

Comments on ‘Comparative Correlatives in Greek: The syntax of *oso*’¹

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The commentary is laid out as follows. The first section critically examines Kapetangianni and Taylor (2008)’s proposal concerning the contents of the CP-layer in English and Greek comparative correlatives. I argue that their treatment of *the* as a complementizer needs additional motivation within English and in its current form complicates the analysis of Greek comparative correlatives. den Dikken (2005)’s analysis is shown to extend naturally to Greek comparative correlatives. The second section argues that structures that appear superficially to be equative correlatives in Greek should be treated as equative correlatives and not be derived from comparative correlatives via deletion contra the proposal made by Kapetangianni and Taylor (2008). The last section attempts to provide a semantics for the comparative correlative structures proposed by the authors. I begin with examining equative correlatives and extending the semantics developed for them straightforwardly to the Greek comparative correlatives. This is shown to run into problems that were anticipated in Beck (1997) for related German data and led her to propose an analysis that did not treat those constructions as correlatives. An alternative is then provided which seems to allow us to avoid the pitfalls faced by the earlier analysis and yet reflect the correlative syntax of Greek comparative correlatives.

1 Structural Issues

Kapetangianni and Taylor (this volume) (henceforth K&T) propose the following structures for comparative correlatives in English and Greek respectively:

(1) English:

a. The more pizza you eat, the more you’ll need to diet.

b. Structure:

$$[{}_{CP_M} [{}_{CP_A} [C' [C\textit{the}] [{}_{FP} [{}_{DP} \textit{more pizza}]_i [{}_{F'} F^0 [{}_{IP} \textit{you eat } t_i]]]]]] [{}_{CP_M} [C' [C\textit{the}] [{}_{FP} [{}_{DegP} \textit{more}]_j [{}_{F'} F^0 [{}_{IP} \textit{you need to diet } t_j]]]]]]]$$

(2) Greek:

a. *oso pio poli zahari tros, toso pio poles thermides pernis*
as.much.as more sugar eat.2Sg.Prs that.much more calories get.2Sg.Prs
'The more sugar you eat, the more calories you get.'

¹I would like to thank the authors, Adrian Brasoveanu, Marcel den Dikken, Irene Heim, Roumyana Pancheva, and the conference organizers Elena Anagnostopoulou and Sabine Iatridou for comments and help with this commentary.

b. Structure:

$$[{}_{CP_M} [{}_{CP_A} [C' [C \phi] [{}_{FP} [{}_{DP} \text{as much more sugar}]_i [{}_{F'} F^0 [{}_{IP} \text{you eat } t_i]]]]]]$$

$$[{}_{CP_M} [C' [C \phi] [{}_{FP} [{}_{DP} \text{that much more calories}]_j [{}_{F'} F^0 [{}_{IP} \text{you get } t_j]]]]]]$$

The structures postulated for English and Greek are essentially the same. Both in English and in Greek, the DegPs associated with degree abstraction need to move to the [Spec,FP]. When the DegP is contained inside an AP or a PP, it pied-pipes the containing constituents with it. This is why the *more pizza* fronts within the adjunct clause in (1) and *toso pio poles thermides* in (2). The adjunct clauses and the main clauses in the two languages are similarly analyzed as CPs with empty specifiers. The differences between English and Greek comparative correlatives reside in what the two languages allow/require to be overt. Following Taylor (to appear), K&T assume that the *the* in English comparative correlatives is a complementizer and not a determiner. The Greek counterpart of this element is postulated to be silent. On the other hand, Greek comparative correlatives have overt elements *oso* and *toso* that mark the differential argument of the degree abstraction. English lacks overt counterparts of these elements and is assumed to realize them via null operators.

It is worth contrasting the structures postulated by K&T with the structure postulated by den Dikken (2005) for comparative correlatives across a number of languages.

(3) a. The more you eat, the fatter you get.

$$[{}_{CP_M} [{}_{CP_A} XP_i [C' C^0 [{}_{IP} \dots t_i \dots]]]]$$

$$[{}_{CP_M} YP_j [C' C^0 [{}_{IP} \dots t_j \dots]]]]$$

XP, YP are either themselves DegPs or constituents that have been pied-piped by an embedded DegP.

c. DegP: [${}_{DegP}$ [${}_{PP}$ P [QP]] [${}_{Deg'}$ Deg⁰ [AP]]]

According to den Dikken (2005), in English comparative correlatives, Deg⁰ is obligatorily realized by *the*. And the PP in the [Spec,DegP], which roughly corresponds to the Greek *oso/toso*, is realized by a null operator in contemporary English.

