

Abstracting over Degrees in Yoruba Comparison Constructions¹

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Abstract. This paper presents a case study of variation in the semantics of degree constructions between English and Yoruba (Niger-Congo, Nigeria). The main question addressed is whether variation between the two languages can be best explained by a parameter, proposed in Beck et al. 2004 and Beck et al. 2009, regulating the (in)ability of a language to bind variables of type $\langle d \rangle$: the "Degree Abstraction Parameter" (DAP). It is argued that Yoruba requires bound variables of type $\langle d \rangle$ (a +DAP setting) to explain facts relating to degree relatives and degree questions. These findings differ from those of Beck et al. (2009) who claim, primarily on the basis of data from scope ambiguities in the comparative, that Yoruba has a -DAP status. We propose an alternative account of the lack of scope ambiguities which rests on differences in the semantics of differential measure phrases in Yoruba and English.

Keywords: Degree Semantics, Crosslinguistic Variation, Yoruba

1. Introduction: Crosslinguistic Variation in Degree Semantics, Lexical versus Parametric Variation

The question of cross-linguistic variation in the semantics underlying degree constructions has recently enjoyed considerable attention from formal semanticists. Research on comparison constructions has shown that languages choose different operators to make comparison (e.g. Bhatt and Takahashi 2007, Bhatt and Takahashi 2011, Kennedy 2009 among many others) and may vary with respect to the basic denotations of gradable predicates and the ways in which they combine with degree operators (Svenonius and Kennedy 2006, Bogal-Allbritten (to app.)). A question which remains much less explored is whether (at least some of) the observed variation can be linked back to parameters governing the basic semantic mechanisms which are available in a particular language. One attempt to do so has been made in work by Beck et al. (2004) and Beck et al. (2009): Beck et al. (2004) claim that a host of differences between degree constructions in Japanese and English can be explained by a single parameter governing the (in)ability of a language to bind variables of type $\langle d \rangle$, the semantic type of degrees. They call this parameter the Degree Abstraction Parameter (DAP). Their research is expanded upon in the study by Beck et al. (2009) which investigates the setting of this parameter, along with two others in a larger sample of languages. The striking result of this study is the observation that languages do not seem to vary at random with respect to the kinds of degree construction they allow. Rather, clusters of languages with roughly the same inventory of constructions can be distinguished. They link the clusters they find to their proposed

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parameters and take this correlation between languages as evidence for the parametric variation.

The goal in this paper is to re-examine the setting of the Degree Abstraction Parameter in Yoruba, a language of the Niger-Congo family spoken primarily in Nigeria. Yoruba is an interesting case because, outwardly, it patterns with Japanese and other -DAP languages in its inventory of degree constructions. Nevertheless, we will argue that a closer look reveals that bound degree variables are necessary for the analysis of phrasal comparatives and degree questions. After making the case that Yoruba is +DAP, we examine the data which lead to the opposite conclusion: the lack of scope ambiguities in comparatives. We argue that other factors, namely differences between the semantics of differential measure phrases in Yoruba and English, are responsible for the pattern observed by Beck et al. (2009).

The paper is structured as follows: Section two introduces the accounts of parametric variation from Beck et al. 2004 and Beck et al. 2009. In section three we motivate our assumptions about the semantics and syntax of Yoruba degree operators and gradable predicates. Section four turns to the question of bound degree variables and investigates degree relatives and degree questions as evidence for a positive setting of the DAP. In section five we discuss scope ambiguities in comparatives and section six draws theoretical and methodological conclusions.

2. Background: The Parametric View of Crosslinguistic Variation in Comparatives

2.1. Beck et al. (2004) and the DAP

Beck et al. (2004) observe a number of differences between English and Japanese comparison constructions: Japanese comparatives appear to lack the ability to build subcomparatives, (1), and do not display scope ambiguities of the kind discussed in Heim (2001), (2), or negative island effects in comparatives, (3).

(1) SUBCOMPARATIVES

- a. *The shelf is longer than the door is wide.*
- b. **Kono tana-wa ano doa-ga hiroi yori (mo) (motto) takai.*
 this shelf-TOP that door-NOM wide YORI (MO) (more) tall
 "This shelf is taller than that door is wide."

(2) SCOPE AMBIGUITIES (The draft is 10 pages long...)

- a. *The paper is required to be exactly 5 pages longer than that.*
 - (i) Reading 1: The paper must be 15 pages (no longer, no shorter).
 - (ii) Reading 2: The paper must be at least 15 pages long (but it could be longer).
- b. *Sono ronbun-wa sore yori (mo) tyoodo 5 peeji nagaku-nakerebanaranai.*
 that paper-TOP that YORI (MO) exactly 5 page long-be-required
 (i) Reading 1: *OK* "The paper is required to be exactly 5 pp longer than that."

(ii) Reading 2: *"The minimal satisfactory length is 15pp."

