

Comparative Correlatives in Greek: The Syntax of *oso*

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0. Introduction

- (1) *oso pio poli zahari tros toso pio poles thermides pernis*
as.much.as more sugar eat.2sg.pres that.much more calories get.2sg.pres
'The more sugar you eat, the more calories you get' (Greek)
- (2) The more sugar you eat, the more calories you get. (English)

Comparative correlatives, given in Greek and English in (1) and (2) above, are readily available in the world's languages. The expressions are productive in a wide variety of the world's languages and language families.¹ More noteworthy, there is no reference to or report of a language in the literature that does not have a productive strategy to derive comparative correlatives (Taylor 2006). This paper investigates Greek comparative correlatives and the morpheme *oso* which obligatorily occurs in the first clause. Our goal is to provide a unified analysis of comparative correlatives for Greek and English, and to motivate that this analysis can be extended to other languages as well.

Beyond this, we examine *oso* and its contribution in comparative correlatives, as well as in other places in the grammar. *Oso* is the neutral singular form of the Greek non-interrogative, bare *wh*-item *osos*. *Oso* also appears in equative comparatives (3) and free relatives (4).

- (3) *o vassilis ine toso psilos oso o yanis*
the Bill be.3sg.pres that.much tall.masc.sg as.much.as the John
'Bill is as tall as John'

- (4) *troi oso theli* (from Alexiadou & Varlokosta 1996)
eat.3sg.pres as.much.as want.3sg.pres
'He eats as much as he wants'

In the examples above, *oso* is glossed as "how much" and "as much as". We argue that *oso* is a definite quantifier (following Vlachou 2005) that expresses amounts. As such it can function as the measure phrase of a degree head (Deg⁰) in comparative correlatives. We're going to further argue that the syntactic properties of *oso* are similar in equative comparatives and in comparative

¹ Other than Greek and English, comparative correlatives have been reported in Maltese, Standard Arabic, Berber, Hebrew, Turkish, Khalkha Mongolian, Basque, Malayalam, Spanish, Italian, Portuguese (Brazilian and European), French, Latin, German, Dutch, Danish, Swedish, Russian, Polish, Bulgarian, Hindi, Japanese, Korean, Mandarin Chinese, and Hungarian. Each of these languages is discussed in one or more of the following references – Abielle, Borsley & Espinal, 2006; Beck, 1997; Borsley, 2003; Culicover & Jackendoff, 1999; Den Dikken, 2005; McCawley, 1988; Michaelis, 1994; Roehrs, Sprouse & Wermter, 2002; Taylor, 2006.

correlatives. In equative comparatives, *oso* functions as the measure phrase in the second degree phrase. Similarly, in comparative correlatives, it functions as the measure phrase in the degree phrase in the first clause (non-matrix). In both types of expression, the DegP A'-moves to a higher position in the tree.

The paper is organized as follows: In §1, we discuss the semantic analysis of *oso* advanced by Vlachou (2005). §2 is a more detailed presentation of comparative correlatives in Greek. §3 provides the review of the literature relevant to the theoretical assumptions we assume for our analysis (Chomsky, 1977; Kennedy, 1997; Kennedy & Merchant, 2000). In §4, we present our analysis of Greek comparative correlatives and the role of the quantifier *oso* as a measure phrase in these expressions. In §5, we examine some implications for this analysis. Specifically we address A'-movement out of the two clauses of comparative correlatives (observed in English by Culicover & Jackendoff 1999), and the striking similarity between Greek and English with respect to this behavior. We also propose that the movement of the DegP to clause-initial position is focus movement, in concert with the proposal by Tsimpli (1995). In §6, we extend the treatment of *oso* in comparative correlatives to equative comparatives, noting that its role as a measure phrase is the same in both types of expression. Lastly in §7 we conclude.

1. Semantics of *oso* (Vlachou 2005)

The semantic properties of *oso* have only recently been probed (Vlachou 2005, also Alexiadou & Varlokosta 1996, Alexiadou & Giannakidou 1998 for Greek bare *wh*-items). Vlachou (2005) analyzes *oso* as a definite quantifier expressing amounts and receiving a maximal interpretation based on the semantic properties that *oso* exhibits in free relatives (6), in comparatives (7), and in its temporal use shown in (8) where *oso* is translated as 'while':

(6) *troi oso theli*
eat.3sg.pres as.much.as want.3sg.pres
 'He eats as much as he wants'

(from Alexiadou & Varlokosta 1996)

(7) *o yanis ine pio psilos apo oso ine ta agoria tis taksis tu*
the John is more tall from how much are the boys of.the class his
 'John is taller than the boys in his class (are)'

(8) *oso o Petros dhiavaze eghe proseha to pedhi*
as.much.as the Peter study.3sg.imperf.past I take.care.1sg.imperf.past the child
 'While Peter was studying, I was taking care of the child'

(examples (7) and (8) are from Vlachou, 2005)

Vlachou argues that the semantics of *oso* in all examples above are revealing for its special status among the class of Greek bare *wh*-items and for the previous analyses that have been advanced regarding *wh*-items in English and in Greek. More specifically, Jacobson (1995) proposed that both bare and complex *wh*-items in English are definites whereas Tredinnick (1996) analyzed bare *wh*-items as existential quantifiers and complex ones as universal quantifiers. Alexiadou & Varlokosta (1996) analyze Greek bare *wh*-items as universal quantifiers (semantically equivalent to English complex *wh*-items) whereas Alexiadou & Giannakidou (1998) treat them as definites. Vlachou (2005) shows using a set of different diagnostics that *oso* is a definite quantifier (in

accordance with Jacobson (1995) and Alexiadou & Giannakidou (1998) and contra Alexiadou & Varlokosta (1996)).

1.1 *Oso* is a definite quantifier

One piece of evidence² that supports the argument that *oso* is a definite quantifier is that unlike universal quantifiers, which can be followed by exceptive sentences as shown in (9), ‘oso’ CANNOT as can be seen in (10):

(9) milisa se kathe mathiti ektos apo ton Christo
talk.1sg.past to every student apart from the Chris
 ‘I talked to every student apart from Chris’

(10) *efagha oso mu evales ektos apo to spanaki
eat.1sg.past how much me put.2sg.past apart from the spinach
 ‘I ate what you put me apart from spinach’

Further evidence that *oso* is a definite item, comes from the fact that *oso* can be modified by a universal quantifier as shown in (11), just like definite items can, as shown in (12), whereas universal quantifiers CANNOT as seen in (13):

(11) To efagha olo oso emine.
it eat.1sg.past all how much was left
 ‘I ate all that was left’

(12) Efagha olo to kreas pu emine.
eat.1sg.past all the meat that was left
 ‘I ate all the meat that was left’

(13) *To efagha olo kathe kreas emine.
it eat.1sg.past all every meat was left
 Lit. - ‘I ate all every meat was left’.

In addition, Vlachou shows that when *oso* is used as a temporal connective (as in example 8 above), it is paraphrased into a definite NP (14a) and not into a universal quantifier (14b):

(14) a. oso /tin periodho /tin ora pu o petros dhiavaze
as.much.as/ the period /the hour that the Peter study.3sg.imperf.past
 eggho proseha to pedhi
I take.care.1sg.imperf.past the child

² Vlachou provides evidence from different tests that shows that *oso* behaves like a definite quantifier. We will present here only a few of these tests, given space limitations. For a detailed discussion, see Vlachou (2005).

- b. # **tis periodus / tis ores** pu o petros dhiavaze
the periods /the hours that the Peter study.3sg.imperf.past
 egho proseha to pedhi
I take.care.1sg.imperf.past the child

The fact that *oso* in (14) cannot be translated into *whenever* (as predicted by Alexiadou and Varlokosta's analysis of Greek bare wh-items as universal quantifiers) but into *while* (i.e. a bare wh-item), has led Vlachou to conclude that *oso* is a definite quantifier and not a universal one, confirming Alexiadou and Giannakidou's proposal that Greek bare wh-items are definites and consistent with Jacobson's 1995 analysis for English wh-items.