The choices made by K&T and den Dikken can be both be seen as responses to the fact that *the* in English comparative correlatives behaves differently from *the* elsewhere in the grammar of English, where it behaves like a determiner. den Dikken treats it as a realization of the Deg⁰ head. He shows that earlier varieties of English provide explicit support for this idea.

(4) [[[[[By how much] **the** better] man]_i [you are yourself t_i]], [[by so much] **the** more]_j will [you be inclined t_j to believe me]]]

(Fielding, *Tom Jones*, 18th century, from den Dikken (2005), pg. 502)

He further notes that there a number of degree constructions in contemporary English which involve an overt *the* as well as material in the specifier of this *the*.

(5) a. [${}_{DegP}$ [so much] [${}_{Deg'}$ the [${}_{AP}$ better]]]

b. [${}_{DegP}$ much [${}_{Deg'}$ the [${}_{AP}$ wiser]]]

c. [${}_{DegP}$ all [${}_{Deg'}$ the [${}_{AP}$ more serious]]]

(from den Dikken (2005), pg. 520)

We are still left with the task of explaining why *the* does not surface more generally as a degree head in contemporary English. Why can't we say **Bill is 2 inches the taller than Bill?* There

is no completely satisfying answer to this question but its answer is probably related to the fact that the Deg⁰ *the* in comparative correlatives in contemporary English has a silent degree operator in its specifier that ranges over the differential argument. We don't know why there should be this connection but it seems that the cases in (5) aside, Deg⁰ can only be realized as *the* in contemporary English when it has a null operator in its specifier, i.e. only in comparative correlatives.

Even though den Dikken does not explicitly give an analysis of Greek comparative correlatives, his proposal extends naturally to the data that K&T consider. For him, the fronted DegPs would be in [Spec,CP] and not [Spec,FP]. Other than that, Deg⁰ could be realized by a *pio* with the remaining degree morphology if any appearing in the complement of Deg⁰.

Now let us consider K&T's motivation behind postulating that the *the* in comparative correlatives is in C⁰. Directly related to the decision that this *the* is in C⁰ is their proposal that the moved DegP moves not to [Spec,CP] but the [Spec,FP]. Their primary motivation comes from the observation that neither the adjunct clause nor the main clause in a comparative correlative is an island for extraction.

- (6) a. extraction from adjunct clause:

[Pia themata]_i nomizis oti [[oso pio poli diavasis t_i] [toso pio kala
which materials think.2Sg that as.much more read.2Sg that.much more good
tha grapsis stis eksetasis]]?
will write.2Sg on.the exam

'Which materials_i do you think that [[the more you read t_i], [the better you will do on the exam]]?

- b. extraction from main clause:

Pion_i nomizis oti [[oso pio poli argis na paris to didaktoriko su]
who think.2Sg that as.much more NA the dissertation your
[toso pio poli apogoitevis t_i]]?
that.much more disappoint.2Sg

'Who_i do you think [[the longer you spend in your PhD], [the more you will disappoint t_i]]?

K&T take the fact that their structure has an empty [Spec,CP], as opposed to den Dikken's structure which does not, as an important step towards explaining why comparative correlatives allow for extraction. But it is not clear that having an empty [Spec,CP] by itself helps explain the exceptional availability of extraction in comparative correlatives. Even though the [Spec,CP] is unoccupied, there has been an A-bar movement to [Spec,FP], which one might expect to create a *wh*-island. It could be that the idea is that movement to [Spec,FP] involves a different feature from movement to [Spec,CP] and that therefore movement to [Spec,FP] does not block movement to [Spec,CP]. But then this idea could be easily adopted into a system where the CP has multiple specifiers created by distinct feature requirements (degree related, *wh*-EPP related). More crucially the empty/full [Spec,CP] question does not by itself explain the central mystery of comparative correlative extraction: why can we extract from an adjunct clause in the first place? K&T do not address this issue but a fairly concrete proposal can be found in Taylor (2007), which addresses extraction out of *if*-clause adjuncts. One component of Taylor's proposal, which assumes sideways movement, is that sideward movement may only target items positioned on the edge of a tree. So K&T could use the empty [Spec,CP] as a place for

the moving element to get to the edge. But then again a proponent of den Dikken's structure could also use multiple specifiers of CP for a similar purpose.