(3) NEGATIVE ISLAND EFFECTS

- a. **John bought a more expensive book than Peter didn't.*
 b. *John-wa dare-mo kawa-naka-tta no yori takai hon-o katta.*
 John-TOP anyone buy-NEG-PAST NO YORI expensive book-ACC bought.
 "John bought a more expensive book than no-one did."

They note that a common feature of these constructions is the fact that they all rely on the presence of a syntactically derived set of degrees obtained via abstraction over the the gradable predicate's degree argument in the *than*-constituent and propose that all of these differences are due to different settings of a single parameter in Japanese and English, which they call the Degree Abstraction Parameter (DAP), given in (4).

(4) DEGREE ABSTRACTION PARAMETER:

A language does/does not have binding of degree variables in the syntax.
 (Beck et al. 2004)

Let us look briefly at their proposal and its consequences for the constructions in (1-3) and illustrate why they serve as tests for the setting of the DAP. This will also allow us to spell out our assumptions about comparatives in English.

2.1.1. Subcomparatives

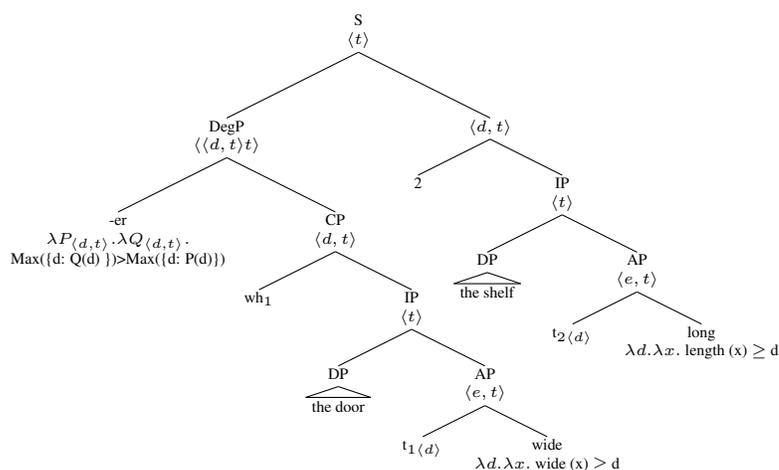
On a standard account of comparatives in English, subcomparatives are structurally identical to regular comparatives. The difference between the two is that in regular comparatives the gradable predicate in the matrix and embedded clauses are identical, and the second is therefore elided, whereas in subcomparatives the two predicates are different, so no ellipsis occurs.

The syntax and semantics we are assuming for English comparatives has its origins in proposals by Bresnan 1973, on the syntactic side, and von Stechow 1984, on the semantic side, but is essentially that of Heim 2001: English *than*-clauses have an underlying clausal structure and are generated as complements of the comparative operator *-er* which is located in the head of a Degree Phrase (DegP), which is itself in the specifier of the matrix clause AP. Semantically, the DegP is a generalized quantifier over degrees (type $\langle\langle d, t \rangle t\rangle$) which undergoes QR to resolve a type mismatch, leaving a trace of type $\langle d \rangle$. The comparative operator is the analogue of the quantificational determiner (type $\langle\langle d, t \rangle\langle\langle d, t \rangle, t\rangle\rangle$) and has the lexical entry in (5). In the *than* clause, movement of a silent *wh*-pronoun out of the degree argument position of the gradable adjective yields a set of

degrees which serve as the restrictor of *-er*. Thus the sentence in (1) has the LF in (6).

$$(5) \quad [[-er_{English}]] = \lambda P_{\langle d,t \rangle} . \lambda Q_{\langle d,t \rangle} . \text{Max}(Q) > \text{Max}(P)$$

(6)



Crucially, QR of the DegP in the main clause and movement of the silent *wh*-pronoun in the embedded clause allow for deriving sets of degrees on different scales in each clause if the predicates in the matrix and embedded clause are different. On other existing analyses of comparatives, for example the so called direct analysis (eg. Heim 1985, Bhatt and Takahashi 2007, 2011) or Beck, Oda and Sugisaki's contextual account for Japanese, the gradable predicate is a direct argument of the comparative operator, so the subject and standard of comparison cannot be measured with respect to different scales.²

$$(7) \quad \begin{array}{l} \text{a.} \quad [[-er_{Bhatt\textit{-and-Takahashi}}]] = \lambda x . \lambda P_{\langle d(e,t) \rangle} . \lambda y . \text{Max}\{d: P(d)(y)\} > \text{Max}\{d: P(d)(x)\} \\ \text{b.} \quad [[-er_{Beck\textit{-Oda-Sugisaki}}]]^g = \lambda P_{\langle d(e,t) \rangle} . \lambda x . \text{Max}(\{d: P(d)(x)\}) > g(c) \end{array}$$

²Under the direct analysis (Heim 1985; Bhatt and Takahashi 2007, 2011) the comparative has three arguments: the subject, the standard of comparison and the gradable predicate. It yields a truth value of 1 iff the maximal degree to which the subject of the comparative has the gradable property is greater than the degree to which the standard has it. It is often used for the analysis of comparatives with phrasal *than*-constituents.

