance, and
ii. β is non-veridical, or a subproperty thereof.

Therefore, NPIs are elements that appear in non-veridical contexts and are excluded from affirmative environments. There is a distinction between *strong* and *weak NPIs*. Strong NPIs are elements being licensed only in antiveridical contexts (negation and *without*-clauses). Weak NPIs are elements that occur in non-veridical contexts (questions, conditionals, modal verbs, imperatives, generics, habituals, disjunctions, and the antiveridical ones).

Given that the bound degree modifier *poly-* cannot appear in affirmative contexts, unlike its free counterpart *poly*, a question that arises is what kind of NPI *poly-* is. I argue that, according to the *(Non)veridicality Theory of Polarity*, *poly-* is as a strong NPI appearing under the antiveridical licensers of negation and *xoris* 'without', but not under the scope of non-veridical licensers, i.e. imperatives, modal verbs, conditionals, questions, generics, habituals, and disjunctions:

a. *Negation*
Like all NPIs, *poly-* occurs in negative environments, as in (5a), and is excluded from affirmative contexts, as in (5b) (repeated from (2)):

(5)   a. I   Ioanna dhen **poly**-kimithike xthes vradi.
           the Joanne not   much-slept.3sg last   night
           'Joanne didn't sleep much last night'
       b. *I   Ioanna **poly**-kimithike xthes vradi.
            the Joanne much-slept.3sg last   night
            Lit: 'Joanne slept much last night.'

b. *Xoris-* 'without' clauses
Poly- also appears embedded in *xoris*-clauses:

(6)   I Ioanna egrapse   dhiagonisma xoris   na   **poly**-dhiavasi.
       the Joanne wrote.3sg exam   without SUBJ much-sleep.3sg
       'Joanne took an exam without studying much.'

c. *Imperatives*
Like many strong NPIs, *poly-* does not occur in imperatives:

(7)   ***Poly**-dhiavase   ghia to   dhiagonisma!
         Much-study.2sg.imper for   the exam

Lit: 'Study much for the exam!'

d. *Modal verbs*

Sentences with *poly-* under the scope of modal verbs are ill-formed:

(8)   *I   Ioanna bori na   **poly**-dhiavasi.
        the Joanne may SUBJ much-study.3sg
        Lit. 'Joanne may study much.'

e. *Conditionals*

Like other strong NPIs, *poly-* does not produce well-formed sentences when occurring as the antecedent in conditionals:

(9)   *An i   Ioanna **poly**-dhiavasi, tha pari   A.
         if   the Joanne much-studies   will take.3sg A
        Intended. 'If Joanne studies much, she will take an A.'

f. *Questions*

In *yes-no* questions, the bound *poly-* does not allow well-formed sentences:

(10) ***Poly**-dhiavase   i   Ioanna?
         much-studied.3sg the Joanne
        Intended: 'Did Joanne study much?'

g. *Generics*

The context of generics cannot license the occurrence of *poly-*:

(11) *Kathe fititis   **poly**-dhiavazi.
         every student much-studies
        Lit: 'Every student studies much.'

h. *Habituals*

Verbs with *poly-* and the presence of habituals in a sentence are ill-formed:

(12) *I   Ioanna sinithos **poly**-maghiveri.
         the Joanne usually much-cooks
        Lit: 'Joanne usually cooks much.'

i. *Disjunctions*

The context of *poly-* cannot license the bound degree modifier *poly-*:

(13) *I   itan tixeros ke   perase   tin eksetasi i   **poly**-dhiavase.
         either was lucky and passed.3sg the exam   or   much-studied.3sg
        Lit: 'Either he was lucky and passed the exam or he studied much.'

Therefore, as its narrow distribution shows, *poly-* clearly belongs to the category of strong NPIs, only occurring under the scope of the antiveridical negation and *xoris* 'without'.