K&T refer to an argument developed in Taylor (2008) to support the proposal that the comparative correlative *the* should be treated as a complementizer. The argument relies on the fact that we find effects that Taylor treats as instances of Comp-trace violations.

(7) (from Taylor (2008), ex. 30)

- a. I said that the more Bill eats vegetables, the less Mary wants sweets.
- b. What_i did I say that the more Bill eats t_i, the less Mary wants sweets?
- c. *Who_i did I say that the more t_i eats vegetables, the less Mary wants sweets?
- d. ✓ Who_i did I say that the more for all intents and purposes t_i eats vegetables, the less Mary wants sweets?

(the judgements reported are Taylor's. My informants find (7b) less than perfect and find (7d) significantly less than perfect/completely ungrammatical. Some do not find any contrast between (7c) and (7d), while others do find a contrast in the direction indicated by Taylor.)

This pattern is indeed reminiscent of Comp-Trace violations. But the comparative correlative cases differ in one crucial manner from regular Comp-Trace environments. There is an A-bar moved element between the putative complementizer and the subject trace. We know from wh-questions that such cases lead to ungrammaticality even without any overt complementizer.

- (8) a. I wonder which book John will give away to his students.
- b. *Which professor do you wonder which book t_i will give away to his students?

Such cases are typically analyzed as ECP violations and we do not expect them to be improved by adverbial intervention or phonological deletion.

This leaves us with the potential contrast between (7c) and (7d). I do not have an explanation for why some speakers find a contrast between these examples but it is worth noting that this potential improvement is not actually predicted by existing analyses of Comp-trace effects. Kandybowicz (2006)'s account of Comp-trace effects, for example, argues that they should be given a prosodic account along the following lines:

- (9) * $\langle C^0, t \rangle$ iff:
 - i. C⁰ and t are adjacent within a prosodic phrase **AND**
 - ii. C⁰ is aligned with a prosodic phrase boundary(Kandybowicz (2006):223)

An intervening adverb breaks the adjacency between the complementizer and the trace and hence mitigates the effect of the Comp-trace effect. In K&T's structure, the putative Complementizer *the* and the subject trace are not adjacent to begin with; the DegP intervenes between them. Consequently, the presence of an adverb is not predicted to have any effect. This is what seems to be the case for at least some speakers. To conclude, it is not clear that the facts in (7) provide support for treating *the* as a complementizer.

To sum up, den Dikken's (2005) structure extends very naturally to the Greek data discussed by K&T. In a sense, the structure fits the Greek data more directly than English: the differential operators and the Deg⁰ head are all overtly realized in Greek. Unlike K&T's structure, we do not need to assume a completely empty CP layer in Greek comparative correlatives. Finally den Dikken's structure does not cause us to lose any of the empirical coverage achieved by K&T.

2 Comparative Correlatives and Equative Correlatives

In many languages, comparative degree morphology appears in both the main clause and the adjoined clause in comparative correlatives. This is exemplified in the following examples from English, Greek, and German.

- (10) a. The **more** specific a feature description, the **fewer** feature structures satisfy it. (from Smith (2007))
- b. German (from Beck (1997))
 Je **müder** Otto ist, desto **aggressiver** ist er.
 the tired-er Otto is the aggressive-er is he
 ‘The more tired Otto is, the more aggressive he is.’
- c. Greek (from K&T)
 Oso **pio** poli zahari tros toso **pio** poles thermides pernis.
 as.much more sugar eat.2Sg.Prs that.much more calories get.2Sg.Prs
 ‘The more sugar you eat, the more calories you get.’

In other languages such as Bulgarian and Hindi-Urdu, we find no comparative morphology in either clause.²

- (11) a. Bulgarian (Roumyana Pancheva p.c.)
 Kolkoto četeš, tolkova naučavaš.
 how.much read.2Sg that.much learn.2Sg
 ‘As much you read, that much you learn.’
- b. Hindi-Urdu
 [jitnii der ho-tii gayii], [utnii ṭhaṇḍ baṛh-tii gayii]
 how.much.f later be-Impfv.f go.Pfv.f that.much.f cold increase-Impfv.f go.Pfv.f

²Both Bulgarian and Hindi-Urdu also allow for comparative morphology in both clauses.