Under the account of Japanese from Beck et al. (2004) the comparative operator has two arguments: the subject and the gradable predicate. They analyse *than*-clauses in Japanese as individual-denoting expressions which non-compositionally set the comparison class of the gradable predicate. In this respect, the Japanese comparative is similar to the English positive construction. Japanese *than*-clauses function like the "compared to" clause in sentence like (i).

(i) Compared to John, Mary is tall(-er).

2.1.2. Scope Effects

Beck et al. (2004) take the absence of scope ambiguities in comparatives as an additional indicator that Japanese lacks the ability to bind degree variables. As discussed at length in Heim 2001, the degree quantifier account of comparatives predicts that we should find scope ambiguities in comparatives if there are other scope bearing items in the matrix clause. For reasons which are unclear, no ambiguity arises with DP quantifiers or negation³ but is found in sentences with modals in their matrix clause. The ambiguity of sentences like (2) can be explained if we take one reading to come from an LF where the DegP outscopes the modal (8-b) and the other to come from an LF where the modal outscopes the DegP (8-a). Note that the example in (2) contains the differential measure phrase *exactly 15 pages*. Although both LFs can be generated for comparatives without differentials, the two yield identical truth conditions, so the presence of a differential (or a *less* comparative) is crucial to bring out the two readings.⁴

- (8) a. [must [exactly 10 pp]₁ [DegP [-er t_{d1}] wh₂ the draft t_{d2} tall]_{t3} the paper t_{d3} tall]
(Reading 1 from (2a))
b. [[exactly 10 pp]₁ [DegP [-er t_{d1}] wh₂ the draft t_{d2} tall]_{t3} must the paper t_{d3} tall]
(Reading 2 from (2a))⁵

Assuming this account of the ambiguity in (2) is on track, these kinds of sentences should be unambiguous in languages without the ability to abstract over degrees, since here the only LF available is one where the degree operator stays in-situ.

2.1.3. Negative Island Effects

Semantic accounts of negative island effects in comparatives (Rullmann 1995, Beck and Rullmann 1999, Fox and Hackl 2006) all rely on the assumption that *than*-clauses containing negation or a negative quantifier denote a syntactically derived predicate of degrees (in the case of (3), for

³This has been taken by some (e.g Kennedy (1999)) as indication that the quantifier account is on the wrong track.

⁴The two LFs generated by *less* comparatives also generate different truth conditions.

- (i) (The draft is 10 pages long...)
The paper is required to be less long than that.
a. Reading 1: The paper must be less than 10 pages long, an 11 page paper is unacceptable.
b. Reading 2: The shortest acceptable paper is less than 10 pages long, an 11 page paper is OK.

⁵A third logical form, in which the differential measure phrase moves to a position higher than *must* at LF, is theoretically possible here:

- (i) [[exactly 10 pp]₁ must [DegP [-er t_{d1}] wh₂ the draft t_{d2} tall]_{t3} must the paper t_{d3} tall]

This LF would generate the same truth conditions as the LF in (b).

example, it is the following property: $\lambda d. \textit{Peter did not buy a } d \textit{ expensive book.}$) and use certain facts about this property to explain the badness of (3). Rullmann’s account, for example, claims that these properties have no maximal degree which they map to true and that this causes problems since comparatives compare the maximal degree of which the matrix clause property is true to the maximal degree of which the *than* clause property is true. Fox and Hackl point out some problems with Rullmann’s account, but offer one in the same spirit. They suggest instead that it is the minimal (and maximally informative) degree to which this property maps true which is undefined and at the root of the problem. Under both accounts, however, if *than* clauses are taken to denote individuals (and Beck et al. (2004) claim that they do in Japanese) we lose the motivation for these effects and predict negation to be acceptable in *than*-clauses.

2.2. Beck et al. (2009) and the DAP

Beck et al. (2009) expand on the parametric approach of Beck, Oda and Sugisaki. Using a questionnaire study they test the availability of a various degree constructions in a sample of 17 languages. In addition to basic comparatives they test for the following constructions: differential comparatives (DiffC), comparison with a degree (CompDeg), scope ambiguities (Scope), negative island effects in comparatives (NegIs), degree questions (DegQ), direct measure phrases (MP) and subcomparatives (SubC). They observe that languages seem to form four distinct clusters with respect to the inventory of constructions they allow and propose three parameters of variation (shown in Fig. 1) to explain them.