3   The syntax of POLYs

3.1 Strong licensing

Given that *poly-* 'much' is a strong NPI, a question that arises now is whether it is licensed locally by negation or it permits long-distance dependencies. Giannakidou (1995; 1997; 1998) and Giannakidou & Quer (1995; 1997) associate strong NPIs with strong licensing: they cannot be licensed by the negation in main clauses when appearing as complements in embedded clauses. Here, I argue that *poly-* is associated with strong licensing too, showing that it can only be licensed locally in the domain of sentential negation.

More specifically, *poly-* exhibits opacity effects when appearing in indicative embedded clauses with the complementizer *oti*:

(14) a. Ipa   oti dhen poly-dhiavases ghia tin eksetasi.
         said.1sg that not   much-studied.2sg for the exam
         'I said that you didn't study much for the exam.'
     b. *Dhen ipa   oti poly-dhiavases   ghia tin eksetasi.
          not   said.1sg that much-studied.2sg for   the exam
         Lit: 'I didn't say that you studied much for the exam.'

Embedded clauses with the complementizer *pu* are also opaque for long-distance dependencies of *poly-* on the negative operator *dhen*:

(15) a. Mu ipe   pu   dhen poly-dhiavazis.
         me told.3sg that not   much-study.2sg
         'He told me that you don't study much.'
     b. *Dhen mu ipe   pu   poly-dhiavazis.
          not   me told.3sg   that much-study.2sg
         Lit: 'He didn't tell me that you study much.'

Regarding subjunctive embedded domains with the complementizer *na*, Giannakidou shows that Greek emphatics, which are strong NPIs, are licensed when the negative operator is in the main clause. However, unlike emphatics, *poly-* seems to not allow long-distance licensing when occurring in *na* subjunctive embedded clauses[1].

(16) a. Bori na   min poly-dhiavases   ghia tin eksetasi.
         might SUBJ   not much-studied.2sg for   the exam
         'It can be the case that you didn't study much for the exam.'
     b. *∕?Dhen bori   na   poly-dhiavases   ghia tin eksetasi.

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[1] Giannakidou and Quer (1997) point out also cases of subjunctive embedded domains which are opaque, as in Catalan.

not   might SUBJ much-studied.2sg for   the exam
Intended: 'It can't be the case that you studied much for the exam.'

Therefore, *poly-* is licensed only locally by negation exhibiting opacity effects with long-distance dependencies, when occurring in *oti-* and *pu*-indicative and *na*-subjunctive embedded clauses and restricting its distribution to the boundaries of mono-clausal structures.

3.2 POLYs in structure

So far, I have shown that *poly-* 'much' is a strong NPI, being licensed by antiveridical operators, like negation and *xoris-* 'without' clauses. Moreover, this licensing can happen only locally, since *poly-* exhibits locality effects with the sentential negation. I propose a syntactic analysis for its licensing. Although *poly-*, like all NPIs, is sensitive to its semantic environment, I argue that its licensing is accomplished syntactically.
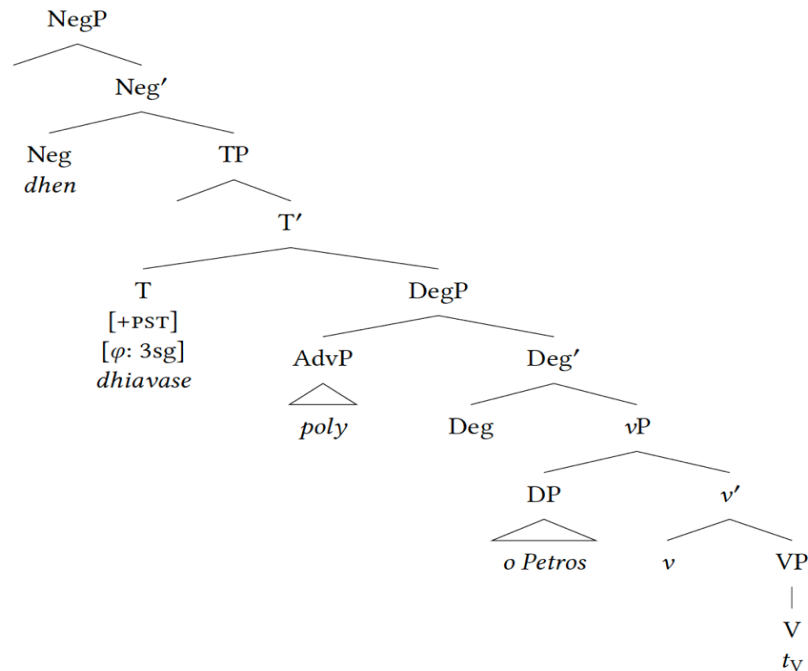
Before I give the syntax of the bound *poly-*, it is instructive to see the lexical features and the position of its free counterpart *poly* in the syntactic structure, which is of the category of adverbs.