- i. a. Bulgarian (Roumyana Pancheva p.c.)
 Kolkoto **poveče** četeš, tolkova **poveče** naučavaš.
 how.much more read.2Sg that.much more learn.2Sg
 ‘The more you read, the more you learn.’
- b. Hindi-Urdu
 [jitnii **zyaadaa** der ho-tii gayii], [utnii **zyaadaa** ṭhaṇḍ baṛh-tii gayii]
 how.much.f more later be-Impfv.f go.Pfv.f that.much.f more cold increase-Impfv.f go.Pfv.f
 ‘The later it got, the colder it became.’

The Bulgarian example with additional morphology seems to pattern with the cases in (10) while the Hindi-Urdu example seems to pattern with (11b). The unexpected behavior of the Hindi-Urdu cases follows from two independent aspects of Hindi-Urdu comparatives. The first is that *zyaadaa* does not always indicate comparison. It can also provide an intensifying meaning, functioning as a degree modifier with the meaning *a lot*. The second is that *than*-phrases cannot as easily go missing in Hindi-Urdu as in English - the reading indicated in (32b) is hard to get in Hindi-Urdu. Instead the Hindi-Urdu counterpart of (32b) primarily receives a reading which combines the question ‘how much will you eat?’ with the assertion that you will eat a lot. Together this means that cases like (2b) can be analyzed as equative correlatives and moreover a comparative correlative analysis is less easily accessible.

‘The later it got, the colder it became.’ (Literally: As much late it got, that much cold it became.)

We do see an overt degree abstraction in both clauses. These constructions are equative correlatives, a close relative of comparative correlatives. Equative correlatives are also found in Greek. Consider the following example from K&T, which can be profitably analyzed as equative correlatives.

- (12) *oso tros, toso pahenis*
 as.much eat.2Sg that.much get.fat.2Sg.Prs
 ‘As much as you eat, that much you get fat.’

K&T propose a derivation for (12) that derives it from the corresponding comparative correlatives by deletion of the degree morphology in both clauses. This is puzzling because they also note that in equative correlatives an *oso/toso* that modifies a noun phrase must agree with it (see 13a). This is in contrast to comparative correlatives where *oso/toso* remain invariant (see 13b).

- (13) a. Equative Correlative: *oso/toso* agree
osi zachari tros, toses thermides pernis
 as.much.Sg sugar eat.2Sg.Prs that.much.FPl calories get.2Sg.Prs
 ‘As much sugar you eat, that many calories you get.’
- b. Comparative Correlative: *oso/toso* are invariant
oso pio poli zachari tros, toso pio poles thermides
 as.much.Sg more sugar eat.2Sg.Prs that.much more calories
 pernis
 get.2Sg.Prs
 ‘As much sugar you eat, that many calories you get.’

On their deletion account, this contrast has to be stipulated. If we, however, stay faithful to the surface form and analyze (13a) as an equative correlative and (13b) as a comparative correlative, a more appealing solution becomes available. Note that in an equative correlative, *oso/toso* directly modify the NP. In contrast, in a comparative correlative, *oso/toso* correspond to the differential argument. They are arguments of the degree head *pio*, not of the NP. I take the difference in their agreement properties to be a reflection of this basic structural difference. Support for this connection comes from the fact that the part of the degree morphology that does directly modify the NP in the comparative correlative, namely *poli/poles* does agree with the noun phrase.

3 The Connection with Correlatives

3.1 Individual and Degree Correlatives

Comparative Correlatives look transparently like correlatives in languages with productive correlative constructions such as Hindi-Urdu. In other languages where the correlative construction is less productive, comparative correlative still have the crosslinguistic syntax associated with correlatives even though this may be sometimes obscured by the surface syntax (see den Dikken (2005) for a detailed development of this idea). As a point of departure for the following discussion, let me introduce you the world’s most famous correlative.

