

REFERENCE TO DEGREES AND NOMINALIZATION IN MBYÁ*

GUILLAUME THOMAS

Henrich Heine Universität Düsseldorf

Abstract

This paper investigates the interaction between comparison and nominalization through the analysis of data from Mbyá Guaraní, a Tupí-Guaraní language spoken in Argentina, Brazil and Paraguay. More precisely, it aims to account for the fact that there are no cross-polar anomalies (Kennedy, 2001) in Mbyá, i.e. the fact that sentences like **John is taller than Mary is short* are grammatical in this language. To do so, I argue that the grammar of Mbyá is sensitive to the difference between *thin degrees* (measurements without an order relation) and *fat degrees* (measurements with an order relation). Cross-polar anomalies arise when two fat degrees with inverse order relations are compared. In cross-polar comparisons in Mbyá, nominalization of the standard of comparison maps a property of fat degrees to a definite description of thin degrees, therefore rescuing the comparison. Crucially, the presence of a property of fat degrees inside the nominalized property can be diagnosed through the evaluativity of standards of comparison built with negative gradable predicates like *karape'i* ('short'): following Heim's (2009) reformulation of Rett's (2008) analysis, the evaluativity of negative standards of comparison can be derived from a competition between the negative and positive forms of gradable predicates, which exploits the order relation of fat degrees. The difference between English and Mbyá with respect to cross-polar anomalies is then explained as a matter of lexical variation: in Mbyá, the mapping of properties of fat degrees to definite descriptions or properties of thin degrees is productive and takes the form of an operation of clausal nominalization, which allows the expression of cross-polar comparison. In English, this mapping is attested but seems to be lexically restricted to a subset of positive adjective nominalizations like *height*.

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1 Introduction

This paper investigates cross-polar comparisons in Mbyá, a Tupí Guaraní language spoken in Argentina, Brazil and Paraguay. Our starting point is the surprising observation that (1) and (2) are grammatical. These sentences are built with the pair of antonym gradable predicates *yvate* ('tall') and *ikarape* ('short'). In (1), the negative member of the pair is embedded in the comparative complement, which is nominalized by the suffix *-a*:

- (1) Juan yvate-ve Maria i-karape'i-a gui
 Juan tall-more Maria 3-short-NLZ from
 'Juan is taller than the degree to which Maria is short.' (i.e. 'Juan is taller than Maria, who is short.')

Note that the negative predicate in the comparative complement is evaluative (while the matrix predicate is not): the sentence is true if and only if Juan's height is greater than Maria's, and Maria is short. Note also that the mirror sentence in (2), with a negative predicate in the matrix clause and its antonym in the comparative complement, is not evaluative at all. This sentence is true if and only if Maria's height is less than Juan's height:

- (2) Maria ikarape'i-ve Juan yvate-a gui
 Maria short-more Maria tall-NLZ from
 'Maria is shorter than the degree to which Juan is tall.' (i.e. 'Maria is shorter than Juan.')

It seems that (1) and (2) are unlike any comparative construction that we may use to translate them into English. If they had the structure and interpretation of English sub-comparative deletions, we would expect (1) to be a cross-polar anomaly (CPA) or a comparison of deviation (Kennedy, 2001). Cross-polar anomalies are ungrammatical, as illustrated in (3). Comparisons of deviations have different truth-conditions. (4), from Kennedy (2001), is true if and only if the degree to which the Red Sox exceed a standard of legitimacy is greater than the degree to which the Orioles fall short of this standard. Contrary to Mbyá cross-polar comparisons, comparisons of deviation are evaluative both in the matrix clause and in the comparative complement, i.e. (4) entails both that the Red Sox are legitimate and that the Orioles are fraudulent.

- (3) *Juan is taller than Maria is short.
 (4) The Red Sox are more legitimate than the Orioles are fraudulent.

(1) and (2) are also not accurately translated by constructions such as (5) and (6). In these sentences, the standard of comparison is a polarized (aka 'positive') adjective nominalization (Moltmann, 2009). Polarized nominalizations like *tallness* and *shortness* are evaluative both with positive adjectives and with negative adjectives, while only negative *-a* nominalizations are evaluative in comparative complements in Mbyá. Furthermore, polarized adjective nominalizations are ungrammatical in comparative complements in English:

- (5) *Juan is taller than Maria's tallness. (6) *The ceiling is higher than Maria's tallness.

Finally, one cannot translate (1) as (7) either. This sentence is built with the absolute adjective nominalization *height* in its comparative complement. The issue is that absolute adjective

nominalizations like *height*, *depth* or *width*, are not evaluative. Furthermore, they do not come in pairs of antonyms.

(7) Juan is taller than Maria's height.

In sum, every English comparative construction that we may use to translate (1) and (2) is either ungrammatical, or has different truth-conditions. This suggests that some aspect of the structure or the lexical make-up of (1) and (2) is unattested in English.

I will discuss two possible analyses of Mbyá cross-polar comparisons. First, I will consider and discard an extension of Büring's (2007a) analysis of English Cross-Polar Nomalies (CPN) to Mbyá.

(8) The ladder is shorter than the house is high.

I will then argue that the grammaticality of cross-polar comparisons in Mbyá is due to the availability of a type of degree nominalization that is unattested in English. This proposal will rely on a rich degree ontology that includes both fat degrees (pairs of a measurement and an order relation, see Cresswell, 1976) and thin degrees (measurements without an order relation), as well as on Rett's (2008) theory of evaluativity, as proposed in Heim (2009). Following Kennedy (2001), cross-polar anomalies arise when two fat degrees are compared, which have opposite or incommensurable order relations. The absence of cross-polar anomalies in Mbyá, I argue, is due to the fact that nominalized degree clauses in Mbyá are definite descriptions of thin degrees. However, the evaluativity of negative gradable predicates in comparative complements shows that they are predicates of fat degrees. Therefore, the type of nominalization that is observed in Mbyá cross-polar comparison maps properties of fat degrees to descriptions of thin degrees, a mapping which is unattested in English. I propose that the availability of this operation is a parameter of cross-linguistic variation.