Figure 1: Beck et al. (2009): Parameters of Variation in Degree Constructions

Degree Semantics Parameter (DSP)	Degree Abstraction Parameter (DAP)	Degree Phrase Parameter (DegPP)
<p>“A language does/does not have lexical items that introduce degree arguments.”</p> <p>Diagnostic Constructions</p> <ul style="list-style-type: none"> • Comparison with a Degree • Differential Comparatives 	<p>“A language does/does not have binding of degree variables in the syntax.”</p> <p>Diagnostic Constructions</p> <ul style="list-style-type: none"> • Scope ambiguities • Negative Island Effects (requires clausal comparatives) 	<p>“The degree argument of an unmarked gradable predicate may/may not be occupied by a syntactically visible element at a pre LF level of Syntax.”</p> <p>Diagnostic Constructions</p> <ul style="list-style-type: none"> • Direct Measure Phrases • Subcomparatives • Degree Questions

For our purposes the cluster containing Japanese and Yoruba is the most interesting. The questionnaire revealed that these languages have differential comparatives and comparison with a degree and thus must have a semantics which introduces degree (+DSP), but do not have scope effects, negative island effects, degree questions or subcomparatives, indicating a negative setting of the DAP. In addition to Yoruba and Japanese, Chinese, Samoan and Mooré also exhibit the same pattern. The next two sections of this paper will re-examine this conclusion for the Yoruba data and

argue for a different explanation of the facts.

3. Yoruba Degree Constructions

Before looking at Yoruba degree relatives and questions, this section provides an introduction to the semantics of gradable predicates and comparison in Yoruba. We motivate our assumptions about the denotations of gradable predicates, the comparative verb (*ju*) and the equative verb (*tó*).

3.1. Gradable Predicates

Yoruba has both gradable adjectives, which are used exclusively in attributive positions, and gradable verbs, which are always predicates, to express meanings which correspond to English gradable adjectives. The adjective form is derived from the verbal form via reduplication of the first syllable. Interestingly, only the verbal form can be used in degree constructions other than the positive.

(9)	GRADABLE ADJECTIVES	(10)	GRADABLE VERBS
	a. <i>Ade je ọmọ sisanra.</i> Ade be child fat "Ade is a fat child."		a. * <i>Ade je ọmọ sanra.</i> Ade be child be.fat "Ade is a fat child."
	b. * <i>Ade (je) sisanra.</i> Ade (be) fat. "Ade is fat."		b. <i>Ade sanra.</i> Ade be.fat "Ade is fat."
	c. * <i>Ade je ọmọ sisanra ju baba</i> Ade be child fat exceed father <i>re lọ</i> his STD "Ade is a fatter child than his father."		c. <i>Ade sanra ju baba re lọ</i> Ade be.fat exceed father his STD "Ade is fatter than his father."

It is not yet clear whether this is the result of a semantic restriction, for example that the gradable adjective denotes a vague predicate (type $\langle e, t \rangle$) and therefore cannot combine with degree operators, or a syntactic one, for example that degree operators in Yoruba subcategorize for a verb. We will leave the semantics of gradable adjectives in Yoruba aside and focus in this paper on gradable verbs, as they allow for the widest range of degree constructions. These we take to be relations between degrees and individuals (type $\langle d\langle e, t \rangle \rangle$). As Beck et al. (2009) and Vanderelst (2010) have already noted, gradable verbs can combine freely with a variety of degree morphology including degree modifiers *gan/die/pupo* ('very'/'little'/'extremely'), comparative and equative morphemes *ju* and *to* ('exceed' and 'reach', discussed in 3.2 and 3.3). Although direct measure phrase constructions (e.g. *John is five feet tall*) are not grammatical in Yoruba, we find differential measure phrases and measure phrases as the standard of a comparisons or equatives. As it has been pointed in the literature (von Stechow (1984), Schwarzschild (2005), Bochnak (2012)), these expressions

seem to denote degrees or sets of degrees and it is, thus, unclear how to account for their contribution under vague predicate accounts of scalar adjectives. On these grounds we take (12) to be the lexical entry for gradable verb *ga* (tall) in Yoruba.

- (11) a. *O ga fi esebata kan ju mi lo*
 3SG.NOM be.tall PREP foot one exceed 1sg.acc GO
 "He is one foot taller than me."
 b. *Ade ga ju/to esebata marun.*
 Ade be.tall exceed/reach foot five
 "Ade is taller than five feet/ Ade is five feet feet tall."
 c. *O ga gan/die/pupo*
 3.sg.acc be.tall somewhat/little/very
 "He is somewhat/little/very tall."

- (12) $[[ga]] (= [[tall]]) = \lambda d. \lambda x. HEIGHT(x) \geq d$

3.2. Comparatives

In Stassen (1985), a typological study of comparison constructions, Yoruba's comparatives are classified as "exceed-type" comparatives: the comparative morpheme is a lexical verb whose subject and object are the subject and standard of comparison respectively. In this respect, they are similar to English sentences like (13).

- (13) John exceeds/surpasses Bill in height.