1.2 *Oso* expresses amounts

Another interesting property that *oso* exhibits is that it behaves like a degree item, expressing amounts. As Vlachou points out, *oso* behaves differently from English complex wh-items when used in comparatives and in constructions expressing amounts. As can be seen in examples (15) and (16), *oso* is not translated into a complex wh-item: it is paraphrased into expressions that denote amounts (i.e. 'how much' or 'as much as').

- (15) o yanis ine pio psilos **apo oso** ine ta agoria tis taksis tu
the John is more tall from how much are the boys of.the class his
 'John is taller than the boys in his class (are)'

- (16) To efagha **oso** kreas emine.
it.cl eat.1sg.past how much meat was left
 Lit. - 'I ate how much meat was left'
 'I ate the meat that was left'

The use of *oso* in Free Relative clauses is revealing for this argument: In example (16), *oso* does not refer to a single entity, i.e. the 'meat' that was eaten, but to the 'amount of meat'. To make things more clear, consider the following example from English in (17) which is a classic Amount Relative clause:

- (17) We could never drink the wine that was spilled that night

In (17), two readings are available:

- a) restricted relative reading: We could never drink **the actual wine** that was spilled
 b) amount relative reading: We could never drink **the amount of wine** that was spilled.

It is the second reading we are concerned with here. It is that the referent of the relative clause is not the actual mass noun (**wine** in this case), but rather the **amount** of the mass noun. This is exactly the reading that *oso* in Free Relatives receives; the referent of *oso* in example (16) above is not **the actual meat** but the **amount of meat that was left**.

Vlachou explains this semantic property of *oso* by arguing that Free Relatives introduced by *oso* are Amount Relatives. How do we know that *oso*-relatives are Amount Relative clauses? Let us

examine some diagnostics (from Carlson 1977 and adopted by Vlachou 2005): First, *oso* can be modified by the quantifier *all* but not by the quantifier *some* as example (18) shows:

- (18) Efagha **olo**/**(*kapjo)** *oso* emine.
eat.1sg.past all/ some how much is left
 Lit. - I ate all/(**some*) that was left over.
 ‘I ate the same amount of food of all the food that was left over’
 *‘I ate some of the amount of food of the food that was left over’

In addition, as has been observed by Vlachou and also by Alexiadou and Varlokosta, there are restrictions on what type of nouns can appear with *oso* in Free Relatives. *Oso* cannot be used with singular count nouns as shown in (19):

- (19) **Oso* **pedhi** emine to pigha spiti tu.
how much child left it drive.1sg.past home his
 Lit. - *The child there was I drove him home.
 *‘I drove home the amount of child that was there’

Oso can only appear with singular mass nouns (20 & 21) and not with individual NPs (22).

- (20) *Oso* **kreas** ipirxe faghothike apo to liondari.
how much meat there was, was eaten by the lion
 Lit.- ‘The/what meat there was, was eaten by the lion’
 ‘The amount of meat that there was, the lion ate that much’

- (21) ipja *oso* **krasi** mu dosane
drink.1sg.past as much as wine me give.3pl.past
 ‘I drank what (lit. as much) wine (as) they gave me’

- (22) * ipja *oso* **potiri** krasi mu dosane
drink.1sg.past as much as glass wine me give.3pl.past
 * ‘I drank what glass wine they gave me’

(examples (21) and (22) are from Alexiadou & Varlokosta 1996)

Based on these empirical facts, Vlachou concludes that *oso* is a definite quantifier that expresses amounts and it is used to introduce Amount Relatives. Finally, she argues that *oso* is itself an amount item, considering the following two observations: First, as Alexiadou (1996) has pointed out, in Greek no other element is needed (i.e. an operator) to obtain the amount reading in these constructions (cf. with English); as we have seen, *oso* is the only item that is used. Second, as Vlachou observes, *oso* can stand as an answer to *quantity*-questions (23) and not to *identity*-questions (24) as can be seen below:

- (23) A: **Poso** ladhi aghorases?
 how much oil did you buy?
 B: *Oso* xoraje sto bukali
 ‘I took as much as could fit in the bottle’

- (24) A: **Pjo** ladhi aghorases?
what oil did you buy?
 B: #**Oso** xoraje sto bukali
 # ‘I took as much as would fit in the bottle’
- B: **Opjo** horaje sto bukali
 ‘Whatever would fit in the bottle’

Thus, we see that Greek possesses a special bare wh-item, *oso* which behaves like a degree item that denotes amounts when used in different types of expressions in the grammar. As we will see in the following section, *oso* receives a maximal interpretation based on its use in comparatives and as a temporal connective.

1.3 *Oso* expresses maximal degrees

Recall that *oso* does not appear only in Free Relatives: it is also used in comparatives and as a temporal connective meaning ‘while’. Vlachou argues that when *oso* is used in comparatives it expresses maximal degrees in that it refers to a maximal plural entity. This can be seen in example (25) where *oso* does not refer to the height of every single boy in John’s class but to only one height; the biggest one; thus example (25) means that *John is five inches taller than the tallest boy in his class*.

- (25) o yanis ine pende ekatosta psiloteros apo **oso** ine ta aghorja tis taksis tu
the John is five inches taller than how much are the boys in class his
 ‘John is five inches taller than the boys in his class’ (from Vlachou 2005)

As Vlachou points out “*oso* refers to the highest value of a degree of values or, otherwise, to its *maximal* one.” (Vlachou, 2005: 11).

That *oso* refers to a maximal plural entity can also be seen when *oso* is used temporally. Consider the example we have seen above repeated here in (26):

- (26) **oso** o Petros **dhiavaze** eghe proseha to pedhi
as.much.as the Peter study.3sg.imperf.past I take.care.1sg.imperf.past the child
 ‘While Peter was studying, I was taking care of the child’

Oso here does not refer to a unique event, as a definite item would, but to a sum of multiple events. This is evidenced by the fact that *oso* can only be compatible with imperfective aspect shown in (26) and not with perfective aspect as can be seen in (27):

- (27) * **oso** o Petros **dhiavase** eghe proseha to pedhi
as.much.as the Peter study.3sg.perf.past I take.care.1sg.imperf.past the child
 * ‘While Peter studied, I was taking care of the child’

On the assumption that perfective aspect is used in progressive contexts and is associated with frequent interpretation, examples (26) and (27) show that *oso* cannot refer to a single atomic event but to a ‘plural non-atomic one’ that is to an ‘amount’. As was the case with the comparative example in (25) above, *oso* in (26) ‘denotes a set of individuals in the form of

events but it picks as its reference only one which is the result of the sum of all the events which belong to this set' (Vlachou, p.11). The conclusion that Vlachou draws from these examples is that *oso* is definite quantifier that denotes a maximal plural entity either in form of 'degrees' (i.e. in comparatives and Amount Relatives) or in form of 'events' (i.e. when *oso* is used temporally) and thus *oso* involves both definiteness and maximality (in the sense of Jacobson 1995 and Link1983).

2. *Oso* in Comparative Correlatives

In the previous section, we have seen that in comparatives and free relatives *oso* behaves like a definite quantifier expressing maximal degrees. The item *oso* appears also in Comparative Correlatives as shown in (28):

- (28) **oso** pio poli **zahari** tros **toso** pio poles **thermides** pernis
as.much.as more sugar eat.2sg.pres that.much more calories get.2sg.pres
 'The more sugar you eat, the more calories you get'

Greek CCs consist of two clauses: The first is a subordinate clause obligatorily starting with the definite quantifier *oso*³ glossed as 'as much as', the second is the matrix clause obligatorily beginning with the demonstrative quantifier *toso*, glossed as "that much". The quantifier in each clause is followed by the comparative morpheme/particle *pio* or *perissotero*, both meaning "more." The comparative morpheme can modify an NP, AdjP, AdvP, or IP ((28) - (31) respectively).