The paper is structured as follows. In section 2, after introducing the language and the fieldwork context, I give an informal overview of comparative constructions and *-a* nominalizations in Mbyá. In section 3, I present the phenomena of cross-polar anomalies and comparisons of deviation in English, and I present a reformulation of Kennedy's (2001) analysis of cross-polar anomalies using Cresswell's (1976) ontology of degrees. I come back to cross-polar comparisons in Mbyá, and I show that they are not comparisons of deviation, and that they do not give rise to cross-polar anomalies, contrary to English cases of sub-comparative deletions with polar opposites. I compare cross-polar comparisons in Mbyá with the phenomenon of cross-polar nomalies in English, and I show that Büring's (2007a) analysis of the latter cannot be extended to Mbyá. In section 4, I argue that *-a* nominalizations in Mbyá cross-polar comparisons map properties of fat degrees (which encode an order) to definite descriptions of thin degrees (which do not encode an order), which accounts for their grammaticality. I explain the patterns of evaluativity in these constructions by integrating Rett's (2008) theory of evaluativity to their analysis. I conclude that the type of degree nominalization that is attested in Mbyá cross-polar comparisons, which maps properties of fat degrees to descriptions of thin degrees, is not attested in all languages. This accounts for the variation in the grammaticality of cross-polar comparisons attested in English and Mbyá.

2 Overview of comparison and nominalization in Mbyá

2.1 Language and fieldwork methodology

Mbyá is a Guaraní language of the Tupí-Guaraní family in the Tupí stock (see Rodrigues, 1984). The Tupí-Guaraní family includes more than 50 languages and is one of the most numerous linguistic families in South America, according to Rodrigues (1984, 1987). Rodrigues divided the Tupí-Guaraní family in 8 sub-groups. In this classification, Mbyá belongs to the sub-group of Guaraní languages, along with Paraguayan Guaraní, Aché, Avá, Eastern Bolivian Guaraní, Western Bolivian Guaraní, Kaiwá and Xetá.

I worked with three consultants, who are all native speakers of Mbyá from the province of Misiones, Argentina. Two of them live in the community Kuña Piru, and the other lives in Posadas, the capital of the province. Data were elicited only with the informed consent of the consultants. Since most of the elicitation sessions were held in a Mbyá community, Kuña Piru, the authorization to hold elicitation sessions in the community was obtained from the political leader of the community.

2.2 Core comparative constructions

Comparison in Mbyá is expressed with the morpheme *-ve*, as in (9). That (9) is a comparative sentence is shown by a number of facts beyond its mere translation. First of all, the truth conditions of the sentence are irreducibly comparative: (9) is true if and only if the height of Juan is greater than the height of Pedro, and its negation in (10) is true if and only if the height of Pedro is at least as great as the height of Juan:¹

- (9) Juan Pedro gui i-jyvate-ve.
 Juan Pedro from B3-tall-VE
 ‘Juan is taller than Pedro.’
- a. true: Juan’s height is 1m75, Pedro’s height is 1m70.
 b. false: Juan’s height is 1m70, Pedro’s height is 1m75.
 c. false: Juan’s height is 1m75, Pedro’s height is 1m75.
- (10) Juan Pedro gui nda-i-jyvate-ve-i.
 Juan Pedro from neg-B3-tall-VE-neg
 ‘Juan is not taller than Pedro.’
- a. false: Juan’s height is 1m75, Pedro’s height is 1m70.
 b. true: Juan’s height is 1m70, Pedro’s height is 1m75.
 c. true: Juan’s height is 1m75, Pedro’s height is 1m75.

In addition, patterns of inferences that are licensed or blocked with antonyms confirm that we are dealing with comparative constructions. This is illustrated in sentences (11) and (12). Consultants agreed that (12) but not (11) is unacceptable. This is expected if the two predicates are antonyms, in which case (12) is a contradiction.

¹The context of evaluation of comparative sentences was described verbally in Spanish. All three consultants are bilingual, and were schooled in Spanish.

- (11) Juan yvate-ve Maria gui, ha'e vy Maria i-karape'i-ve Juan gui.
 Juan tall-more Maria from, ANA SS Maria 3-short-more Juan from
 'Juan is taller than Maria, therefore Maria is shorter than Juan.'
- (12) #Juan yvate-ve Maria gui, va'eri Maria nda-i-karape'i-ve-i Juan gui.
 Juan tall-more Maria from, but Maria NEG-3-short-more-NEG Juan from
 #'Juan is taller than Maria, but Maria is not shorter than Juan.'

There is evidence that *-ve* denotes a comparative operator, while the post-position *gui* ('from') is used to introduce the standard of comparison (I will refer to the positional *gui* phrase as the comparative complement). First, note that while comparison cannot be expressed without *-ve*, as is illustrated by the ungrammaticality of (13), the use of the post-positional *gui*-phrase is optional. In (14) for instance, the standard of comparison is contextually understood to be Pedro's height:

- (13) *Juan Pedro gui i-jyvate.
 Juan Pedro from B3-tall
 Intended: 'Juan is taller than Pedro.'
- (14) Pedro i-jyvate, va'eri Juan i-jyvate-ve.
 Pedro B3-tall, but Juan B3-tall-VE
 'Pedro is tall, but Juan is taller.'

Last but not least, the morphosyntax of (9) is also typical of comparative constructions cross-linguistically. A gradable predicate *yvate* ('tall') combines with a marker of comparison *-ve*. This predicate provides the scale on which two entities are being compared. These two entities are realized as Noun Phrases. Following Stassen (1985), the NP that denotes the entity that serves as a standard comparison may be called the *standard* NP, and the NP that denotes the entity that is compared to this standard may be called the *comparee* NP. Let us then observe that (9) is a typical instance of separative comparative in Stassen's typology. Separative comparatives are constructions in which the standard NP is part of an adverbial phrase that is headed by a separative adposition or has a separative case (c.f. the 'source' meaning of the post-position *gui*). According to Stassen, more than 30% of the languages in his sample belong to this typological class.

2.3 Clausal and phrasal comparison

Comparative complements may be clausal, as in (15), or phrasal, as in (16):

- (15) Yvyra oo i-puku-a gui i-jyvate-ve.
 tree house B3-long-NLZ from B3-tall-VE
 'The tree is taller than the house is long.'
- (16) Yvyra oo gui i-jyvate-ve.
 tree house from B3-tall-VE
 'The tree is taller than the house.'

Note that contrary to English, the gradable predicate in a clausal standard of comparison can be identical to the matrix predicate – there is no obligatory deletion under identity:

- (17) Yvyra oo yvate-a gui i-jyvate-ve.
 tree house tall-NLZ from B3-tall-VE
 'The tree is taller than the house is (*tall).'

The availability of both clausal and phrasal standards of comparison raises the question whether phrasal standards are obtained by ellipsis from an underlying clause, or whether they are genuinely phrasal, a debate that has divided analyses of comparison in English and across languages since the seminal work of Bresnan (1973) and McConnell-Ginet (1973). In what follows, I will argue that phrasal comparatives in Mbyá are not reduced clauses. The argument is based on licensing constraints on negative words. Incidentally, this argument also allows us to conclude that *-a* nominalization in comparative complements are full clauses.