They are different from English, however, in that the scale along which the two individuals are compared is not introduced in a PP as in English, but rather by a gradable verb which forms a serial verb construction with the comparative verb *ju*. An example is given in (14). The serial verb can optionally be modified by a differential PP, as in example (11) from 3.1.

- (14) *Joko yii da ju iyen lo*
 Chair this be.good exceed that.one STD
 "This chair is nicer than that one."

The object of the serial verb construction is obligatorily followed by *lo*, which is glossed throughout the paper as a standard marker (STD). However, there is evidence to suggest that *lo* is not actually a standard marker, but that the comparative verb is in fact *julo*. The phenomenon of 'verb splitting' is widely reported in the literature on Yoruba (e.g. Bode (2000), Awobuluyi (1982)): Cer-

tain bisyllabic transitive verbs appear to 'split' around their internal argument, as illustrated in the example below. The two syllables of splitting verbs are reported, for the most part, not to have independent meanings (cf. Bode 2000, p. 216).

- (15) Ade ba agogo naa je
 Ade V- timepiece the V
 "Ade broke the timepiece." Awobuluyi (1982:234)

In the case of *ju...lọ*, this is not the case, *lọ* used independently is the verb 'to go'. This is interesting because in many languages, the standard of comparison is expressed in a locative PP Stassen (1985). A historical link between the semantics of comparatives and constructions expressing paths has been drawn in the literature for other languages (e.g. Hohaus (2012) for Samoan). Nevertheless, evidence from verb fronting in focus constructions indicates that an account of *ju...lọ* as a splitting verb is on the right track. We leave the question of a historical link between *julọ* and *lọ* aside here. As Bode notes, when a splitting verb is fronted in focus constructions, both parts of the splitting verb must be fronted. This is also what we observe for *ju* and *lọ*.

- (16) a. *Bíbaje ni Ade ba okò re jé.*
 REDUPL-break FOC Ade V- car his V-
 "What happened was that Ade broke his car."
 b. *Jijulọ ni Omotayo ju Olat lọ*
 REDUPL-exceed FOC Omotayo exceed Olat V-
 "The fact is that Omotayo exceeds Olat" (Consultant's translation)

There is evidence that the standard of comparison is a nominal constituent rather than a reduced clause in Yoruba. The presence of a verb, modal or tense and aspect marker after *ju* renders the sentence ungrammatical, unless it is contained in a relative clause. Based on this syntactic structure, will follow Vanderelst (2010) in taking *ju* to be a 3-place operator with the lexical entry in (18). A small modification of the operator above will be necessary to capture comparatives whose standards are measure phrases or degree relatives of the type discussed in section 4. We propose that *ju* can either take an individual or a degree as its first argument, so that we also have the lexical entry in (19) to use for comparison with a degree or degree relative.

- (17) **Omotayo yara ju Ade le (yara) lọ*
 Omotayo be.fast exc. Ade can (run) STD
 Intended: "Omotayo is faster than Ade can be."

- (18) $[[ju]] = \lambda x. \lambda P_{\langle d, \langle e, t \rangle \rangle}. \lambda y. Max(\{d : P(d)(y)\}) > Max(\{d : P(d)(x)\})$

$$(19) \quad [[ju_{degree}]] = \lambda d. \lambda P_{\langle d, \langle e, t \rangle \rangle}. \lambda y. Max(\{d' : P(d')(y)\}) > d$$

3.3. Equatives

A brief discussion of the equative *to* is relevant at this point because of the role it plays in the constructions discussed in section four. An interesting difference between *to* and English equatives ((20)), it is used to build comparatives of inferiority (*less*-comparatives) (21), is obligatory in degree questions (see section 4.2) and appears optionally in degree relatives (4.1).

$$(20) \quad O \quad ga \quad to \quad mi.$$

3.SG.NOM be.tall reach 1.SG.ACC
"He is as tall as me."

$$(21) \quad Mary \ ko \ ga \ tó \ Bill.$$

Mary NEG be.tall reach Bill
"Mary less is tall than Bill."

Syntactically, it is a transitive verb like *ju...lo* which forms a serial verb construction with a gradable predicate. Semantically, we propose that it is also a three-place operator which takes an individual (or a degree), a gradable predicate and another individual as arguments and returns true if the second individual has the gradable property to a degree which is greater than or equal to the degree associated with the first argument. This lexical entry straightforwardly allows us to derive the right truth conditions for equatives and *less* comparatives. In section four, we will discuss how it does so for degree questions and degree relatives as well.

$$(22) \quad \text{a. } [[to_1]] = \lambda d. \lambda P_{\langle d, \langle e, t \rangle \rangle}. \lambda y. Max(\{d' : P(d')(y)\}) > d$$

$$\text{b. } [[to_2]] = \lambda x. \lambda P_{\langle d, \langle e, t \rangle \rangle}. \lambda y. Max(\{d : P(d)(y)\}) > Max(\{d : P(d)(x)\})$$