- (29) **oso** pio **dinatos** ine o kafes **toso** pio **orea** gefsi ehi
as.much.as more strong be.3sg.pres the coffee that.much more good taste have.sg.pres
 'The stronger the coffee is, the better taste it has'

- (30) **oso** pio **grigora** teliosis ti dhulia su
as.much.as more soon finish.2sg.pres the work yours
toso pio **grigora** tha figis
that.much more soon fut leave.2sg
 'The sooner you finish your work, the sooner you will leave'

- (31) **oso** pio poli/perissotero **tros** **toso** pio poli/perissotero **pahenis**
as.much.as more eat.2sg.pres that.much more get. fat.2sg.pres
 'The more you eat the fatter you get'

As can be seen from the gloss in all of the examples above, *oso* in CCs also expresses amounts; specifically, in (28) *oso* refers to the amount of the mass noun 'sugar' one consumes and not to the actual sugar. In (31) *oso* refers to the amount (of food) and not to the actual food that one eats. Consider also the following example in (32) where *oso* appears with a plural count NP i.e. 'books':

³ Holton, Mackridge and Philippaki-Warburton (1997) use the term 'quantitative correlative' for *oso* and 'quantitative demonstrative' for *toso* in comparative correlatives.

- (32) **oso pio pola vivlia** diavasis, toso pio kala tha grapsis stis eksetasis
as.much.as more books.pl read.2sg that.much better fut write at.the exams
 ‘The more books you read, the better you’ll do at the exam’

In (32) *oso* denotes the amount of books that one needs to read in order to succeed in the exam and not the actual (or specific books) that one needs to read. Thus, *oso* in CCs expresses ‘amounts’ of the entity or ‘degree’ of the property/characteristic (see (29) and (30)) of the comparative constituent in the subordinate clause. We see then that *oso* behaves like an amount item not only in Free Relatives and Comparatives but also in Comparative Correlatives. Following Vlachou (2005), we will assume that *oso* is a definite quantifier that expresses amounts in CCs too and we will argue that as such it can function as the measure phrase of a degree head (Deg⁰) in CCs.

Finally, consider the demonstrative item *tosō* that appears in the matrix clause: *tosō* seems to behave like *oso*, in that it also expresses amounts (i.e. amount of calories in (28)) or degree of a property (i.e. the degree of the good taste in (29))⁴. Considering this fact, we will argue that in CCs both *oso* and *tosō* constitute measure phrases heading a QuantifierP.

3. Theoretical Background

3.1 Chomsky (1977)

Chomsky (1977) (“On Wh-movement”) demonstrates that WH-movement (henceforth, A'-movement) is a broader phenomenon than originally conceived. It does not only apply to wh-phrases where we expect to find them (like in direct and indirect questions, or relative clauses), but rather there are many different constructions in which A'-movement occurs. Further, A'-movement is always the same operation regardless of the construction it is found in – successive cyclic movement to Spec,CP. Chomsky demonstrates that A'-movement has the following properties:

- It leaves a gap
- Where there is a bridge, it can violate subadjacency, Propositional Island Condition (PIC) (that is, the tensed-S condition) and the Specified Subject Condition (SSC).
- It observes the complex noun phrase constraint (CNPC)
- It observes wh-island constraints

⁴ Further evidence that both items *oso* and *tosō* are associated with an amount/degree interpretation comes from their function in equative comparatives. Consider examples (1) and (2):

- (1) o yanis ine **tosō** psilos **oso** (ke) o vassilis
the John be.3sing.pres that much tall.masc.sing as.much.as (and) the Bill
 ‘John is as tall as Bill (is)’
- (2) o yanis efage **tosō** gliko **oso** ke i maria
the John eat.3sing.past that much dessert as.much.as and the Mary
 ‘John ate as much dessert as Mary did’

In (1) the two NPs ‘John’ and ‘Bill’ are compared and found to be identical with respect to the degree of their ‘height’. In (2), the comparison concerns the amount of dessert that ‘John’ and ‘Mary’ ate. We will revisit equative comparatives in the last section of the paper and we will show that the analysis we propose for Greek CCs can also be extended to account for the properties of *oso* and *tosō* in equative comparatives.

Following Chomsky (1973) and Vernaud (1974), Chomsky demonstrates that comparative deletion has the properties above:

- (33) a. John is as tall as Bill is
 b. John is as tall as I believe (that) Bill is
 c. i. John is as tall as I believe (that) Jane claimed (that) Bill is
 ii. * John is as tall as I believe Jane's claim that Bill is
 d. * John is as tall as I wonder whether Bill is
- (34) a. John is taller than Bill is
 b. John is taller than I believe (that) Bill is
 c. i. John is taller than I believe (that) Jane claimed (that) Bill is
 ii. * John is taller than I believe Jane's claim that Bill is
 d. * John is taller than I wonder whether Bill is

And relevant for us in this talk, Greek comparatives show the same properties.

What is A'-moving, however? There's nothing (overt) there. Not in English, not in Greek. In other more obvious examples of A'-movement (like movement of a wh-phrase in direct and indirect questions in (35) and (36)), we can see that an overt wh-word is moving to Spec,CP.

(35) [CP What [do [IP you like t]]]

(36) I wonder [CP what [[IP you like t]]]

With respect to comparatives, Chomsky (1977) postulates a WH-OP is moving to Spec,CP, just as the movement of wh-phrases in (35) and (36) proceeded. A WH-operator that is phonologically null appearing as the object of the lower verb. This operator A'-moves to Spec,CP of the lower clause, leaving a trace.

(37) John is as tall [PP as [CP WH-OP [[IP Peter (is) t]

(38) John is taller [PP than [CP WH-OP [[IP Peter (is) t]

Chomsky generalizes this and says this shouldn't be surprising because of two facts.

- In many dialects of English, comparatives like (37) and (38) have a version in which an overt wh-word appears (see (39), Chomsky's example (51)).
- In (39a) and (39b), the complement of the preposition ("than" or "as") is a free relative. In this way, nothing special has happened, because the preposition is taking a NP (i.e., DP) complement, exactly what we should expect.⁵

⁵ In the expressions in (37)-(38), the constituent that constitutes the object of the preposition is labeled as CP. Yet we say here, after considering (39) that this constituent is actually a DP, like a free relative. Which is it, CP or DP? Semantic and syntactic analyses of free relatives (e.g., Srivastav 1991, Dayal 1995, 1997, Caponigro 2003, Vries 2002, 2006) consistently treat them as nominals (DP or NP) that contain a CP. Within that CP, A'-movement of an overt wh-item or null operator takes place. Thus for ease of illustration, we have illustrated the CP constituent to

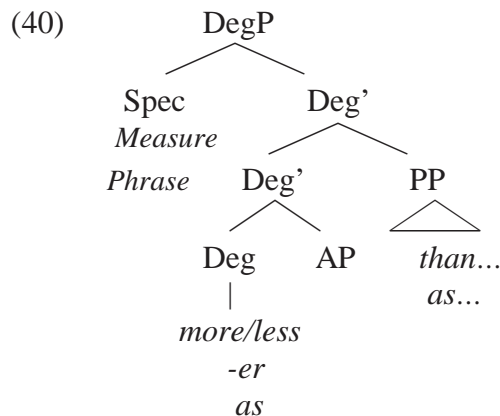
- (39) a. John is taller than what Mary is
 b. John is taller than what Mary told us that Bill is

Chomsky 1977's ex. (51)

Take home message of this: Comparatives obligatorily involve A'-movement: In English and in Greek. In English (taking dialects that allow (39) as exceptions), the A'-movement is of a null WH-operator.

3.2 Degree Phrases – Kennedy (1997, 1999)

Kennedy (1997) proposes the structure in (40) for degree phrases. This structure is partially based on Chomsky's analysis, but much of it is original to account for the semantics of comparative expressions. One major part that comes from Chomsky (1977) is that *than* in comparatives or *as* in equative comparatives is a preposition, heading a PP.



Consider the following comparative:

- (41) Homes in Boston are three times more expensive than homes in Virginia Beach

The parts of the DegP are the following: The degree head is a morpheme recognized as those lexical items in the language which express degree – *more*, *less*, *-er*, *as*:

- (42) Homes in Boston are three times **more** expensive than homes in Virginia Beach.