There are two families of analyses of phrasal comparatives. In a reduction analysis, the phrasal standard of comparison is actually a clausal standard that is reduced by ellipsis. In that case the comparative morpheme can be analyzed just as in the analysis of unreduced clausal comparatives. In a direct analysis, the standard of comparison is genuinely phrasal, and denotes an entity to which some argument of the matrix clause is compared, rather than a property of degrees.

A reduction analysis of (18) is presented in (19). (19) is a clausal comparative construction where the subordinated vP has been elided:

- (18) Juan Pedro gui i-jyvate-ve.
 Juan Pedro from B3-tall-VE
 ‘Juan is taller than Pedro.’

- (19) [IP Juan I [_{vP} [_{DegP} -ve [_{PP} Pedro ijyvatea gui]] [_{vP} 1 [_{vP} Juan [_{VP} -ve₁ ijyvate]]]]]

In the direct analysis the comparison operator is ambiguous between a clausal operator and a phrasal operator *-ve*. The phrasal operator combines first with the standard of comparison, then with the gradable predicate, and last with the matrix argument of the gradable predicate. The syntactic structure of phrasal comparatives is therefore different from that of clausal comparatives, not only because the standard of comparison is genuinely phrasal, but also because the constituent composed of the comparison operator and the standard of comparison must combine with the gradable predicate before the latter combines with its matrix argument. This is illustrated in (20):

- (20) [IP Juan I [_{vP} Juan [_v v [_{VP_i} [_{DegP} [_{Deg} -ve] [_{PP} [_{NP} Pedro] [_P gui]]]] [_{VP_i} 1 [[_v ijyvate] [_{DegP} -ve₁]]]]]]]]]

The question which of these two strategies is attested in a given language has received a lot of attention in the literature on comparatives, and it has been argued that languages vary as to which strategy they adopt (see Bhatt and Takahashi, 2007). As far as Mbyá is concerned, there is evidence from the licensing of negative words (N-words) in favor of the direct analysis.

N-words in Mbyá are formed by adding a negative suffix *-ve* (accidentally homophonous with the comparative operator) to a root that is also used in the formation of question words and existential Free Choice Items (FCIs), as illustrated in the following table:

Root	N-word	Existential FCI	Question word
mava'e (person)	mava'eve	mava'erã	mava pa
(21) mba'e (thing)	mba'eve	mba'erã	mba'e pa
mamo (place)	mamove	mamorã	mamo pa

N-words must be licensed by a negation in their local clause (see (22) vs. (23)). Provided there is a local negation, N-words can be licensed in subject position (see (24)). However, a negation cannot license N-words in a different clause, even if the negation c-commands the N-word (see 25)):

- (22) Nd-a-echa-i mava'e-ve. (23) *A-echa mava'e-ve.
 NEG-A1.SG-see-NEG person-NEG A1.SG-see person-NEG
 'I didn't see anyone.' Intended: 'I saw no one.'
- (24) Mava'e-ve nda-che-r-echa-i.
 person-NEG NEG-B1.SG-R-see-NEG
 'No one saw me.'
- (25) *N-a-icha'ã-i er-echa mava'e-ve.
 NEG-A1.SG-think-NEG B2.SG-see person-NEG
 Intended: 'I don't think that no one saw you.'

In the absence of a local negation, N-words are not licensed in contexts that license Negative Polarity Items cross-linguistically, such as questions and antecedents of conditionals:

- (26) *Maria o-echa vy mava'e-ve pe, o-mombeu Juan pe.
 Maria A3-see SS person-NEG OBJ A3-tell Juan OBJ
 Intended: 'If Maria sees anyone, she will tell Juan.'
- (27) *O-echa ndau'-ra'e Maria mava'e-ve pe?
 A3-see Q Maria person-NEG OBJ
 Intended: 'Did Maria see anyone?'

Coming back to comparative constructions, we observe that a negation in the matrix clause of a comparative licenses N-words inside phrasal standards of comparison, but not inside clausal standards:

- (28) Juan mava'e-ve gui nda-i-jyvate-ve-i.
 Juan person-NEG from NEG-B3-tall-VE-NEG
 'Juan is not taller than anyone.'
- (29) *Juan mava'e-ve i-jyvate-a gui nda-i-jyvate-ve-i.
 Juan person-NEG B3-tall-NLZ from NEG-B3-tall-VE-NEG
 (Intended) 'Juan is not taller than anyone is.'

This shows that phrasal comparatives are not reduced clauses. If they were, we would expect the N-words to be anti-licensed by the fact that the matrix negation is not local. Incidentally, this also shows that *-a* nominalizations in comparative complements have enough functional structure to act as the minimal domain of (anti)-licensing of N-words.

2.4 Syntactic assumptions

I will adopt Bhatt and Pancheva's (2004) analysis of the syntax of comparatives. First, the morpheme *-ve* is merged with the matrix gradable predicate:

Finally, there is evidence that at least some instances of *-a* nominalizations have the internal structure of a clause. (39) shows an instance of *-a* nominalized complement clause. Sentences (39) to (44) shows that a wide range of functional material can occur on the nominalized verb in the complement clause: reflexive markers (40), predicative negation² (41), desiderative aspect (42), prospective aspect (43) and adverbs of frequency (44).

- (39) Cirilo he'i Juan Aureliano pe o-ikychĩ-a.
 Cirilo B3.say Juan Aureliano OBJ A3-cut-NLZ
 'Cirilo said that Juan cut Aureliano.'
- (40) Cirilo he'i Juan o-ñe-kychĩ-a.
 Cirilo B3.say Juan A3-RFL-cut-NLZ
 'Cirilo said that Juan cut himself.'
- (41) Cirilo he'i Juan Aureliano pe n-o-ikychĩ-i-a.
 Cirilo B3.say Juan Aureliano OBJ NEG-A3-cut-NEG-NLZ
 'Cirilo said that Juan didn't cut Aureliano.'
- (42) Cirilo he'i Juan Aureliano pe o-ikychĩ-che-a.
 Cirilo B3.say Juan Aureliano OBJ A3-cut-DES-NLZ
 'Cirilo said that Juan wants to cut Aureliano.'
- (43) Cirilo he'i Juan Aureliano pe o-ikychĩ-ta-a.
 Cirilo B3.say Juan Aureliano OBJ A3-cut-PROS-NLZ
 'Cirilo said that Juan was going to cut Aureliano.'
- (44) Cirilo he'i Juan Aureliano pe o-ikychĩ-a jevy.
 Cirilo B3.say Juan Aureliano OBJ A3-cut-NLZ again
 'Cirilo said that Juan cut Aureliano again.'