(17)   *Poly*   CAT: [Adv]
                 INFL: [-]
                 SEL: [< - >]

For a sentence with the free degree modifier *poly*, as in (18), I assume the syntactic derivation in (19):

(18)   O   Petros dhen dhiavase   poly.
       the Peter   not   studied.3sg much
       'The student didn't study much.'

(19)

```
NegP
 |
 Neg'
 ├── Neg
 │   dhen
 └── TP
      |
      T'
      ├── T
      │   [+PST]
      │   [φ: 3sg]
      │   dhiavase
      └── DegP
           ├── AdvP
           │    poly
           └── Deg'
                ├── Deg
                └── vP
                     ├── DP
                     │    o Petros
                     └── v'
                          ├── v
                          └── VP
                               |
                               V
                               t_V
```

As (19) shows, the free *poly* is generated at the specifier of the functional phrase DegP. The verb moves, via Head Movement (Travis 1984), to T to get subject-agreement and tense[2]. That *poly* sits in the specifier position of DegP comes from the fact that it can appear in complex heads with other elements:

(20)   O   Petros dhen dhiavase   para poly.
        the Peter   not   studied.3sg very much
        'Peter didn't study very much.'

On the other hand, the bound degree modifier *poly-* 'much' needs to be licensed locally by antiveridical operators, such as negation. Working on the NPI *oute* 'even', Giannakidou (2007) proposes that its licensing is related to the local relation it has with negation and the uninterpretable negative feature, [uNeg], *oute* hosts. This feature, which is a characteristic it shares with other NPIs, needs to be checked by the interpretable [*Neg*] feature of sentential negation (Giannakidou 1997, 2007, Zeijlstra 2004, 2008). Following this account, I assume that *poly-* contains an inflectional uninterpretable feature [*uNeg*] that requires the presence of a matching categorial interpretable feature [*Neg*], in order for the sentence to be grammatical. This interpretable [*Neg*] feature is found in the negative operator *dhen* 'not':

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[2] Following Spyropoulos and Revithiadou (2009), I assume that T is subject of fusion between T and Agr. However, I omit discussing other functional categories in the verbal projection, such as Voice and Aspect (see Merchant 2015 for a relevant discussion).

(21) *Dhen*
$$\begin{bmatrix} \text{CAT:} & \text{[Neg [\textit{Neg}]]} \\ \text{INFL:} & \text{[-]} \\ \text{SEL:} & \text{[<TP>]} \end{bmatrix}$$

(22) *Poly-*
$$\begin{bmatrix} \text{CAT:} & \text{[Deg]} \\ \text{INFL:} & \text{[\textit{uNeg}]} \\ \text{SEL:} & \text{[<\textit{vP}>]} \end{bmatrix}$$