This degree head (Deg⁰) takes a complement – AP, an Adjective or Adverb phrase:

- (43) Homes in Boston are three times more **expensive** than homes in Virginia Beach.

The highest specifier of the degree phrase (Spec, DegP) is the position for measure phrases:

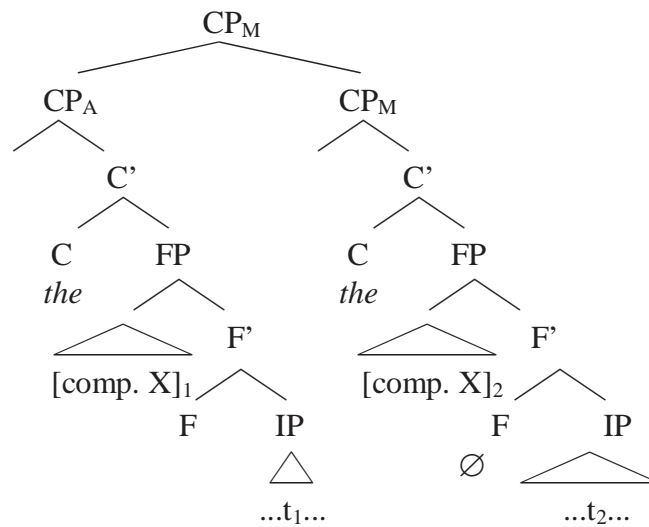
- (44) Homes in Boston are **three times** more expensive than homes in Virginia Beach.

demonstrate that the A'-movement is the same type of operation we see elsewhere in the grammar (e.g., (35) and (36)). But indeed, there is a level of structure missing in examples (37)-(38), namely that this CP is contained within a DP, the actual object of the prepositions *as* and *than*.

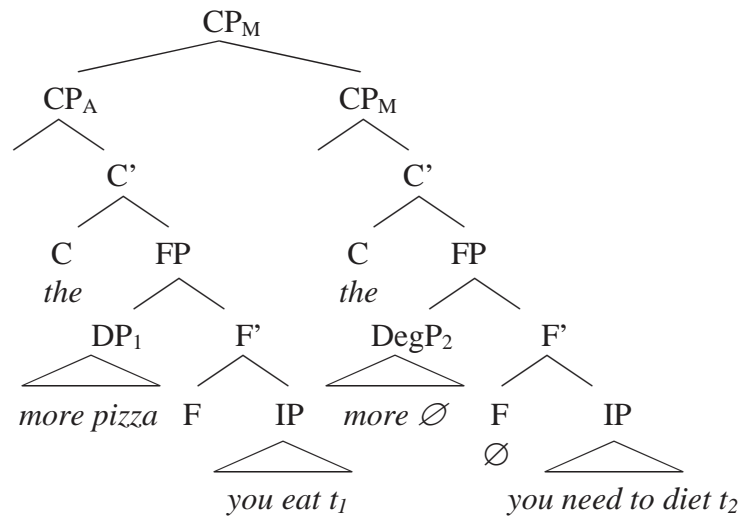
FP, the head of which triggers movement of the comparative constituent to its specifier; 4) the comparative constituent A'-moves from its canonical position inside the IP to Spec, FP; 5) and the adjunct clause is base-generated and adjoined high in the structure as an adjunct to the matrix CP.

For a clearer example, (57) is the same structure with actual lexical items inserted from example (56).

(56)



(57)



Culicover & Jackendoff report that this can occur in both the first and second clause of the comparative correlative. This description appears to be too broad. Taylor (2006) reports that speakers freely allow *that* in the first clause, but strongly disprefer *that* in the second clause, as in (ii):

(ii) * The more food that you eat, the fatter **that** you get.

This finding is taken to indicate a few things: (a) *that* in each clause is not freely optional; and (b) the possibility of its presence in the first clause (and lack of it in the second) supports an analysis of comparative correlatives in which the first clause is a type of relative clause, and the second clause is not.

We digress here briefly to discuss the classification of *the* as a C^0 . The first clause is classified as a CP because we observe A'-movement out of this clause (in both English and Greek). This is addressed directly in §5. For this movement to occur successive cyclically, we assume that this movement is to the specifier position of C. Under standard assumptions for English, we could propose that this C^0 is null in both clauses. However, this leaves with a mystery as to what the obligatory *the* at the start of both the first and second clause is. One possibility is that *the* heads a DP which contains the comparative constituent. In (57), this would entail the constituency of *the more pizza* in the first clause, and *the more* in the second. Yet, we see DPs nowhere else in the grammar that take this appearance. As it turns out, the word *the* that occurs obligatorily in clause-initial position evidences behaviors similar to an overt complementizer such as *that*-trace effect. Given these observations, we continue with the classification of *the* as a C^0 . For a complete discussion, see Taylor (2007, to appear(b)).

4.2 The structure of comparative correlatives in Greek

All things being equal, it would be preferable if the syntactic structure of comparative correlatives crosslinguistically were similar (at some point in the derivation). But, if we take (56) to be the structure of comparative correlatives in languages other than English (like Greek), it looks like there is a problem. There doesn't seem to be a place for *oso* (or *toso* likewise). Consider (46) again:

- (46) **oso** pio poli *zahari* tros **toso** pio poles *thermides* pernis
as.much.as more sugar eat.2sg.pres that.much more calories get.2sg.pres
 'The more sugar you eat, the more calories you get'

We could assume that *oso* can take the same position of *the*, since they act similarly (both are obligatory in the first clause), and since they show up in the same linear position (before the comparative):

- (58)a. **the** more sugar you eat **the** more Calories you get
 b. **oso** pio poli zahari tros **toso** pio poles thermides pernis

If this were true, this would be surprising. Why? The *the* that shows up in English CCs acts like a complementizer⁸ (cf., Taylor 2006, 2007). As we saw in §1, *oso* is a definite quantifier, modifying mass nouns. Given this, English CCs' *the* and Greek CCs' *oso* are not just instances of the same thing.

We could, instead, argue that *oso* and *the* are different things, and they have null counterparts in each language. If this is true, we just need to fit *oso* into the structure.

Under this idea, we would need a structure that reflects one of the two orders below:

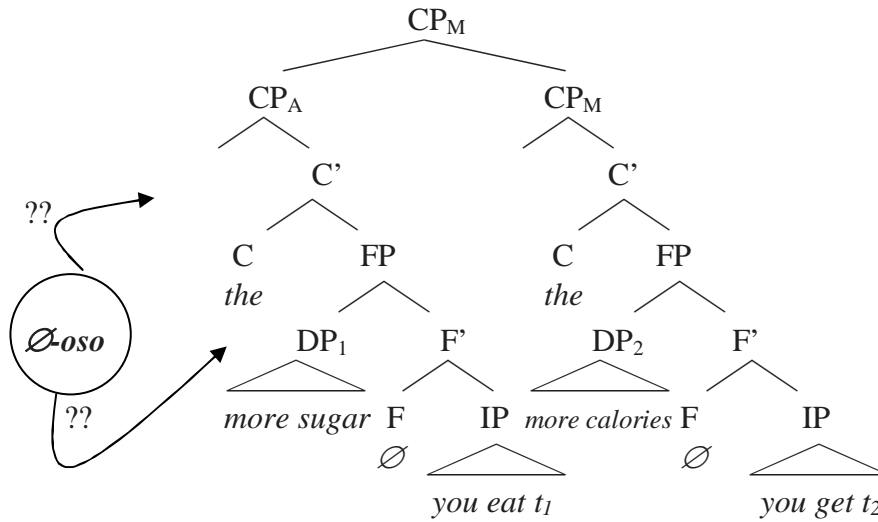
- (59)a. **the** ∅ More sugar you eat **the** ∅ More calories you get
 b. ∅ **oso** pio poli zahari tros ∅ **toso** pio poles thermides pernis