These facts suggest that *-a* nominalized complement clauses contain a full vP and higher functional projections in the extended verbal projection (see Grimshaw, 2005).

3 Cross-polar comparisons in Mbyá and in English

3.1 Cross-polar comparisons in Mbyá

Let us now go back to cross-polar comparisons. In this subsection, I establish the patterns of evaluativity of gradable predicates in these constructions (cf. Rett, 2008), and I show that they are not comparisons of deviation (cf. Kennedy, 2001).

First, note that mono-polar comparisons are not evaluative. (45) for instance does not entail that Juan is tall (and therefore it does not entail that Pedro is tall either). This is shown by the fact that (46) is acceptable, hence not contradictory:

- (45) Juan yvate-ve Pedro yvate-a gui.
 Juan tall-more Pedro tall-NLZ from
 'Juan is taller than Pedro is.'

²Note that the negative circumfix *n-θ-i* is only attested on predicates; negation on arguments or modifiers of predicates is realized as a suffix *e'ỹ*, see Dooley (2006).

- (46) Juan *nda-yvate-i*, *ha'e rã yvate-ve Pedro yvate-a* *gui*.
 Juan NEG-tall-NEG ANA DS tall-more Pedro tall-NLZ from
 'Juan is not tall, but he is taller than Pedro is.'

Let us now investigate the evaluativity of cross-polar comparison with antonyms, such as (47) and (48):

- (47) Juan *yvate-ve Maria i-karape'i-a* *gui*.
 Juan tall-more Maria 3-short-NLZ from
 'Juan is taller than the degree to which Maria is short.'
- (48) Maria *i-karape'i-ve Juan yvate-a* *gui*.
 Maria 3-short-more Juan tall-NLZ *gui*.
 'Maria is shorter than Juan's height.'

That the pair of gradable predicates *yvate* ('tall') and *karape'i* ('short') are antonyms is confirmed by the fact that (49) is acceptable while (50) is not, cf. also examples (11) and (12):

- (49) Juan *yvate-ve Maria* *gui*, *ha'e vy Maria i-karape'i-ve Juan* *gui*.
 Juan tall-more Maria from, ANA SS Maria 3-short-more Juan from
 'Juan is taller than Maria, therefore Maria is shorter than Juan.'
- (50) #Juan *yvate-ve Maria* *gui*, *ha'e rã Maria nda-i-karape'i-ve-i* Juan *gui*.
 Juan tall-more Maria from, ANA DS Maria NEG-3-short-more-NEG Juan from
 #'Juan is taller than Maria, but Maria is not shorter than Juan.'

In order to assess the evaluativity of cross-polar comparatives, I elicited judgments of acceptability on the following examples. These sentences are cross-polar comparatives that are preceded by the negation of the positive form of either the matrix comparative clause or the comparative complement. Consider (51) for instance. It is the conjunction of two sentences, the first of which asserts that Maria is not short, while the second can be paraphrased as the assertion that Juan is taller than the degree to which Maria is short. If the comparative complement were not evaluative, then everything else being equal, the conjunction should be acceptable. Otherwise, it should be contradictory, and thus unacceptable.

- (51) #Maria *nda-ikarape'i-i*, *va'eri Juan yvate-ve (Maria) i-karape'i-a* *gui*.
 Maria NEG-short-NEG but Juan tall-more Maria 3-short-NLZ from
 #'Maria is not short, but Juan is taller than the degree to which Maria is short.'
- (52) Juan *nda-yvate-i*, *va'eri Maria i-karape'i-ve Juan yvate-a* *gui*.
 Juan NEG-tall-NEG but Maria 3-short-more Juan tall-NLZ *gui*.
 'Juan is not tall, but Maria is shorter than Juan's height.'
- (53) Juan *nda-yvate-i*, *va'eri (Juan) yvate-ve Maria i-karape'i-a* *gui*.
 Juan NEG-tall-NEG but Juan tall-more Maria 3-short-NLZ from
 'Juan is not tall, but he/Juan is taller than the degree to which Maria is short.'
- (54) Maria *nda-ikarape'i-i*, *va'eri (Maria) i-karape'i-ve Juan yvate-a* *gui*.
 Maria NEG-short-NEG but Maria 3-short-more Juan tall-NLZ *gui*.
 'Maria is not short, but she/Maria is shorter than Juan's height.'

These data show that only negative predicates (such as *karape'i*, ‘short’) in comparative complements are evaluative in cross-polar comparisons. Negative predicates in the matrix clause of a cross-polar comparison are not evaluative, as illustrated in (52), and positive predicates are evaluative neither in the matrix clause nor in the comparative complement of cross-polar comparisons, as illustrated in (53) and (54).

These data also support the conclusion that cross-polar comparisons with antonyms are not comparisons of deviation (Kennedy, 2001). Remember that comparisons of deviation assert that the degree to which a compared entity exceeds a standard of comparison, is greater than the degree to which a ‘comparée’ entity falls short of this standard. (55) for instance (from Kennedy, 2001) asserts that the degree to which the Red Sox exceed a standard of legitimacy is greater than the degree to which the Orioles fall short of this standard. Comparison of deviation is therefore inherently evaluative both in the matrix clause and in the standard of comparison, as Kennedy (2001) observed already:

(55) The Red Sox are more legitimate than the Orioles are fraudulent.

Let us now turn our attention to cross-polar comparisons formed with pairs of predicates that are polar opposites but that are not antonyms, as illustrated in (56) and (57):

(56) Yvyra i-puku-ve yakã i-po'i-a gui.
bridge 3-long-more river narrow-NLZ from
‘The bridge is longer than the degree to which the river is narrow.’

(57) Yakã i-po'i-ve yryvovo i-puku-a gui.
river 3-narrow-more bridge 3-long-NLZ from
‘The river is narrower than the bridge is long’

First, we establish that the predicates *puku* (‘long’) and *po'i* (‘narrow’) are not antonyms. This is shown by the acceptability of (58). If *puku* and *po'i* were antonyms, (58) would be contradictory, hence unacceptable. Indeed, the alternative sentence (59) obtained by substituting *puku* by *ype* (‘wide’), which is the antonym of *po'i*, is unacceptable:

(58) Tape i-puku-ve yakã gui, va'eri yakã nda-i-po'i-ve-i tape gui.
path 3-long-more river from, but river NEG-3-narrow-more-NEG path from
‘The path is longer than the river, but the river is not narrower than the path.’