Unlike its free counterpart, the bound *poly-* belongs to the category of Deg. I argue that the its licensing is accomplished syntactically via the operation of Agree (Chomsky 2000; 2001). The negative operator *dhen* 'not' with the interpretable [*Neg*] feature c-commands *poly-* with the uninterpretable [*uNeg*] feature. The [*uNeg*] feature is checked and eliminated against the [*Neg*] feature of *dhen*. Therefore, the agreement happens via c-command, as schematically illustrated below:
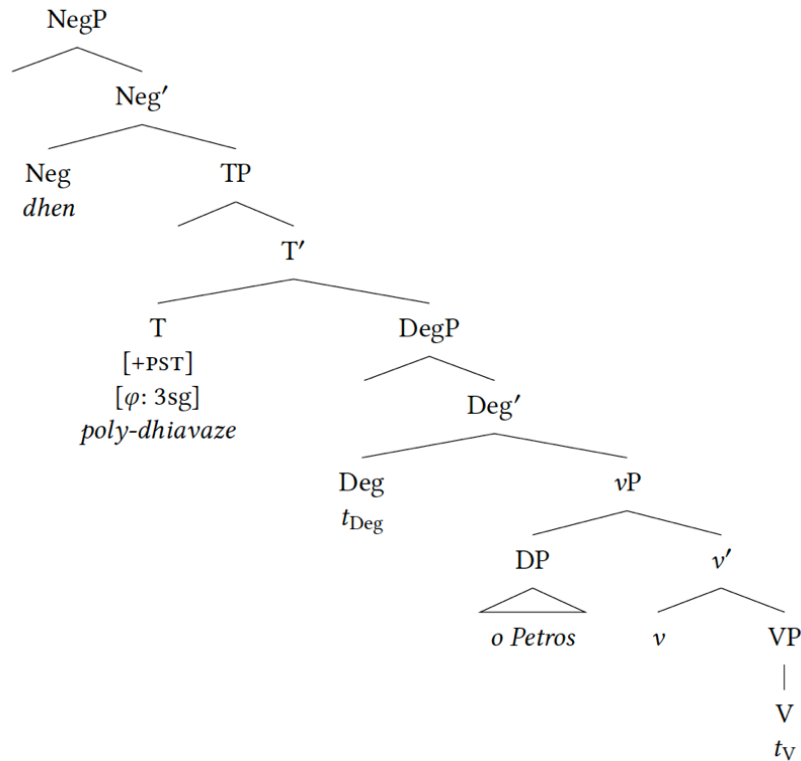
(23)
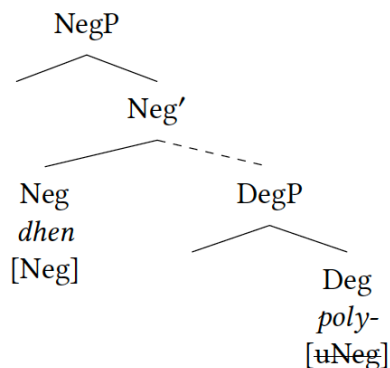
As (23) shows, *poly-* remains under the scope of negation. Its licensing happens in situ, thus no movement for checking is needed. Moreover, the fact that *poly* with the uninterpretable [*uNeg*] feature is licensed by the interpretable [*Neg*] feature of negation can also explain the impossibility of *poly-* to be licensed by non-veridical operators, such as questions and imperatives. Since non-veridical operators lack the [*Neg*] feature, the [*uNeg*] feature of *poly-* cannot be checked. For a sentence with the bound *poly-*, as in (24), I propose the syntactic derivation in (25):

(24)   O   Petros dhen poly-dhiavase.
      the Peter   not   much-studied.3sg
      'Peter didn't study much.'

(25)

```
NegP
 |
Neg'
 ├── Neg
 │    dhen
 └── TP
      |
      T'
      ├── T
      │   [+PST]
      │   [φ: 3sg]
      │   poly-dhiavaze
      └── DegP
           |
           Deg'
           ├── Deg
           │    t_Deg
           └── vP
                ├── DP
                │    o Petros
                └── v'
                     ├── v
                     └── VP
                          |
                          V
                          t_V
```

I argue that *poly-* is obligatorily generated at the head of the functional phrase DegP, unlike the free *poly*, which is generated in [Spec, DegP]. The formation of the verbal complex happens as a subject of Head Movement (Travis 1984): the verb moves to the Deg-head, where the bound morpheme is generated, creating a complex unit. Later on, the complex head moves even higher, i.e. to T[3].

Therefore, the free *poly* and the bound *poly-* occupy different positions in the syntactic derivation.