(14) Hindi-Urdu:

a. The most famous correlative:

[jo laṛkii kharīi hai], [vo lambii hai].
Rel girl standing.f be.Prs.Sg Dem tall.f be.Prs.Sg

‘The girl who is standing is tall.’ (Lit. which girl is standing, she is tall.)

b. Plural version of the most famous correlative:

[jo laṛkiyā kharīi hĒ], [vo lambii hĒ].
Rel girls standing.f be.Prs.Pl Dem tall.f be.Prs.Pl

‘The girls who are standing are tall.’ (Lit. which girls are standing, they are tall.)

(from Srivastav (1991))

On the syntactic side, the most notable aspect of the correlative construction is that it consists of two clauses, the correlative clause and the matrix clause. The correlative clause has one or more relative phrases and the matrix clause has an equal number of demonstrative phrases. In general, the correlative clause does not need to be adjacent to the demonstrative phrase that refers to it. This brings us to an important semantic aspect of correlatives. Correlative clauses involve maximalization. So (14a) is only acceptable in an environment where there is a unique girl who is standing and this unique standing girl is tall. The maximality requirement means that (14b), which has a plural predicate, picks out the maximal sum of girls who are standing and these girls are tall. Simplifying considerably, in a given situation, the correlative clause picks out the maximal entity that satisfies the predicate in the correlative clause. The demonstrative in the main clause refers to this entity and therefore the main clause must be true with the demonstrative referring to the maximal entity picked out by the correlative clause. Now we can look at some degree correlatives.

(15) Hindi-Urdu Degree Correlatives:

a. Comparative:

[Atif-ne kal jitne giit gaa-e the] [Salma-ne aaj
Atif-Erg yesterday how.many song sing-Pfv.MPI be.Pst.MPI Salma-Erg today
us-se zyaadaa nazmē paṛh-ī:]
that-than more poems.f read-Pfv.FPI

‘Salma recited more poems today than Atif sang songs yesterday.’ (Lit. ‘How many songs Atif sang yesterday, Salma recited more poems than that today.’)

b. Equative:

[Atif-ne kal jitne giit gaa-e the] [Salma-ne aaj
Atif-Erg yesterday how.many song sing-Pfv.MPI be.Pst.MPI Salma-Erg today
utnii nazmē paṛh-ī:]
that.many.f poems.f read-Pfv.FPI

‘Salma recited as many poems today as Atif sang songs yesterday.’ (Lit. ‘How many songs Atif sang yesterday, Salma recited that many poems today.’)

It can be seen that these constructions transparently have correlative syntax. Furthermore the maximalization based semantics suggested above for correlatives that involve abstraction over individuals apply unchanged to the degree correlatives in (15). For example, the correlative clause in (15a) picks out the maximal number of songs that Atif sang yesterday and the main clause asserts that the number of poems that Salma recited today exceeds that number.

3.2 Correlative Semantics and Equative Correlatives

Equative correlatives in Hindi-Urdu of the sort that are comparable with comparative correlatives in other languages are (more or less) ordinary degree correlatives:

(16) Hindi-Urdu

[jitnii der ho-tii gayii], [utnii ṭhaṇḍ baṛh-tii gayii]
 how.much.f later be-Impfv.f go.Pfv.f that.much.f cold increase-Impfv.f go.Pfv.f

‘The later it got, the colder it became.’ (Literally: As much late it got, that much cold it became.)

With respect to their syntax, they are unquestionably correlatives. With respect to the semantics too, they seem to behave like correlatives: the correlative clause picks out the extent to which it got late and the demonstrative in the main clause refers to this extent. The one difference is that equative correlatives of this sort typically have imperfective morphology that marks the generalizing nature of the statement. Even when there is no explicit imperfective morphology, the kind of correlative that we are interested in quantifies over a number of situations. There is no such requirement on ordinary degree correlatives.

A closer examination of the semantics of Hindi-Urdu equative correlatives reveals that unlike ordinary individual correlatives, the connection between the demonstrative and the correlative clause has to be somewhat indirect. In this, the Hindi-Urdu facts are the same as the facts discussed in Beck (1997). To see this point, consider (17).

(17) Hindi-Urdu:

[tum jitnaa khaanaa khaa-oge] [utnaa(-hii) tumhaaraa vajan
 you how.much food eat-Fut.MPI that.much-only your weight
 baṛh-egaa]
 increase-Fut.M

‘The more you eat, the more your weight will increase.’