4. Challenging the DAP in Yoruba

Recall from section two, Beck et al. (2009) conclude that Yoruba, which patterns with Japanese in lacking subcomparatives, negative island effects and scope ambiguities in comparatives, has a negative setting of the degree abstraction parameter (that is, variables of type $\langle d \rangle$ cannot be bound). The analysis we have sketched so far for Yoruba comparatives and equatives is consistent with this conclusion. Since the gradable predicate and two individuals are direct arguments of the comparative or equative operator, no degree-abstraction is necessary. In this section, however, we will develop an account for two further constructions which we will argue represent a serious

challenge for the DAP in Yoruba. The first of these is a clausal comparative construction not discussed in the previous literature on Yoruba comparatives whose *than* constituent is a degree relative. An example is given in (23). The second are degree questions like (24).

(23) *Omotayo le sare ju bi Ade se le sare lo.*
 Omotayo can run.fast exceed how Ade Q can run.fast STD
 "Omotayo can run faster than Ade can."

(24) *Bawo ni Ade se ga to*
 How FOC Ade Q be.tall reach?
 How tall is Ade?

4.1. Degree Relatives as Evidence for Binding of Degree Variables

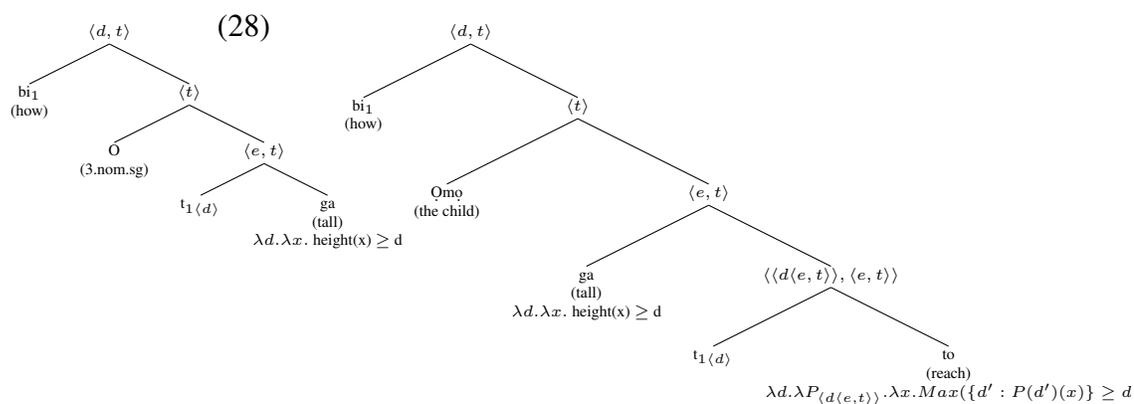
Although reduced comparatives are ungrammatical in Yoruba, clausal comparatives can be built with a free relative as the standard of comparison. An example is given in (25) below. This kind of degree free-relative can also occur independently of the comparative, as illustrated in (26).

(25) *Tabili yii gun ju bi omo yii se ga to lo*
 Table this be.long exceed how child this Q be.tall reach STD
 "The table is longer than the child is tall."

(26) *Jo ko bi o se ga, bi o se tobi ati amin oju inu apoti yii.*
 Please write how 2.SG Q be.tall, how 2SG. Q be.big and colour eye inside box this.
 "Please write your height, weight and eye colour in this box."

In these free-relatives, a wh-pronoun (*bi*) moves from its position either as the complement of the verb *to* or from its position within the gradable verb's VP to the specifier of the relative's CP. (The same wh-pronoun, *bi*, also occurs in embedded degree and manner questions.) Semantic accounts of wh-pronouns in English typically treat them as expressions that bind variables (e.g. Karttunen 1977, Heim 2000). Here, they are presumably binding a trace of type $\langle d \rangle$ in the degree argument position of *to* or of the gradable verb. This would yield an LF like (28) for the degree relative in (25) and (27) for the first one in (26).

(27)



These LFs bear a striking resemblance to the LFS we have been assuming for English *than*-clauses. But, such a representation should be ruled out in a -DAP language. Either Yoruba does, after all, have the ability to bind degree variables and has clausal comparatives which are remarkably similar to those found in English or, despite appearances, the semantics of these degree relatives in Yoruba is significantly different from that of English. We argue that the former is correct.