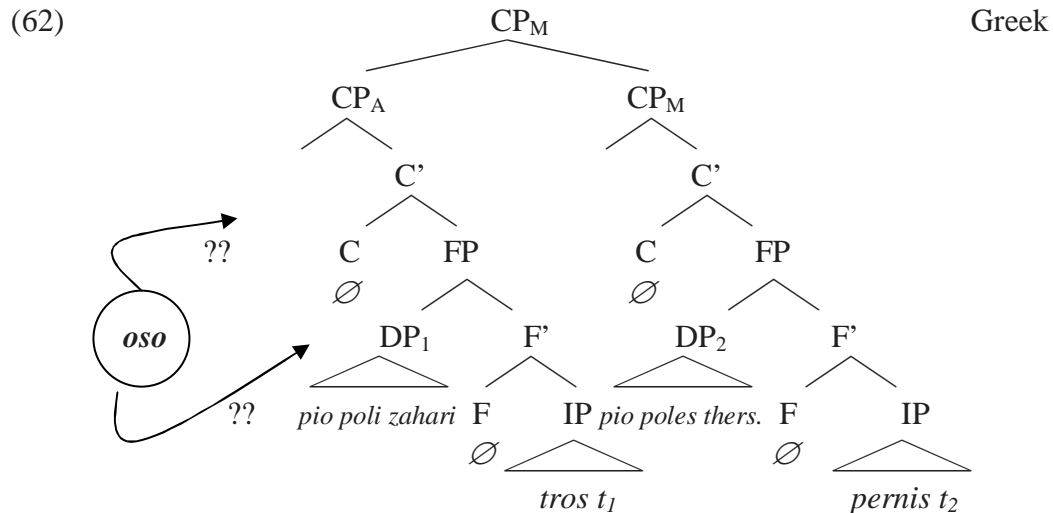
⁸ See Den Dikken (2005) for an analysis of the lexical item *the* in English CCs as a Deg⁰.

- (60)a. \emptyset **the** More Sugar you eat \emptyset **the** More calories you get
 b. **oso** \emptyset pio poli Zahari tros **toso** \emptyset pio poles thermides pernis

This seems to be a plausible idea, but where do we fit *oso* into the structure in Greek, or its null counterpart in English? Recall the structure we assumed for English CCs:

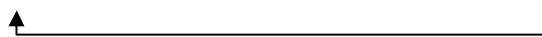
- (61) English





Could it be that *oso* is in Spec,CP? That might be possible, except for one empirical fact. Comparative correlatives in Greek allow A'-movement out of each clause as shown in the following examples:

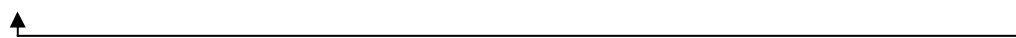
(63) [Pia themata]₁ nomizis oti oso pio poli diavasis t₁ toso pio kala tha grapsis stis eksetasis?



“Which materials₁ do you think that the more you read t₁ , the better you will do on the exam?”



(64) Pion₁ nomizis oti oso pio poli argis na paris to didaktoriko su toso pio poli apogotevis t₁?



Who₁ do you think the longer you spend in your PhD, the more you will disappoint t₁ ?



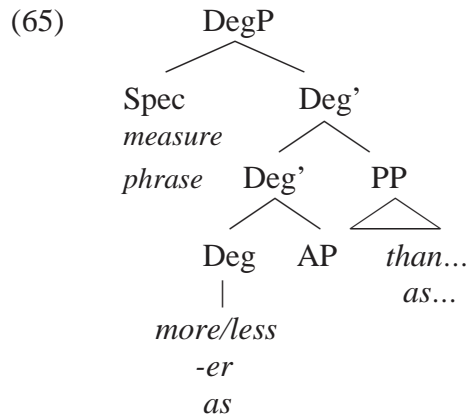
If *oso* is in Spec,CP, the A'-movement cannot proceed successive cyclically – and the prediction is that (63) and (64) above should be as bad as subjacency violations.

We will argue then that we have to look closely at the constituent that is in the Spec, FP in order to fit *oso* in the structure of CCs.

4.3 *Oso* in DegP in Spec,FP

So far we have said that the comparative morpheme and that which it modifies form a constituent, and that this constituent moves from within the IP of a clause to Spec,FP. But we haven't said anything about the internal structure of this “comparative constituent”. To figure out where *oso* goes (and presumably its null counterpart in English), we need to look closer at the syntax of this constituent.

Since comparative morphemes (*more*, *less*, or *-er* in English) are Degree heads (Deg⁰) in other types of expressions in the grammar, we assume that these same morphemes are degree heads in comparative correlatives as well. Given this, they project a degree phrase, just as what we saw in §3.2.

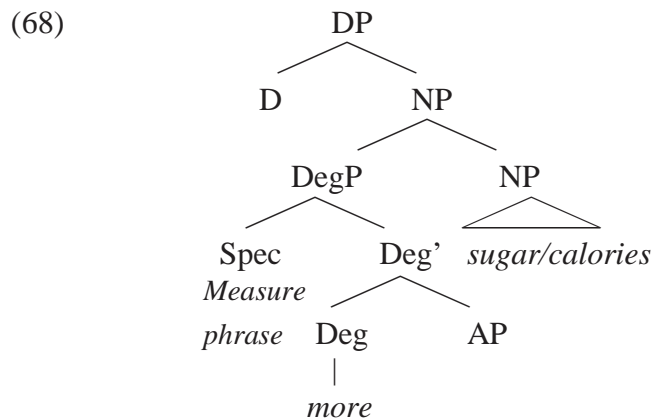


Let us assume that this DegP is base-generated within IP of each clause, and A'-moves to Spec,FP. The parts of a CC's DegP are similar to those in a standard comparative's DegP (that we saw above in §3.2). The complement of Deg⁰ can appear if the Deg⁰ modifies an AdjP or AdvP:

(66) The more **intelligent** a student is, the **easier** they will understand the material

If the comparative modifies a nominal, the DegP is adjoined to NP, which in turn is dominated by DP (similar to attributive comparative deletion as proposed by Kennedy & Merchant, 2000) as shown in (68) below. The entire DP moves to Spec,FP. (We'll address immediately below in this subsection why this entire DP moves, instead of just the DegP.)

(67) The more **sugar** you eat, the more **calories** you get



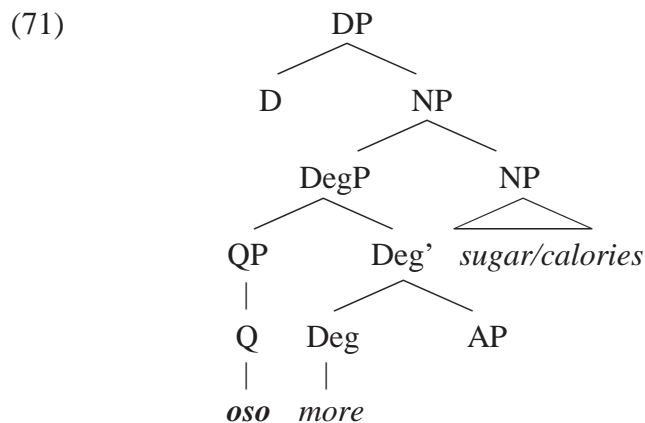
It is noted that in English CCs, the Deg⁰ of each clause of the CC cannot take a measure phrase. But why?

(69) * the **six hours** longer the storm lasts...

Den Dikken (2005) proposes that the measure phrase of the DegP in English is filled with a null morpheme. Though the micro-structure he proposes differs from the one proposed here in (56) (most notably, he treats the obligatory *the* as a Deg⁰), we critically adopt his null measure phrase in Spec,DegP. Den Dikken (2005) provides historical motivation for this measure phrase in English with examples like (70) (Den Dikken's (14b)).

(70) By how much the better then my word I am, by so much shall I falsifie mens hopes.
(Shakespeare, Henry the Fourth; 16th c.)