If the connection between the demonstrative and the correlative clause worked exactly the same as in the individual correlative, we would expect that the amount of food consumed equals weight gain. But (17) makes no such commitment. The constraint it imposes is that there is a kind of proportionality. The kind of proportionality can be paraphrased using a formulation from Beck (1997): for all relevant worlds, w_1, w_2 , if you eat more in w_1 than in w_2 , then you gain more weight in w_1 than in w_2 . It is not clear how one can get to this meaning, given that the syntax we are trying to interpret is that of an equative. Here is an attempt.

We have already seen that our equative correlatives involve quantification over situations. Let us assume that the demonstrative does not directly refer to the maximal degree/amount picked out by the correlative clause. Instead the relationship between what the demonstrative refers to and the maximal degree/amount picked out by the correlative clause is mediated by a function f , which has the following property.

- (18) strictly increasing: $\forall x, y. [x > y \rightarrow f(x) > f(y)]$
- a. Possible: $\{(1,1), (2,2), (3,3)\}$
 - b. Possible: $\{(1,2), (2,3), (3,4)\}$
 - c. Possible: $\{(1,4), (2,7), (3,6)\}$

- d. Not Possible: $\{(1,6), (2,5), (3,4)\}$
- e. Not Possible: $\{(1,1), (2,1), (3,1)\}$

According to this property f maintains order. A bigger amount is mapped to a higher value than a lower amount by f . But other than this, there is no proportionality. This allows for a situation where the growth in a function's output keeps getting smaller as the input gets larger. Once we allow ourselves such a restriction on the mapping function, we can outline the following semantics for equative correlatives.

- (19) [CorrelativeClause(w)], [...DemP...(w)]
- a. Let $\llbracket \text{CorrelativeClause}(w) \rrbracket = d$
 - b. $\llbracket \text{DemP} \rrbracket = f(d)$, where f has the strictly increasing property
 - c. Let the main clause be = $\text{Pred}(\text{DemP}, w)$
 - d. Overall Semantics:
 \forall relevant worlds w . $\text{Pred}(f(\text{CorrelativeClause}(w)), w)$

In this formulation, there is no explicit comparison. It remains to be seen whether this formulation diverges from the formulation with explicit comparison formulated in Beck (1997). In this formulation, there is a direct connection between the amount of food eaten in a world and the amount of weight gained in that world. Moreover, according to this formulation if one eats the same amount of food in two distinct relevant worlds, one should gain the same amount of weight in both worlds. This seems to be correct for the Hindi-Urdu example in (17). Consider the following scenario. Suppose I eat a certain amount of food on two distinct occasions which are otherwise comparable. I find that I gain weight on both occasions but different amounts of weight. Then in such a situation, (17) would be judged false on the grounds that the same amount of food consumption led to distinct amounts of weight increase.

3.3 Correlative Semantics and Comparative Correlatives in Greek

It is tempting to treat (20a, b) in German and Greek as comparatives. As K&T argue persuasively, *oso* and *tosó* should be treated as the *wh*/relative and demonstrative words corresponding to amounts. Put together with the Hindi-Urdu facts seen earlier, these cases do look like Degree Correlatives.

- (20) a. German (from Beck (1997))
- Je** müder Otto ist, **desto** aggressiver ist er.
 the tired-er Otto is the aggressive-er is he
 ‘The more tired Otto is, the more aggressive he is.’
- b. Greek (from Kapetangianni and Taylor (2008))
- Oso** pio poli zahari tros **toso** pio poles thermides pernis.
 as.much more sugar eat.2Sg.Prs that.much more calories get.2Sg.Prs
 ‘The more sugar you eat, the more calories you get.’

But there is an important difference: unlike the Hindi-Urdu equative correlatives, both clauses contain *pio/-er*, the indicator of comparison. As discussed earlier, we take this to show that the Greek constructions are comparative (as opposed to equative) correlatives. In an equative correlative, the relative pronoun and the demonstrative range over the degree argument. In the Greek/German cases, the degree argument is already bound by the comparative degree morphology. What then can *oso/tosó* refer to/ range over?