(59) #Tape i-py-ve yakã gui, va'eri yakã nda-i-po'i-ve-i tape gui.
path 3-wide-more river from, but river NEG-3-narrow-more-NEG path from
#‘The path is wider than the river, but the river is not narrower than the path.’

Next, we assess the evaluativity of the gradable predicate in the main clause and in the comparative complement. As examples (60) to (63) demonstrate, the pattern of evaluativity is the same as the one we observed with antonyms: in cross-polar comparisons, only negative predicates in the comparative complement are evaluative:

(60) #Yakã nda-i-po'i-i, ha'e rã yvyra i-puku-ve yakã i-po'i-a gui.
river NEG-3-narrow-NEG ANA DS bridge 3-long-more river narrow-NLZ from
#‘The river is not narrow, but the bridge is longer than the degree to which the river is narrow.’

- (61) Yryvovo nda-i-puku-i, ha'e rã yakã i-po'i-ve yryvovo i-puku-a gui.
 bridge NEG-3-long-NEG ANA DS river 3-narrow-more bridge 3-long-NLZ from
 'The bridge is not long, but the river is narrower than the bridge is long.'
- (62) Yryvovo nda-i-puku-i, ha'e rã (yryvovo) i-puku-ve yakã i-po'i-a gui.
 bridge NEG-3-long-NEG ANA DS bridge 3-long-more river 3-narrow-NLZ from
 'The bridge is not long, but it/the bridge is longer than the degree to which the river is narrow.'
- (63) Yakã nda-i-po'i-i, ha'e rã (yakã) i-po'i-ve yryvovo i-puku-a gui.
 river NEG-3-narrow-NEG ANA DS river 3-narrow-more bridge 3-long-NLZ from
 'The river is not narrow, but it/the river is narrower than the bridge is long.'

An anonymous reviewer suggests that this test does not conclusively show that the matrix predicate of the cross-polar comparison in sentences like (62) is non-evaluative, since the standard of comparison may shift across clauses. To wit, the predicate of the first sentence may be evaluated with respect to the contextual standard of bridges' length, while the matrix predicate of the second sentence would be evaluated with respect to the contextual standard of rivers' width.

The reviewer suggests that the insertion of a measure phrase provides a more reliable test, assuming that differential comparatives are never evaluative. While I have not had the opportunity to apply this test carefully, one of the consultants of this study informed me by email that the following modification of (62) is acceptable:

- (64) Yryvovo i-puku-ve yakã i-po'i-a gui mokoĩ metros py.
 bridge 3-long-more river 3-narrow-NLZ from two meters by.
 'The bridge is longer than the degree to which the river is narrow, by two meters.'

This suggests that (62) is indeed non-evaluative. On the other hand, the same consultant informed me that sentence (65) is unacceptable. This is unexpected since by the logic of this test of evaluativity, it suggests that negative predicates in matrix clauses are evaluative, contrary to is observed in (63).

- (65) *Yakã i-po'i-ve yryvovo i-pukua gui mokoĩ metros py.
 river 3-narrow-more bridge 3-long-NLZ from two meters by.
 Intended: 'The river is narrower than the degree to which the river is long, by two meters.'

The analysis that I propose in this paper does not explain the contrast between (64) and (65). I will leave this question for further research, and I will develop my analysis under the assumption that negative predicates in cross-polar comparisons are evaluative only when they occur in the comparative complement. Given this assumption, the contrast between (64) and (65) must be explained by additional factors.

3.2 On cross-polar (a)nomalies in English

Cross-polar anomalies arise in sub-comparative deletions formed with pairs of adjectives that are polar opposites³:

³The English data in this section and corresponding judgements of grammaticality are from Büring (2007a).

(66) ?*John is shorter than Mary is tall.

(67) *Mary is taller than John is short.

Kennedy (2001) proposes an explanation of this phenomenon that builds on the hypothesis that adjectives denote relations between individuals and degrees, where degrees are analyzed as initial or final segments on a scale. Positive adjectives like *tall* denote relations between individuals and positive degrees, i.e. initial segments on a scale. Negative adjectives like *short* denote relations between individuals and negative degrees, i.e. final segments on a scale. This analysis captures the relation between positive adjectives and their polar opposites in an elegant way. The tallness of an individual, say John, is systematically related to his shortness: his tallness is the interval in the scale of height that covers the initial segment of the scale up to John's height, while his shortness is that interval which covers the final segment of the scale down to John's height:

(68) $S: 0 \text{ --- } pos_S(x) \text{ --- } \bullet \text{ --- } neg_S(x) \text{ --- } \infty$

The comparative operator is analyzed as a relation that obtains between a pair of degrees if and only if the second degree is properly included in the first one⁴:

(69) $x \text{ is more } \varphi_1 \text{ than } y \text{ is } \varphi_2 \text{ is true if and only if } \varphi_2(y) \subset \varphi_1(x)$

With this system in place, Kennedy argues that cross-polar anomalies are ungrammatical because the comparative operator is defined only for degrees of the same sort, i.e. both positive degrees or both negative degrees.

Büring's (2007a) starting point is the observation that sentences such as (70) are an exception to Kennedy's generalization. He refers to these sentences as 'cross-polar nomalies':

(70) The ladder is shorter than the house is high.

(70) is built with a negative adjective (*short*) in the matrix clause, and a positive adjective (*high*) in the standard of comparison. A notable difference from Kennedy's examples is that the two adjectives are not antonyms. Büring also observes that putting the negative adjective in the standard of comparison and the positive adjective in the matrix clause yields an ungrammatical sentence, a phenomenon he calls 'inverse cross-polar nomaly':

(71) *The house is higher than the ladder is short.

Büring's analysis is essentially a reduction of cross-polar nomalies (such as 70) to comparatives of inferiority built with pairs of adjectives of the same polarity, such as (72):

(72) The ladder is less long than the house is high.

Büring proposes that negation relates both antonym gradable adjectives and the opposite comparative operators *more* and *less*. *Short* is analyzed as the combination of *tall* and a degree negation, *LITTLE*. *Less* is analyzed as the combination of *more* and *LITTLE*. In addition, Büring argues that two terminals that are adjacent in a tree can be spelled out as a morphological unit, even if they are not sisters. Because of this, cross-polar nomalies such as (70) can be parsed in two ways, only one of which results in ungrammaticality:

⁴This is actually a reformulation of Kennedy's analysis, which is not directly formulated in terms of inclusion.