This measure phrase can no longer be overt in Modern English, and we concede that the motivation for this change and restriction is unknown. However, we can further support the argument that an obligatory measure phrase exists in English in Spec,DegP with evidence from Greek. We propose here that Greek *oso* is the overt counterpart to English's null measure phrase.



If we propose that *oso* is a quantifier, and the QP it projects constitutes a measure phrase, then this measure phrase will occupy Spec,DegP in the first clause of the comparative correlative. Its semantic interpretation is one of amount “as.much”.

What triggers movement of the DegP to Spec,FP? As we saw in §3.1, Chomsky (1977) proposes the A'-movement of a null Wh-operator to Spec,CP in standard comparatives. Let's assume that the same kind of movement occurs in comparative correlatives – likely, since we see the same kind of island violations we saw in comparatives. Since a WH-operator must be A'-moving, we propose that this WH-operator is *oso* in Greek, and a null counterpart in English. We propose (following Taylor 2006) that the movement of this QP, along with the DegP it is base-generated in the specifier position of, checks a feature of F.

In cases where DegP modifies an NP, why does the entire DP move, instead of just the DegP? We take this to be a result of the Left Branch Condition, which applies to both English and Greek (as demonstrated by Kennedy & Merchant 2000). In case of wh-movement of an attributive DegP, the entire NP must be pied-piped with the DegP in both English and Greek, as examples (72) and (73) illustrate:

- (72) a. ***How interesting** did Pico write **a novel**?
b. **How interesting a novel** did Pico write?

(73) a. ***Poso megalo** agorase o Petros **ena aftokinito**?
how big bought the Petros a car

b. **Poso megalo aftokinito** agorase o Petros?
how big car bought the Petros
 ‘How big a car did Peter buy?’

(Examples from Kennedy & Merchant 2000)

In cases of attributive comparative deletion, both Greek and English require that the NP that a DegP modifies may not be stranded when the DegP undergoes movement as shown in (74) and (75):

(74) * Erik drives a more expensive car than Polly drives a motorcycle.

(75) * O Petros agorase ena megalitero aftokinito apoti o
the Petros bought a bigger car than+what the
 Giannis agorase ena dzip
 John bought a jeep

(Lit. *Petros bought a bigger car than Giannis bought a jeep.)

(Examples from Kennedy & Merchant 2000)

This takes us back to our sentence in (46):

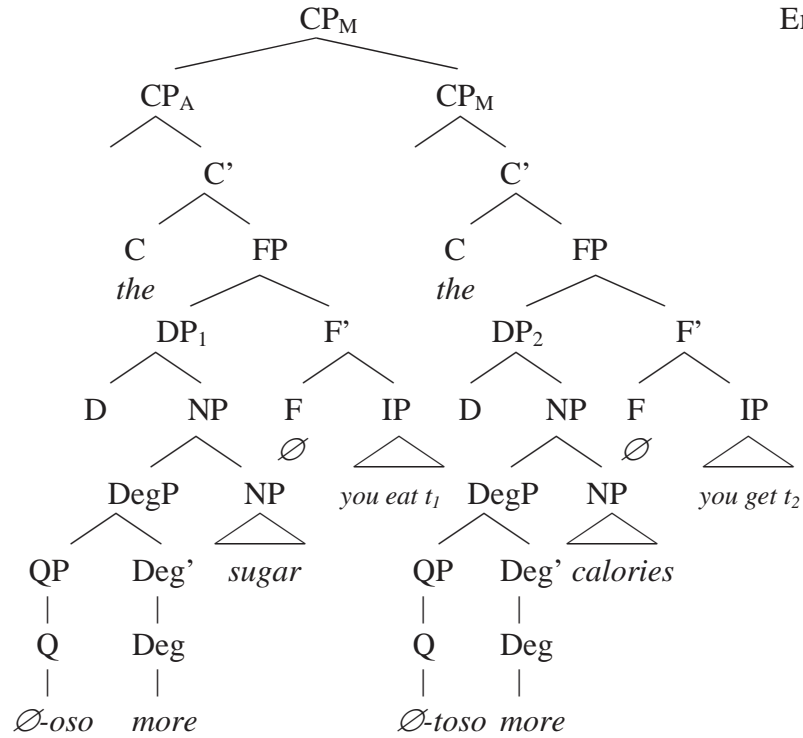
(46) **oso** pio poli **zahari** tros **toso** pio poles **thermides** pernis
as.much.as more sugar eat.2sg.pres that.much more calories get.2sg.pres
 ‘The more sugar you eat, the more calories you get’

In cases where DegP modifies a NP in CCs (see 76), the entire NP with the DegP must be moved to Spec, FP in both languages as shown in (77) and (78).

(76) a. **the** [_{DegP} [_{QP} \emptyset] more sugar] you eat, **the** [_{DegP} [_{QP} \emptyset] more calories] you get
 b. \emptyset [_{DegP} [_{QP} **oso**] pio poli zahari] tros, \emptyset [_{DegP} [_{QP} **toso**] pio poles thermides] pernis

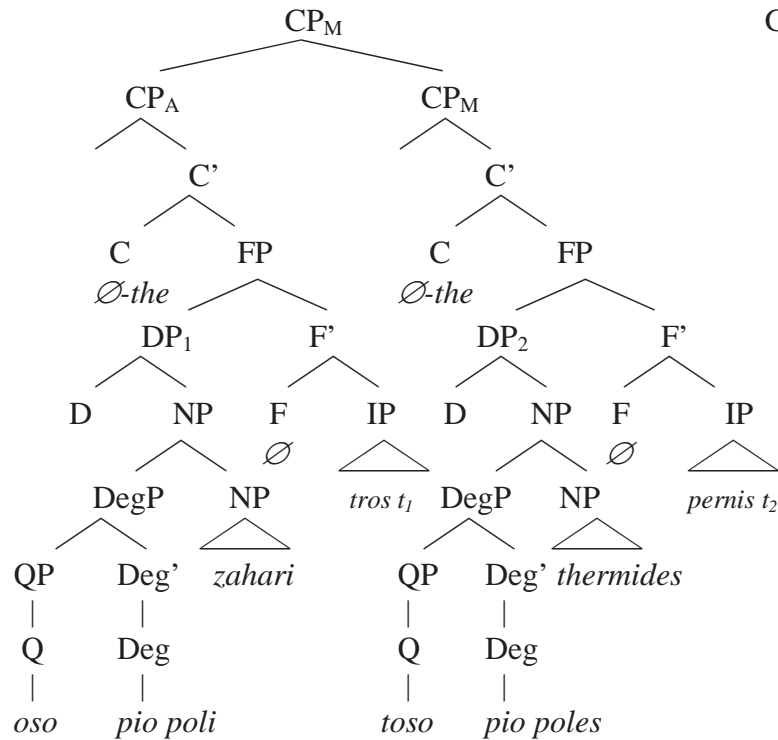
(77)

English



(78)

Greek



5. Implications

In the previous section, we have argued that the DegP A'-moves from its canonical position inside the IP to Spec, FP. We have assumed that 1) the movement of DegP is an instance of an operator movement, similar to comparatives, and 2) movement of DegP checks a feature of the head F. In addition, we have proposed that the adjunct clause is base-generated and adjoined high in the structure as an adjunct to the matrix CP. According to the structure in (78), the SpecCPs of both clauses are available for movement out of this clause to occur successive cyclically. As demonstrated by Culicover & Jackendoff (1999), in English CCs, movement out of both of the clauses is acceptable. Consider the base sentence in (79): the examples in (80) show movement out of each clause in order to form a relative clause, those in (81) show movement for topicalization, and those in (82) show wh-movement (all examples are from Culicover & Jackendoff (1999)).

(79) The sooner you solve this problem, the more easily you'll satisfy the folks up at corporate headquarters.

(80) a. \checkmark This is the sort of problem which₁ the sooner you solve t₁, the more easily you'll satisfy the folks up at corporate headquarters.

b. \checkmark The folks up at corporate headquarters are the sort of people who₁ the sooner you solve this problem, the more easily you'll satisfy t₁.