3.3.1 Conditionals or Correlatives?

One response is to give up on the idea that *tosó* directly refers to the correlative clause. This is in effect the conclusion Beck (1997) comes to for the related *je-desto* construction in German. The semantics that Beck develops does not attempt an assimilation with Degree Correlatives. Instead it is more akin to conditionals. Beck does refer to the *je desto* construction not as comparative correlatives but as comparative conditionals. Beck (1997) analyzes *je/desto* as having the same semantics. They operate on the degree morpheme *-er* directly.

- (21) a. Je besser Otto vorarbeitet ist, desto besser wird sein Referat werden.
the better Otto prepared is the better will his talk be
‘The better Otto is prepared, the better his talk will be.’
- b. $\llbracket je \rrbracket(w_1, w_2)(\llbracket -er \rrbracket)(D_{sdt})$ iff
 $\exists d [d > 0 \wedge \llbracket -er \rrbracket(D(w_1))(d)(D(w_2))]$.
- c. LF:
 $\llbracket [Je -er] [\lambda w \lambda d [\text{Otto is prepared}_w d\text{-well}]] \rrbracket$
 $\llbracket [desto -er] [\lambda w \lambda d [\text{Otto's talk will be } d\text{-good}_w]] \rrbracket$
- d. For all pairs of worlds w_1, w_2 where Otto is better prepared in w_1 than in w_2 ,
Otto gives a better talk in w_1 than in w_2 .

Under Beck’s analysis, the presence of comparative morphology in both clauses makes sense: semantically there is a comparison in both clauses. But the *than*-phrase complement of the degree head *-er* is not overtly realized. The content of this clause is provided through the semantics of *je/desto*. A consequence of this move is that the *than*-phrase complement cannot be overt. This is in fact the case in German.

- (22) German (from Beck (1997):230:ex. 2)
- *Je müder Otto ist als Hans, desto aggressiver ist er.
The tired-er Otto is than Hans the aggressive-er is he
- ‘*The more tired Otto is than Hans, the more aggressive he is.’

Both Beck (1997) and K&T generate *je/desto* and *oso/tosó* respectively in the position that would be otherwise occupied by the differential argument.

- (23) At S-structure
 $[DegP \text{ } oso [Deg' \text{ more } [AP \dots \dots]]]$

Beck notes that this derives the incompatibility of an overt specification of the differential argument in a comparative conditional:

- (24) German (from Beck (1997):236, ex. 14)
- *je (um) eine Stunde später es wurde, desto (um) drei Grad heißer wurde es.
the by one hour later it got the by three degrees hotter got it
- ‘For each hour later it got, the temperature rose by three degrees.’

At LF, Beck assumes that *je/desto* directly combines with *-er*. It does not saturate the differential argument of *-er*. This works out due to the particular semantics assumed for *je/desto*. But if *oso/tosó* range over amounts/degrees, one might expect them to saturate the differential argument and abstract over it. This suggests a way to combine Beck’s idea of a ‘hidden’ comparative with the intuition that the Greek cases are correlatives:

- (25) a. The *oso/toso* over the differential argument of the comparative degree head *pio*.
 b. Both clauses have a silent *than*-clause associated with them.
 c. We still have quantification over situations/worlds.
- (26) a. Greek
 Oso **pio** poli zahari tros toso **pio** poles thermides pernis.
 as.much more sugar eat.2Sg.Prs that.much more calories get.2Sg.Prs
 ‘The more sugar you eat, the more calories you get.’
 b. How much more sugar you eat in w_1 than in w_2 ,
 that much more calories you get in w_1 than in w_2 .

This might look reasonable but unfortunately it turns out to be inadequate when we attempt to make precise the relationship between the maximal degree denoted by the correlative clause and the reference of *that much*. We run into the absence of proportionality that had already been noticed in Beck (1997). When we were handling equative correlatives, we used a strictly increasing mapping function to relate the degree correlative and the demonstrative. We can use that here too.

- (27) a. Let $\llbracket \text{How much more sugar you eat in } w_1 \text{ than in } w_2 \rrbracket = d$
 b. $\llbracket \text{that much} \rrbracket = f(d)$

According to the above formulation, the calorie differential between w_1 and w_2 is directly proportional to the sugar differential between w_1 and w_2 . Now consider worlds w_2 and w_3 which have the same sugar differential as w_1 and w_2 . The above formulation would entail that w_2 and w_3 have the same calorie differential as w_1 and w_2 . This requirement is clearly too strict. All that is required is that if w_3 exceeds w_2 in sugar consumption then w_3 also exceeds w_2 in calorie acquisition. There is no proportionality between the sugar differential and the calorie differential. We can conclude that the formulation in (26) cannot be right.