- (73) The ladder is *LITTLE*-er long than *HOW* the house is high
 (74) The ladder is -er *LITTLE*-long than *HOW* the house was high

In (73), *LITTLE* combines semantically with the comparative operator, but is spelled out together with the adjective *long*, which surfaces as its antonym *short*. Nevertheless, the logical structure of the sentence is that of a comparison of inferiority built on a pair of adjectives of the same polarity. Therefore, it is predicted to be grammatical. In (74) on the other hand, *LITTLE* combines semantically with *long*, which is interpreted as a true negative adjective. This results in the configuration of cross-polar anomaly, and the sentence is predicted to be ungrammatical.

This analysis correctly derives the ungrammaticality of inverse cross-polar anomalies: since the negative adjective is embedded in the standard of comparison, the negation *LITTLE* is not adjacent to the comparative operator, and therefore there is only one way to parse the sentence:

- (75) The house is -er high than *HOW* the ladder is *LITTLE*-long

In order to implement this analysis, Büring analyses gradable adjectives as relations between individuals and degrees, which are points on a scale (rather than intervals as in Kennedy's analysis). A positive adjective denotes a relation between an individual and the degrees that are at most as great as the measurement of this individual on some scale. Intervals are defined as non-empty convex sets of degrees on a scale. The degree negation *LITTLE* maps an interval to its complement in its scale.

- (76) $\llbracket \text{tall} \rrbracket^{c,g} = \lambda d. \lambda x. \text{height}'(x) \geq d$
 $\llbracket \text{LITTLE} \rrbracket^{c,g} = \lambda i. \lambda d. i(d) = 0$
 $\llbracket \text{LITTLE} \rrbracket^{c,g}(\llbracket \text{tall} \rrbracket^{c,g}) = \lambda x. \lambda d. \text{height}'(x) < d$

Because gradable adjectives do not have the type of intervals, Büring assumes a special composition rule to combine them directly with *LITTLE*. In and of itself, *LITTLE* maps an interval on a scale *S* to its complement on *S*. If the interval in input is an initial segment on *S* (as in the case of intervals obtained from positive adjectives), the output is the final interval that is its complement on *S*. This allows Büring to adopt Kennedy's analysis of cross-polar anomalies.

As in Kennedy's analysis, the comparative operator denotes a relation of inclusion between intervals. However, in order to relate *more/-er* and *less* by negation, Büring gives an additional argument to the operator denoted by *more/-er*, which can be saturated either by a silent identity function defined on intervals, *MUCH*, or by the degree negation *LITTLE*. While the combination of *-er* and *MUCH* is spelled out as *more/-er*, the combination of *-er* and *LITTLE* is spelled out as *less*. (78) is the structure that Büring would assign to the cross-polar anomaly in (70):

- (77) $\llbracket \text{-er} \rrbracket^{c,g} = \lambda f. \lambda S. \lambda M. f(S) \subset f(M)$
 $\llbracket \text{MUCH} \rrbracket^{c,g} = \lambda i. i$
 $\llbracket \text{LITTLE} \rrbracket^{c,g}(\llbracket \text{-er} \rrbracket^{c,g}) = \lambda S. \lambda M. \{d : S(d) = 0\} \subset \{d : M(d) = 0\}$
 $\llbracket \text{MUCH} \rrbracket^{c,g}(\llbracket \text{-er} \rrbracket^{c,g}) = \lambda S. \lambda M. S \subset M$
- (78) $[_{IP} [_{IP} [_{IP} [_{DP} \text{ the ladder }] [_{VP} 2 [_{VP} \text{ is } [_{AP} [_{DegP} [_{Deg} \text{-er LITTLE }] t_3] [1 [t_2 [t_1 \text{ long }]]]]]]]] [_{CP} \lambda d \text{ than the house is } d\text{-high }]]$

In the above structure, *LITTLE* combines semantically with *-er*, but is assumed to be spelled out together with the matrix adjective as *short*.

Note that as the analysis stands, nothing prevents us from parsing the cross-polar anomaly in (79) in such a way that *LITTLE* combines semantically with the comparative operator. But since the sentence is ungrammatical, this possibility must be ruled out:

(79) ?*John is shorter than Mary is tall.

(80) Unattested parse: John is *LITTLE*-er tall than Mary is tall

Büiring suggests that (80) is ruled out on the same grounds as (81). Namely, the identity of the Adjective Phrase in the matrix clause and the subordinated clause forces the elision of the subordinated AP. The principle of Max-Elide (Takahashi and Fox, 2005) that is responsible for this phenomenon does not apply in cross-polar nomalies, because the adjectives are not identical:

(81) ?John is taller than Mary is tall.

The reader is referred to Büiring (2007a,b) for a more detailed discussion of this analysis (see also Heim, 2006, 2007). Data-wise, the two main generalizations are as follows:

(82) Büiring's observations on the distribution of cross-polar nomalies (CPN) in English:

- a. CPNs only arise with a negative adjective in matrix clause.
- b. CPNs are unattested with antonyms.

3.3 Cross-polar nomalies: why Mbyá is not like English minus Max-Elide

Can we extend Büiring's analysis of cross-polar nomalies to Mbyá? In order to answer this question, consider that one of the ingredients of Büiring's analysis of cross-polar nomalies in English is the assumption that gradable predicates in the complement clause of comparative constructions must be elided under identity with the matrix predicate. Let us then imagine a language English' that is just like English, except that this requirement (MaxElide) doesn't hold. The grammar of cross-polar comparison in English' would be identical to that of English, save for the fact that cross-polar comparisons with antonyms would be grammatical. This is summarized in (83):

(83) Sub-comparative deletion and cross-polar comparison in English':

- a. ✓ John is taller that Bill is tall. *Ruled out by Max-Elide in English*
- b. ✓ John is shorter that Bill is tall. *Ruled out by Max-Elide in English*
- c. ✓ The ladder is shorter than the house is high.
- d. *John is taller than Bill is short.
- e. *The house is higher than the ladder is short.

Coming back to Mbyá, we observe that this language is strikingly similar to English'. Indeed, Max-Elide is not active in Mbyá, as illustrated in (84), and cross-polar comparisons are grammatical even with antonyms and a negative predicate in the matrix clause, as illustrated in (85).

- (84) Juan yvate-ve Pedro yvate-a gui.
 Juan tall-more Pedro tall-NLZ from
 'Juan is taller than Pedro is *tall*.'