(81) a. \checkmark This problem₁, the sooner you solve t₁, the more easily you'll satisfy the folks up at corporate headquarters.

b. \checkmark The folks up at corporate headquarters₁, the sooner you solve this problem, the more easily you'll satisfy t₁.

(82) a. \checkmark Which problem₁ do you think that the sooner Bill solves t₁, the more easily he'll satisfy the folks up at corporate headquarters

b. ? Who₁ do you think that the sooner that Bill solves this problem, the more easily he'll satisfy t₁ ?

The issue that arises is whether we find the same empirical facts in Greek CCs. Since we have assumed the same structure for both English and Greek CCs, we predict that movement out of both clauses will be allowed in Greek too. Let us consider first the examples in (83) which illustrate Focus movement:

(83) a.* [TI MARIA]₁ oso pio poli flirtari o yanis t₁ toso pio poli
 THE MARY *as.much.as more flirts the John that.much more*
 zilevi o Giorgos.
get.jealous the George
 'It is Mary that the more John flirts with, the more jealous George gets'

- b. *[TUS GONIS SU]₁ oso pio poli argis na paris to didaktoriko su
THE PARENTS YOURS as.much.as more take.time subj get the PhD yours
 toso pio poli apogotevis t₁.
that.much more disappoint.2sg
 ‘It is your parents that the longer you spend in your PhD, the more you disappoint’

In (83a), the object of the predicate in the adjunct clause has been displaced to sentence-initial position whereas in (83b), the displaced element is the object of the predicate in the matrix clause. Focus movement in Greek is analyzed as an instance of Operator-movement of the focused constituent to the Specifier of a FocusP, in the left periphery of the clause (Tsimpli 1990, 1995 & Kiss 1998). All of our Greek informants consider the examples in (83) ungrammatical. However, they all consider grammatical the examples in (84) which involve Topicalization (Clitic Left Dislocation):

- (84) a. [Ti Maria]₁ oso pio poli ti₁ flertari o yanis toso pio poli
the Mary as.much.as more cl. flirts the John that.much more
 zilevi o Giorgos.
get.jealous the George
 ‘It is Mary that the more John flirts with, the more jealous George gets’
- b. [Tus gonis su]₁ oso pio poli argis na paris to didaktoriko su
the parents yours as.much.as more take.time subj get the PhD yours
 toso pio poli tus₁ apogotevis.
that.much more cl disappoint.2sg
 ‘It is your parents that the longer you spend in your PhD, the more you disappoint’

In Clitic Left Dislocation structures, the full DP is base-generated adjoined to IP and a clitic (coindexed with the full DP) occupies the argument position (Iatridou 1994, Anagnostopoulou 1994). The full DP undergoes movement from its adjoined position to a position in the left periphery of the clause (i.e. TopicP).

We observe then that focus movement is not allowed in CCs whereas Clitic Left Dislocation is. Finally, let us consider the examples in (85) which illustrate wh-movement:

- (85) a. √ Pia proionda₁ oso pio grigora pulisume t₁
which products as.much.as more quickly sell.1pl
 toso pio pola kerdi tha ehume?
that.much more profit fut have.1pl
 ‘Which products the more quickly we sell, the more profit we’ll have?’
- b. √ Pion₁ oso pio poli gnorizis t₁ toso pio poli ton ektimas?
who as.much.as more get.to.know2sg that.much more cl appreciate.2sg
 ‘Who the more you get to know, the more you appreciate him?’

- c. ?Pia₁ oso pio poli flertari o Yanis t₁
who as.much.as more flirts the John
 toso pio poli zilevi o Giorgos?
that.much more get.jealous the George
 ‘Who the more John flirts with, the more jealous George gets?’
- d. ?pios oso pio poli flertari o Yanis ti Maria
who as.much.as more flirts the John the Mary
 toso pio poli zilevi t₁?
that.much more get.jealous
 ‘Who the more John flirts with Mary, the more jealous he gets?’

All of our informants found the above examples to be acceptable. Furthermore, when presented with the following examples in (86) where the CCs are embedded under the stance predicate *think*, all speakers considered them grammatical.

- (86) a. √ [Pia themata]₁ nomizis oti oso pio poli diavasis t₁
which materials think.2sg that as.much.as more read.2sg
 toso pio kala tha grapsis stis eksetasis?
that.much more well fut write.2sg to.the exams
 ‘Which materials₁ do you think that the more you read t₁, the better you will do on the exam?’
- b. √ Pion₁ nomizis oti oso pio poli argis na paris
who think.2sg that as.much.as more take.time.2sg subj get
 to didaktoriko su toso pio poli apogoitevis t₁?
the PhD your that.much more disappoint.2sg
 ‘Who₁ do you think the longer you spend in your PhD, the more you will disappoint t₁?’

To summarize, the data in (83-86) show that movement of a Clitic Left Dislocated DP and of a *wh*-phrase out of either of the two clauses is allowed in Greek CCs whereas movement of a focused constituent is disallowed. How can we account for this fact? There seems to be an interesting interaction between Focus movement and movement of the DegP to the Spec,FP. Why is this so? Notice that both instances of movement involve operator movement to a Specifier position: A focused constituent moves to the Specifier of FocusP and the DegP in CCs moves to the Specifier of the functional projection FP. It may be then that the FP we postulated in CCs corresponds to the FocusP which is independently present in Greek. The logic of this argument is supported by two facts: First, there is obligatory movement of DegP from its canonical position in CCs, as there is movement of the Focused constituent in Focus structures too. Second, the DegP in matrix clause carries focal stress, similar to the displayed focused constituent.

We could assume then that FP is FocusP and that movement of the DegP and the focused constituent target the same landing site, namely the Specifier of FocusP, in examples (83) above and thus ungrammaticality arises. This idea appears to be supported by the empirical observation

that in Greek only one focused element is allowed in a sentence, as demonstrated by Tsimpli (1995):

- (87) *STO YANI TA VIVLIA dosame
to.the John the books give. 1pl.past
 ‘It is John we gave the books to’ (from Alexiadou & Anagnostopoulou 2000)

Tsimpli (1995) also shows that in main clauses, a focused phrase and a wh-phrase are disallowed as illustrated in example (88):

- (88) a. *TO JANI pios idhe?
the.acc John who.nom see.3sg.past
 ‘Who saw JOHN?’
- b. * pios TO JANI idhe?
Who.nom the.acc John see.3sg.past
 ‘Who saw JOHN?’

This is not observed, however, when the wh-phrase and the focused constituent are in different clauses and have distinct scope domains as the example in (89) shows or in embedded clauses where both a wh- and a focused phrase are allowed (90):

- (89) TO YANI rotisan pios efige
the.acc John ask.3pl.past who.nom leave.3sg.past
 ‘It was John that they asked who left’
- (90) me rotisan O YANIS pion sinandise
me ask.3pl.past the.nom John who.acc meet.3sg.past
 ‘They asked me who JOHN met’

Based on this evidence, Tsimpli (1995) argues that in main clauses there is only one operator position that can host a wh-phrase or a focused constituent, namely the Specifier of FocusP. Thus, ungrammaticality in (87) arises because the two foci compete for the same operator position, and in (88) because both the wh-phrase and the focused DP target the same landing site. Thus, main clauses lack a CP, which, as Tsimpli argues, is a selected category and appears only in embedded domains. This can be seen in (89), where the focused constituent occupies Spec, FP in the main clause and the wh-phrase is situated in the embedded Spec, CP. That both CP and FP are available in embedded domains can be seen in (90), where, as Tsimpli assumes, the focused constituent lands in Spec,CP and the wh-phrase in Spec,FP.