3.3.2 Another kind of Differential Correlative

The most obvious way of putting together Beck’s idea of a ‘hidden’ comparative together with a semantics for correlative, sketched in the previous section, does not work out. At this point, we could give up and essentially treat the correlative nature of Greek comparative correlatives to be purely an aspect of their syntax. This construction would then be a case where the mapping between syntax and semantics is not maximally general. But before we do this, it is worth re-examining the assumptions that led us to the problematic formulation in (26b).

The first assumption was that *oso/toso* abstract over the differential argument of the degree head. This seems correct based on the DegP-internal location of *oso/toso*, the complementary distribution of differential phrase and *oso/toso*, and the correlations in the form of *oso/toso* and the comparative/equative correlative distinction.

The second assumption was that both clauses have a silent *than*-clause associated with them. Related to this assumption was the idea that we have quantification over a *pair* of worlds, where one of the worlds corresponds to the clause with the overt degree morphology and the other to the silent *than*-clause. Beck (1997) notes that the incompatibility of overt specification of the *than*-clause provides support to her analysis which postulates a silent *than*-clause.

(28) German (from Beck (1997):230:ex. 2)

*Je müder Otto ist als Hans, desto aggressiver ist er.
The tired-er Otto is than Hans the aggressive-er is he

‘*The more tired Otto is than Hans, the more aggressive he is.’

But recently Smith (2007) has noted that *than*-phrases can appear within comparative conditionals.

(29) (from Smith (2007))

- a. The faster the cat is than the dog, the more likely it is to get away.
- b. The faster you run than your friend, the further away you’ll be when the bear attacks him.
- c. Yes, but the older she is than the baby, the more helpful she can be in taking care of it.

There seems to be some variation in the acceptability of English comparative correlatives with overt *than*-phrases. Consider the following contrast reported in den Dikken (2005):523.

(30) (from Leung (2003):18)

- a. *The taller John is [than Mary], the happier I am.
- b. The taller John is [than you think he is], the more money I win.

Footnote 34 of den Dikken (2005) provides further examples of languages that allow for overt comparative standards: Hungarian, Serbo-Croatian, and citing Leung (2003):36-37, Mandarin, Cantonese, Thai, and Japanese. To this list of languages which allow for *than*-phrases within comparative correlatives we can add Bulgarian.

(31) Bulgarian (Roumyana Pancheva p.c.)

- a. kolkoto e po-burza kotkata ot kučeto, tolkova po-verojatno e da
how-much is er-fast cat-the than dog-the that-much er-likely is to
uspee da izbjaga
succeed-3sg to run-away-3sg
‘The faster the cat is than the dog, the more likely it is to get away.’
- b. kolkoto po-burzo bjagaš ot tvoja prijatel, tolkova po-daleč šte si
how-much er-fast run-2sg than your friend that-much er-far will be-2sg
kogato mečkata go napadne
when bear-the him attack-3sg
‘The faster you run than your friend, the further away you’ll be when the bear attacks him.’
- c. da, no kolkoto e po-goljama tja ot bebeto, tolkova po-polezna šte
yes, but how-much is er-old she than baby-the that-much er-useful will
e da go gleda
be-3sg to it take-care-of
‘Yes, but the older she is than the baby, the more helpful she can be in taking care of it.’

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- i. A relation R is monotonically increasing iff
 $\forall x, x', y, y' [(x < x' \wedge xRy \wedge x'Ry') \rightarrow y < y']$

Using relations allows for a weaker notion of proportionality. Two worlds with the same sugar differential from the reference world do not have to map to the same calorie differential but if the sugar differential of w_1 exceeds that of w_2 , then the calorie differential of w_1 must also exceed that of w_2 . We can think of R in functional terms as mapping an element in its domain to a set of elements in its range such that the sets themselves preserve order between elements in the domain. In our example, this would mean that each sugar differential would map to a calorie differential range; the calorie differential ranges corresponding to sugar differentials would preserve ordering relations between sugar differentials. This line of inquiry seems promising. What remains is to examine how it extends to the cases of simple correlatives, where the relation involved seems to be identity.