Suppose Yoruba is not able to bind variables of type $\langle d \rangle$. How can we give the degree-relatives in (25), (23) and (26) an in-situ account which yields a degree (or set of degrees) to combine with *ju*? One option is to modify our assumptions about gradable predicates. We have been assuming that they are expressions of type $\langle d \langle e, t \rangle \rangle$ like we take them to be in English, but they might also be of type $\langle e \langle d, t \rangle \rangle$. For Yoruba, no data from direct measure phrase constructions motivates a choice of the former over the latter. Changing our assumptions about the lexical entries of gradable verbs would provide a quick fix for the problem with degree relatives. The subject of the relative clause now combines directly with the gradable verb to give a set of degrees. We might take *bi* to be an operator which will map a set to its maximal degree. This gives us exactly what we need to combine with *ju*. However, this is not an adequate solution. On the one hand, this does not address the problem of degree relatives with *to*. We would need to also posit a different lexical entry for *to* in which the degree argument is its third argument and this seems less compelling given that when the degree argument of *to* is filled overtly (for example by a measure phrase), it is filled by the internal argument of *to* (as in (11) b). Perhaps more importantly, modals and propositional attitude verbs can intervene between *bi* and the gradable verb or *to*. Changing the order of the gradable verb's arguments will not be enough to capture sentences like (29).

- (29) *Olumide ga ju bi mo se ro wipe o se ga lo*
 Olumide be.tall exceed how I Q think that 3sg.nom Q be.tall STD
 "Olumide is taller than I thought he was."

It is unclear how this proposal can derive the set of degrees to which Olu is tall in the speaker's belief worlds without abstracting over the degree argument of tall in the *than* clause. It runs into

problems as soon as, instead of a proposition, *think* runs into an expression of type $\langle s\langle d, t \rangle \rangle$ as its complement. Our first attempt at a -DAP account of Yoruba degree relatives thus fails to capture all the data. It may be possible to find yet another proposal for Yoruba degree relatives which does not require giving up its -DAP classification but we are unaware of one.

There is some evidence, however that giving up the DAP for Yoruba might, indeed, be what we want to do. Now that we have uncovered a clausal comparative, we can test again for subcomparatives and negative island effects. Doing so reveals further evidence that Yoruba has binding of degree variables: both subcomparatives (30) and negative island effects (31) show up in clausal comparatives.

- (30) *Michael Jordan je agbaboolu-alapere ti o dara ju bi David Beckham se*
 Michael Jordan be basketball.player rel 3.sg be.good exceed how David Beckham Q
je agbaboolu-elese lo
 be football.player.
 "Michael Jordan is a better Basketball player than David Beckham is a (good) football player."
- (31) **John ra iwe to won ju bi Peter ko se ra iwe ti o won*
 John ra iwe rel expensive exceed how Peter not Q buy book rel 3.sg expensive.
 "John bought a more expensive book than Peter didn't buy."

4.2. Degree Questions

A further argument in favor of degree abstraction in Yoruba can also be made on the basis of degree questions. As we mentioned in section 3.3, the equative *to* is required in order to form grammatical degree questions. Beck et al. use this as an indication that Yoruba lacks true degree questions and as further evidence for a -DAP setting.

- (32) a. **Bawo ni Kathy se ga?*
 How FOC Kathy Q be.tall
 b. *Bawo ni Kathy se ga to?*
 How FOC Kathy Q be.tall reach
 "How tall is Kathy?"
 (Beck et al. (2009), appendix)

However, under our current assumptions about *to* a degree variable still needs to be bound in order to derive the appropriate question meaning, it simply isn't the degree argument of the gradable

verb but instead the degree argument of *to*. We have no explanation for why abstraction over the degree argument of the gradable verb is prohibited here. It is possible, though, that this restriction is independent of whether or not a language allows for binding of degree variables. Beck et al. (2009) identify a group of languages (including Russian, Turkish and Guarani) which, despite having ability to abstract over degrees, are subject to the same restrictions. Note that for Yoruba any account of this restriction will face the added challenge of explaining why abstraction over the gradable verb's degree argument is possible in relative clauses like (26). It is also worthwhile to note that questions about differential degrees do not require the presence of *to*, so whatever the restriction responsible for the presence of *to* in (32-b), it appears to have more to do with the gradable verb than with the binding of degree variables.

- (33) *Bawo ni Mt. Everest se ga ju K2 lo ?*
 How FOC Mt. Everest Q be.tall exceed K2 go
 "How much taller is Mt. Everest than K2?"

A Hamblin style semantics for questions based on the generation of sets of alternatives would provide a means of deriving the meaning of degree questions without binding of degree variables (e.g. Hamblin 1973). We do not consider such an account here, but note that degree questions can only provide evidence for or against a particular setting of the DAP as long as we can discount a Hamblin style account in the language under consideration.

5. Accounting for Scope Ambiguities

In the previous section, we have argued that evidence from clausal comparatives (and to some extent degree questions) points towards a degree semantics which allows for bound degree variables in Yoruba. There is one loose end which remains to be considered. Beck et al. (2009) report that Yoruba, like Japanese, lacks scope ambiguities in comparatives (their example is given in (34)). If we are correct that Yoruba has the ability to bind degree variables and, by extension QR degree quantifiers, why don't we find scope ambiguities like the ones discussed for English in 1.1.2?