4   Two POLYs, two meanings

In this section, I answer the second question my study addresses, i.e. why the meaning of the bound degree modifier *poly-* differs from that of the free degree modifier *poly*. I posit that this difference can be explained by the semantics of the morphemes themselves.

Both Greek degree modifiers, the free *poly* and the bound *poly-*, occur under the scope of negation:

(26)   a. O fititis   dhen dhiavase   poly.

[3] See Alexiadou and Anagnostopoulou (1998) and Merchant (2015) for V-to-T movement in Greek.

the student   not   studied.3sg a-lot
'The student didn't study a lot'
b. O   fititis   dhen poly-dhiavase.
the student not   much-studied.3sg
'John doesn't really want Mary.'

However, its polarity sensitive behavior identifies *poly-* as an NPI, something that also affects its meaning. To capture the difference, I assume the scale of quantity for gradable predicates in (27):

(27)   *Scale of degree*
       <excessively, a lot, adequately, a little, very little, none>

In the scale in question, the value ADEQUATELY is the threshold representing the value close to the norm. The scale of degree itself is sensitive to contextual factors, and the threshold ADEQUATELY, like all scalar predicates, does not have a fixed value, rather it is context sensitive (Kennedy 2007). By uttering (26a) with the free *poly* under the scope of negation, what the speaker conveys is that the student did not study a lot. Therefore, the degree of the student's studying is below the degree A LOT, close to the value ADEQUATELY. This means that the student studied adequately, but not a lot. On the other hand, by uttering the negative sentence in (26b) with the bound *poly-*, what the speaker actually means is that the student studied a little or even less than a little. Here it is not the case that the student studied a lot or adequately. Instead, the degree of the student's studying moves below the contextually dependent threshold, at the degree A LITTLE, or even close to the lowest values on the scale.

In order to capture the difference in the meaning of the free *poly* and the bound *poly-*, I propose a semantic analysis under which there is a different denotation for each degree modifier. Starting with the free *poly*, I provide the structure in (28) as a simplified version of the sentence in (26a), where the subject is reconstructed to a lower position, i.e. below the negative operator *dhen*:

(28)
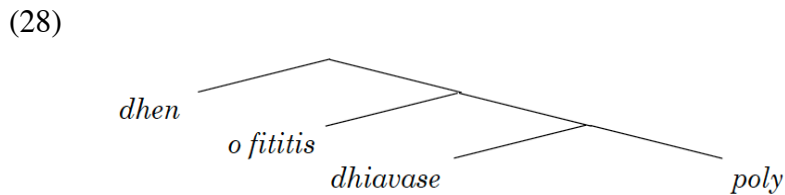
I argue that the negative sentence in (26a) is true if and only if the degree of the student's studying is below the quantity of A LOT. Formally, the denotation for the free degree modifier *poly* is given in (29). The semantics is a construction that involves a degree. It corresponds to the well-known generalized quantifier-style denotation that can also capture the presence of individuals. The free *poly* is a relation that takes a scalar predicate P and an individual argument x and returns True if and only if there exists a degree d such that x P above the degree ADEQUATELY:

(29) $[\![\text{poly}]\!] = \lambda P\lambda x.\exists d\ [P(x)\ (d) \wedge (d > \text{ADEQUATELY})]$

My analysis is also built on other denotations. In particular, the DP *o fititis* 'the student' denotes a unique student:

(30) $[\![\text{o fititis}]\!] = \iota x\ [\text{student}'\ (x)]^4$

The denotation I propose for intransitive verbs like *dhiavazo* 'study' is not the standard one. Here, intransitive verbs denote a function that takes an individual x and a degree d, which is assigned to the denotation of the free *poly*:

(31) $[\![\text{dhiavazi}]\!] = \lambda d\lambda x\ [\text{study}'\ (x)\ (d)]$

(32) $[\![\text{dhiavazi poly}]\!] = \lambda x.\exists d\ [\text{study}'\ (d)\ (x)] \wedge (d > \text{ADEQUATELY})]$

Finally, the standard denotation of the negative operator *dhen* is given in (33), where negation is a function that turns the opposite of the truth value of the proposition it combines with:

(33) $[\![\text{dhen}]\!] = \lambda p\ [\neg p]$

Given the denotations above, the compositional semantics of the sentence in (26a) with the free degree modifier *poly* is unremarkable and proceeds by function application and β-reduction as follows:

(34) $[\![\neg S]\!] = \neg\exists d\ [\text{study}'\ (\iota x\ [\text{student}'\ (x)])\ (d) \wedge (d > \text{ADEQUATELY})]$

Thus, in (34), the meaning of the negated sentence shows that now the degree of the student's studying is not above the degree ADEQUATELY. Rather, it is equal to the degree ADEQUATELY or even below.

Moving to the bound *poly-*, a simplified structure of the sentence in (26b) is presented in (35), and here again the subject is reconstructed to a position below *dhen*:

(35)
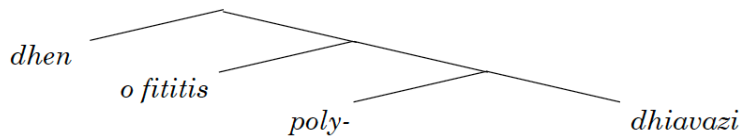
The denotation I propose for the bound degree modifier *poly-* is given in (36). It is similar to that of the independent form, though the degree maps to a different part on the scale. In

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[4] The denotation for the DP *o fititis* is derived by the denotations of the definite determiner *o* 'the' and the noun *fititis* 'student' by function application and β-reduction:
    (i) $[\![\text{fititis}]\!] = \lambda x\ [\text{fititis}'\ (x)]$
    (ii) $[\![\text{o}]\!] = \lambda Q\ [\iota x\ [Q(x)]]$

particular, *poly-* is a function that takes a scalar predicate P and an individual argument x and returns True if and only if there exists a degree d such that x P above the degree A LITTLE:

(36) $[\![\text{poly-}]\!] = \lambda P \lambda x.\exists d \, [\text{P}(x) \, (d) \wedge (d > \text{A LITTLE})]$

The verbal complex *polydhiavazi* 'much-studied' has the following denotation:

(37) $[\![\text{polydhiavazi}]\!] = \lambda x.\exists d \, [\text{study}'(d)(x)] \wedge (d > \text{A LITTLE})]$

Finally, given the denotation in (37), and assuming the same denotations for definite nouns in (30) and negation in (33), the compositional semantics of the sentence in (26b) proceeds by function application and β-reduction as follows:

(38) $[\![\text{S}]\!] = \neg\exists d \, [\text{study}' \, (\iota x \, [\text{student}'(x)]) \, (d) \wedge (d > \text{A LITTLE})]$

Given that the sentence combines with the negative operator, the direction of the degree of the bound modifier *poly-* changes and its degree maps to a value equal to A LITTLE on the scale in (27).

Therefore, my analysis derives the correct meaning for the Greek degree modifiers *poly* and *poly-*. The boundedness of the latter is captured not only syntactically, but also semantically with the denotations I propose here.

5   Conclusion

In this paper I presented an analysis of the NPI poly- making use of the *(Non)veridicality Theory of Polarity* (Giannakidou 1997; 1998 *et seq*.). I have shown that, while the free degree modifier *poly* exhibits no restricted distribution, the bound element *poly-* shows polarity behavior belonging to the category of strong NPIs only being licensed by the antiveridical operators of negation and *xoris-* 'without' clauses.

To answer the question of its polarity sensitive behavior, I argued that the bound *poly-* is associated with strong licensing, displaying opacity effects when appearing in indicative and subjunctive embedded clauses. I claimed that its licensing is an Agree relation between its inflectional uninterpretable [*uNeg*] feature and the interpretable [*Neg*] feature of the antiveridical operator. On the contrary, given that the free *poly* does not have a [*uNeg*] feature, it does not need to be licensed by negation, and thus, can appear in both negative and affirmative environments. Regarding the difference in meaning between *poly* and *poly-*, I provided distinct semantic denotations for each element indicating that the value of the NPI *poly-* is mapped to the lowest values on a degree scale.

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