- (85) Maria i-karape'i-ve Juan yvate-a gui.
 Maria 3-short-more Juan tall-NLZ gui.
 'Maria is shorter than Juan's height.'

Büring's analysis of cross-polar nomalies can therefore account for the grammaticality of cross-polar comparisons such as (85) in Mbyá. Unfortunately, it does not account for the grammaticality of cross-polar comparisons with a positive gradable predicate in the matrix clause, e.g. (86) and (87).

- (86) Juan yvate-ve Maria i-karape'i-a gui.
 Juan tall-more Pedro 3-short-NLZ from
 'Juan is taller than the degree to which Maria is short.'
- (87) Yvyra i-puku-ve yakã i-po'i-a gui.
 bridge 3-long-more river 3-narrow-NLZ from
 'The bridge is longer than the degree to which the river is narrow.'

I conclude that cross-polar comparisons in Mbyá cannot be analyzed as cross-polar nomalies.

4 An analysis using rich degree ontology

In this section, I propose an analysis of cross-polar comparisons in Mbyá that is based on the adoption of a rich degree ontology, which includes both fat degrees (pairs of a measurement and an order relation, see Cresswell, 1976) and thin degrees (measurements without an order relation), following Heim (2009). I show that once we adopt this hypothesis, one can explain the difference between English and Mbyá by invoking a lexical parameter: while gradable predicates denote properties of fat degrees in both languages, there exists a form of nominalization that map properties of fat degrees to descriptions of thin degrees in Mbyá, but not in English. This explains the generalized grammaticality of cross-polar comparisons in Mbyá.

4.1 Comparison with fat-degrees

Our notion of 'fat degrees' is due to Cresswell (1976) (for whom they were simply degrees). According to the definition in (88), a degree is a pair of a measurement and an order relation on measurements. More precisely, if $>$ is a relation (i.e. a set of pairs of entities), its field $\mathcal{F}(>)$ is the set of entities that are members of some pair in $>$:

- (88) A degree (of comparison) is a pair $\langle u, > \rangle$, where $>$ is a relation and $u \in \mathcal{F}(>)$.

Measurements come in various sorts: they are the type of abstract entities that we refer to as height, weight, width, cardinalities, degrees of happiness, etc. Following Heim (2009), I will call them *thin degrees*. We can then say that a fat degree is a pair of a thin degree and an order relation. Strictly speaking, a thin degree is just a measurement without ordering information.

An anonymous reviewer asks whether one may identify thin degrees with equivalence classes of individuals. Following Bale (2006), one may construct a scale of degrees from an equivalence relation, which groups together all individuals that are identical with respect to the extent to which they possess a certain property (see also Cresswell, 1976, Klein, 1980). Such groups are

equivalence classes and they are identified with degrees in Bale's (2006) analysis. In order to form a scale from the set of all equivalence classes generated by an equivalence relation, one needs to define a linear order on this set. The 'directionality' of a scale is encoded in this linear order but not in its equivalence relation, which is symmetric. Therefore, it is certainly natural to identify thin degrees with equivalence classes of individuals, and fat degrees with pairs of an equivalence class and a linear order. However, nothing in the analysis presented in this paper hinges on this interpretation.

Another essential concept in our degree ontology is that of a measure function. Measure functions are functions from individuals to degrees. Since we have access to two types of degrees, thin degrees and fat degrees, we can define two types of measure functions: functions from individuals to thin degrees, and functions from individuals to fat degrees. The latter are defined in terms of the former, as illustrated in (89) to (91). To avoid any confusion, I will call the former *thin measure functions* and the latter *fat measure functions*.

$$(89) \quad \mu_{\text{HEIGHT}} = \lambda x. \text{HEIGHT}(x)$$

$$(90) \quad \mu_{\text{TALL}} = \lambda x. \langle \text{HEIGHT}(x), > \rangle, \text{ where } > \text{ is the 'greater than' order on spatial distances.}$$

$$(91) \quad \mu_{\text{SHORT}} = \lambda x. \langle \text{HEIGHT}(x), < \rangle, \text{ where } < \text{ is the inverse of the 'greater than' order on spatial distances.}$$

(90) and (91) are inverse fat measure functions. They are identical modulo the fact that the order relation of μ_{SHORT} is the inverse of that of μ_{TALL} . Building on this difference, we can define pairs of antonym gradable predicates, as illustrated in (92) and (93):

$$(92) \quad \llbracket \text{yvate} \rrbracket = \llbracket \text{tall} \rrbracket = \lambda d. \lambda x. d = \langle \mu_{\text{HEIGHT}}(x), > \rangle$$

$$(93) \quad \llbracket \text{karape'i} \rrbracket = \llbracket \text{short} \rrbracket = \lambda d. \lambda x. d = \langle \mu_{\text{HEIGHT}}(x), < \rangle$$

We can now define the functions $\lambda d.^1(d)$ and $\lambda d.^2(d)$, which map a fat degree d to its first member (a thin degree) and to its second member (a relation), respectively. For convenience, I will sometimes write δ_d for $^1(d)$ and R_d for $^2(d)$:

$$(94) \quad \text{For any } d \text{ such that } d = \langle a, b \rangle, \text{ let } ^1(d) = \delta_d = a \text{ and } ^2(d) = R_d = b$$

Consequently, we include in our ontology a set D of degrees of type d , which is partitioned in a subset D_{fat} of fat degrees (sorted type d_{fat}) and D_{thin} of thin degrees (sorted type d_{thin}), with the condition that for every fat degree d , there is a unique thin degree d' such that $^1(d) = d'$.

The comparative operators *-ve* (in Mbyá) and *-er* (in English) denote a relation between two properties of fat degrees. One of these properties (written M) is denoted by a matrix constituent, and the other is denoted by the comparative complement (written S). The comparative operator triggers a presupposition that the unique degree that satisfies the matrix property M (written ιM) has the same order relation R as the unique degree that satisfies the subordinated property S .⁵ It asserts that the measurement of the unique degree that satisfies M and the measurement of the unique degree that satisfies S stand in the relation R , i.e. that $\delta_{\iota M} R_{\iota M} \delta_{\iota S}$ is true.