- (34) Context: The draft is 10 pages long, the paper has to be at least 15 but can be more.
- a. *#Iwe naa gbodo gun ju iyen lo pelu oju-ewe marun gerege*
 Book dem. must be.long exceed that STD prep page five exactly.
 "The paper must be exactly five pages longer than that." (Beck et al. 2009, appendix)

The answer we will sketch here is that the ability to QR the comparative operator is a necessary, but not a sufficient condition for scope ambiguities in comparatives. Other factors, including the semantic type of differential measure phrases and the availability of *less* comparatives can also

influence the presence of scope ambiguities in a language. We will argue that in Yoruba the lack of *less* comparatives and degree-quantifier differential measure phrases make it so that two distinct readings are never generated.

We observed in 1.1.2 that, although we could generate two different LFs with a ‘plain’ comparative (no measure phrase, no *less* comparative), the two LFs yield identical truth conditions. This underscores the non-trivial role played by the differential measure phrases in these constructions. (At least the ones without *less*. Since Yoruba lacks *less* comparatives, we will ignore them here.) We suggest that this observation is at the heart of the apparent lack of scope ambiguity in Yoruba, namely, because there is evidence that Yoruba measure phrases do not have the semantic type of degree quantifiers. Empirical investigation of differential measure phrases revealed that measure phrases with modified numerals (e.g. *exactly x*, *at least x*, *approximately x*) seem to be unavailable, with the exception of the *gerege* in sentences like (34). In translation tasks targeting modified numerals, consultants uniformly provided translations with ‘bare’ numeral measure phrases, using other means to paraphrase the desired meaning. An example is given in (35).

- (35) Context: A student with a 17 page draft tells his teacher that he is thinking of writing more. The maximal length of the paper is 20 pages. His teacher says:
Your paper can be at most 3 pages longer than that.
- a. *iwe naa ko gbodo gun fi oju-ewe mefa ju be lo.*
 Paper def. NEG must be.long prep page four exceed that *lo*.
 "Your paper must not be 4 pages longer than that."

The meaning of modified numeral measure phrases cannot be captured by a denotation of type $\langle d \rangle$ or $\langle d, t \rangle$ (similarly to generalized quantifiers like *exactly two students* which cannot denote sets of individuals). This is, however not true of bare numerals which can (and have been argued to) denote sets of degrees, or simply degrees. In languages which lack modified numeral MPs, then, there is no clear indication that measure phrases have a quantificational meaning. It could be the case that they don't. Without them, when it comes to the relevant scope ambiguities, we again generate identical truth conditions for the "wide scope DegP" and "narrow scope DegP" LFs:

- (36) a. Wide Scope DegP:
 $\text{Max}(\{ d: \forall w \text{ compatible with the requirements of the actual world. length (Paper) in } w \geq d \}) \geq \text{Max}(\{ d: \text{length (Draft) in the actual world} \geq d \}) + 5 \text{ pages}$
- b. Narrow Scope DegP:
 $\forall w. w \text{ compatible with the requirements of the actual world. } \text{Max}(\{ d: \text{length(Paper) in } w \geq d \}) \geq \text{Max}(\{ d: \text{length (Draft) in the actual world} \geq d \}) + 5 \text{ pages}$

Both LFs generate the "at least reading": the minimal required length of the paper is 15 pages. In order to get from this reading to the one reported by Beck et al. (2009), we must then think about the contribution of *gerege*. A more detailed investigation of this particle will be necessary for a worked out account, but a preliminary suggestion is that it is not a degree operator, but rather a sentential one which serves to rule out stronger alternatives, similar to English *only*. We propose that in the case of the sentence above, it serves to rule out stronger the stronger scalar alternatives (*The paper must be 6 pages longer, the paper must be 7 pages longer* etc.). Thus, we believe that the lack of two distinct readings in the case of the Yoruba scope ambiguities is compatible with an account of Yoruba which makes it +DAP.

6. Conclusion

Now that we have determined that Yoruba's grammar does allow for bound degree variables and speculated that the observed lack of scope ambiguities in comparatives is the result of unrelated variation in the denotation of differential measure phrases between English and Yoruba, we may consider the consequences for the theory of cross-linguistic variation in the semantics of degree constructions. From a theoretical point of view, this paper has weakened the evidence in favour of a parameter like the DAP. We showed that there is considerably more heterogeneity within the clusters of languages identified by Beck et al. (2009) than is apparent. In order to determine whether our observations for Yoruba are the result of a truly heterogeneous cluster, or whether Yoruba has simply been misclassified, a second look at the other -DAP languages (Mandarin, Samoan and Mooré) is required. A problem with the diagnostic tests for the DAP has also become apparent: In languages without clausal comparatives they rely heavily on the data from scope ambiguities, but these are complex constructions in which many factors in addition to the ability to bind degree variables play a role. A related methodological conclusion to be drawn from this paper is that questionnaire studies can provide misleading results if they are not accompanied by a moderately detailed semantic analysis for each language in question. As we saw with Japanese and Yoruba, two languages may show similar patterns with different underlying causes.

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