How does Tsimpli’s hypothesis relate to the empirical observations we noted here for Greek CCs? Since the data show that wh-movement is allowed in CCs, then there must a Spec,CP that hosts the wh-phrase or allows successive cyclic movement⁹ (see examples in 86). If our

⁹ What we do not demonstrate in detail here is how this successive cyclic movement takes place out of an adjunct. We will appeal to sideward movement (Nunes, 1995, 2004; Hornstein, 2001). Since the adjunct clause is adjoined high in the structure, sideward movement out of it is possible before the adjunction takes place. (see Taylor, 2006, to appear, for a detailed discussion).

assumption, namely that the FP in CCs corresponds to the FocusP in Greek, is on the right track, then we have to assume that two operator positions are available, that is both Spec,CP and Spec,FP which hosts the DegP in CCs. If, instead, we assume that there is a single operator position in CCs, then we cannot explain the wh-movement facts.

On the other hand, if we assume that the Spec,FP where DegP moves to, is indeed the Spec, FocusP, we can account for why movement of a focused element is not allowed in CCs: both DegP and the focused constituent target the same specifier position.

6. Extensions – *Oso* in Equative Comparatives

As we have seen in the Introduction, *oso* appears also in Equative Comparatives in Greek. In this section, we show that the analysis we have proposed for *oso* in CCs can be extended to account for the syntax of *oso* in Comparatives.

Equation in Greek comparatives is expressed by the use of the demonstrative quantifier *toso* ‘this/that much’ in the main clause and the definite quantifier *oso* ‘as much as, how much’ in the comparative clause (examples (91), (92), (93)). *Toso* can modify an adjective (91), a DP (92) or a PP (93).

(91) o yanis ine **toso** psilos **oso** (ke) o vassilis
the John be.3sing.pres that much tall.masc.sing as.much.as (and) the Bill
 ‘John is as tall as Bill (is)’

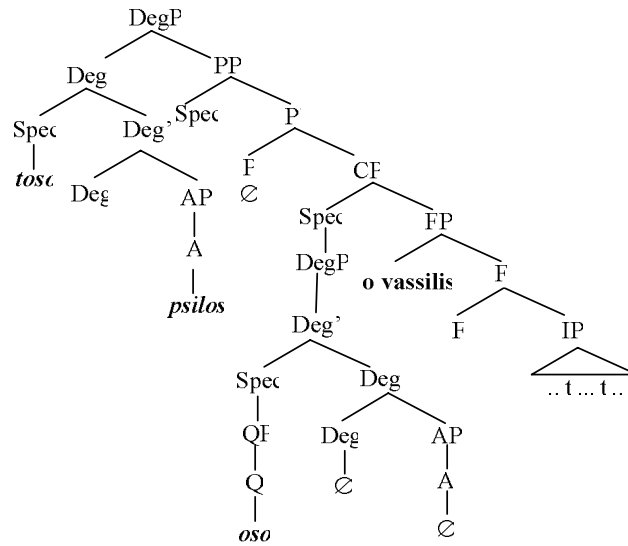
(92) o yanis efage **toso** gliko **oso** ke i maria
the John eat.3sing.past that much dessert as.much.as and the Mary
 ‘John ate as much dessert as Mary did’

(93) o yanis endiaferete **toso** gia tin eleni **oso**
the John be.interested.3sing.pres that much in the Helen as.much.as
 (ke) gia ti maria
(and) in the Mary
 ‘John is interested as much in Helen as he is in Mary’

(modeled after Holton et al. 1997)

We argue that we can treat *oso* in Equative Comparatives in exactly the same way that we treated it in CCs. Given the structure of DegP in (94), we assume that both *toso* and *oso* constitute measure phrases.

(94)



As the structure in (94) shows, *toso* is in Spec, DegP of the main clause. *Oso*, however, unlike *than* or *as* in English, does not behave like a preposition and thus can not head P. We propose that in Greek equative comparatives, the head of PP is null, and that its complement is CP, which in (94) corresponds to *o vassilis ine oso psilos*. The DegP *oso psilos*, is the complement of V. As in CCs, in Spec, DegP is a QP, headed by the Q *oso*; the remaining items in DegP are null. Following Kennedy (1997), we argue that DegP A'-moves to Spec, CP, and therefore *oso* is phonologically realized immediately preceding the IP. (The DP *o vassilis* moves to Specifier, FP; *ine psilos* is phonetically null; see Merchant 2006 for a theory of ellipsis in Greek comparatives). This structure predicts that wh-items should not co-occur with *oso*, since these items would occupy Spec, CP. This prediction is borne out:

(95) *o yanis ine **toso** psilos **ti** **oso** (ke) o vassilis
the John be.3sing.pres that much tall.masc.sing what as.much.as (and) the Bill
 'John is as tall as what Bill is'

Finally, data as in (96) provide further support for this analysis, where both the preposition *apo* 'from' (equivalent to English *than*) and the definite quantifier *oso* appear in comparatives with the preposition preceding the quantifier. Clearly, *oso* must be contained in the complement of this preposition.

(96) o yanis ine pio psilos **apo** **oso** ine ta agoria tis
the John be.3sing.pres more tall from how much be.3pl.pres the boys of.the
taksis tu
class his
 'John is taller than the boys in his class (are)' (from Vlachou 2005)

Conclusion

The paper has addressed three related but separate questions – (a) what is the structure of comparative correlatives crosslinguistically? (b) what is the semantic interpretation of *oso*, and how can it function in the syntax? and (c) in what ways can we motivate the existence of null morphemes in any language? We have demonstrated that the structure of comparative correlatives in Greek and English is very similar. By using a collection of data and applying syntactic and semantic tests to these data, we concluded that English has a null counterpart morpheme to *oso* which appears in the comparative correlative and that correspondingly, Greek has a null complementizer which also is also used to build comparative correlatives.

There are important questions that this paper raises to be investigated in future research. With respect to the semantics, in this paper we have only demonstrated that the semantic properties of *oso* without investigating its contribution to the larger compositional semantics. Further, as noted in the introduction of this paper, *oso* also appears in free relatives, suggesting that comparative correlatives, equative comparatives and free relatives form a natural class. In Hindi the root morpheme *jitn-* obligatorily appears in comparative correlatives. Like *oso*, it appears only in comparative correlatives, equative comparatives, and free relatives; also like *oso*, its interpretation is usually glossed as something like “how much” or “that much”. And relatedly, *oso* also appears in amount relative clauses in Greek, yet we have not investigated how this semantic contribution might naturally fall in line with these other types of expression. Thus, the semantic contribution of *oso* and morphemes like it that appear crosslinguistically should be addressed in order to explain this apparent natural class (see Taylor, forthcoming).

Appendix

In Section 4.1, we claimed that that the adjunct clause in CCs is base-generated and adjoined high in the structure to the matrix clause CP. Bhatt (2003) shows that correlative constructions in Hindi show locality effects and thus he argues that the correlative clause is base-generated adjoined to the Demonstrative-XP of the main clause and from there it moves to adjoin to IP. The evidence that he provides to support such an analysis is the existence of island constraints and reconstruction effects. In this section, we address briefly the question whether Greek CCs exhibit the same behavior. If we assume that the adjunct clause is base-generated lower in the structure, let us say that it right-adjoints to the matrix clause’s VP, and that it moves to adjoin to the matrix CP, we expect to find reconstruction effects. One piece of evidence would be that the adjunct clause can be reconstructed to permit variable binding at LF. Such evidence would be provided by the judgments on the examples (97-98):

- (97) *oso pio poli argi i gineka tu_i*
as.much.as more be.late.3sg the.nom wife his
toso pio poli thimoni [kathe andras]_i
that.much more get.upset every man.nom
 ‘The later his_i wife is, the more upset every man_i gets’

- (98) oso pio poli argi o gios tis_i to vradi,
as.much.as more be.late.3sg the.nom son her the night
 toso pio poli anisihi kathe mitera_i
that.much more be.concerned.3sg every mother_i

All of our informants considered these examples grammatical, permitting the variable binding. For these speakers then the adjunct clause is interpreted lower in the structure, in a position where the pronoun can be bound by the quantifier, and thus obviating the Weak Crossover Effects.

However, it remains to be seen whether Greek CCs exhibit island effects, in order to make a stronger argument that the adjunct clause undergoes movement to adjoin to the matrix CP. We leave this issue open for further investigation.

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