⁵The uniqueness assumption prevents us from dealing with a number of comparative constructions, e.g. with universal quantifiers in comparative complements. I adopt it for ease of exposition only, following (Heim, 2009), who was well aware of this simplification. In order to deal with these cases, we may assume that the comparative operator compares the maximally informative degrees that satisfy each of its arguments of type $\langle d_{fat}, t \rangle$, cf. Beck (2010).

$$(95) \quad \llbracket [-ve] \rrbracket = \llbracket [-er] \rrbracket = \lambda S_{dt} . \lambda M_{dt} : R_{LM} = R_{LS} . \delta_{UM} R_{UM} \delta_{LS}.$$

I assume the late merge analysis of comparison, which was discussed in section 2. Remember that according to this analysis, the syntactic structure of (96) is (97).

$$(96) \quad \text{Juan yvate-ve Pedro yvate-a gui.} \\ \text{Juan tall-more Pedro tall-NLZ from} \\ \text{'Juan is taller than Pedro.'}$$

$$(97) \quad [IP [NP \text{Juan}] [I' I [vP [DegP [Deg -ve] [PP Pedro yvatea gui]]] [vP [NP \text{Juan}] [v' v [VP [V yvate] [DegP -ve]]]]]]]$$

In this syntactic structure, the standard of comparison is the complement of the higher copy of *-ve*. They constitute a degree phrase DegP which selects the matrix extended verb phrase vP as its complement. Therefore when this syntactic structure is interpreted, the operator denoted by the comparative morpheme *-ve* will combine with the denotation of the post-positional standard phrase, and the resulting expression will combine with the denotation of the matrix vP. This is consistent with the analysis of the comparative operator as a relation between properties of degrees, provided it can be shown that the post-positional standard phrase and the matrix vP denote properties of degrees.

In order to interpret the matrix vP as a property of degrees, we assume that the lower copy of *-ve* is interpreted as a variable which is bound by a lambda operator below the adjunction site of the higher copy of *-ve*. In other words, the movement of *-ve* is analyzed as a case of Quantifier Raising in the fashion of Heim and Kratzer (1998). This is represented in the following tree by coindexing the lower copy of *-ve* with a lambda operator itself represented as a numeral:

$$(98) \quad [vP_i 1 [vP_i [NP \text{Juan}] [v' v [VP [V yvate] [DegP -ve_1]]]]]]]$$

In the comparative complement, abstraction over the degree argument of the gradable predicate is due to silent operator movement. An operator (represented as Δ in (99)) is generated as the degree argument of the gradable predicate, which is then moved to the left periphery of the subordinated clause. The lower copy of the operator is interpreted as a degree variable. The higher copy is interpreted as a lambda operator that abstracts over the variable denoted by the lower copy:

$$(99) \quad [IP \Delta_2 [IP [NP \text{Pedro}] [I' I [vP [NP \text{Juan}] [v' v [VP t_2 [.V ijyvatea]]]]]]]]]$$

As illustrated in (100), we derive that (96) is true if and only if Juan's height is greater than Pedro's height:

$$(100) \quad \llbracket [-ve [1 \text{ Pedro } t_1 \text{ yvatea gui}]] \rrbracket 2 [\text{Juan } t_2 \text{ yvate}]]] = \mu_{\text{HEIGHT}}(\mathbf{Juan}) > \mu_{\text{HEIGHT}}(\mathbf{Pedro})$$

4.2 Cross-polar comparisons

We can reformulate Kennedy's analysis of cross-polar anomalies using the rich degree ontology and the analysis of comparison that were presented in the previous section. Cross-polar anomalies are a form of presupposition failure. Indeed, cross-polar anomalies presuppose that the order relation associated with the fat degree argument of two polar opposite adjectives are identical, which is never the case. To illustrate, (101) is interpreted as (102), which is undefined in every context of utterance:

(101) *John is taller than Bill is short.

(102) $\llbracket [-er \text{ [than } t_1 \text{ Bill is } t_1 \text{ short]] } 2 \text{ [John is } t_2 \text{ tall]]} \rrbracket$ is defined only if ${}^2(\lambda d.d = \langle \mu_{\text{HEIGHT}}(\mathbf{John}), > \rangle) = {}^2(\lambda d.d = \langle \mu_{\text{HEIGHT}}(\mathbf{Bill}), < \rangle)$; if defined, it is true iff $\mu_{\text{HEIGHT}}(\mathbf{John}) > \mu_{\text{HEIGHT}}(\mathbf{Bill})$

Note that Büring's analysis of cross-polar nomalies can also be recast in this analysis. First, we redefine the degree negation LITTLE as in (104), where R^{-1} is the inverse of any relation R . $\llbracket \text{LITTLE} \rrbracket$ maps a property D of fat degrees to the property of fat degrees d such that the degree that is obtained by inverting the order relation of d satisfies the property D :

(103) $\llbracket \text{tall} \rrbracket = \lambda d.\lambda x.d = \langle \mu_{\text{HEIGHT}}(x), > \rangle$

(104) $\llbracket \text{LITTLE} \rrbracket = \lambda D.\lambda d.D(\langle {}^1d, ({}^2d)^{-1} \rangle)$

(105) $\llbracket \text{LITTLE tall} \rrbracket = \lambda d.\lambda x.\langle {}^1d, ({}^2d)^{-1} \rangle = \langle \mu_{\text{HEIGHT}}(x), > \rangle$
 $= \lambda d.\lambda x.d = \langle \mu_{\text{HEIGHT}}(x), < \rangle$
 $= \llbracket \text{short} \rrbracket$

Second, we add Büring's polarity function argument to the denotation of the comparative operator, as illustrated in (106). As in the original analysis, in the absence of a degree negation this extra argument is filled by a covert MUCH, which denotes the identity function.

(106) $\llbracket [-er] \rrbracket = \lambda f.\lambda S_{dt}.\lambda M_{dt} : R_{\iota f(M)} = R_{\iota f(S)} \cdot \delta_{\iota f(M)} R_{\iota f(M)} \delta_{\iota f(S)}$.

This account of cross-polar anomalies relies on two assumptions. First, the comparative operator *-er* establishes a comparison between fat degrees. Secondly, clausal comparative complements denote properties of fat degrees. One way to explain the absence of cross-polar anomalies in Mbyá is then to assume that cross-polar comparisons in this language are instances of comparison to a thin degree. According to this view, Mbyá would differ from English insofar as its comparison operator would denote a different function, and also insofar as the lexicon of the language would include a nominalizer that maps properties of fat degrees to properties of thin degrees.

The revised denotation of the comparative morpheme *-ve* is given in (107). Unlike $\llbracket [-er] \rrbracket$, whose internal argument is a property of fat degrees, $\llbracket [-ve] \rrbracket$ combines first with a thin degree, and then with a fat degree. Since it has a single fat degree argument, *-ve* cannot trigger the presupposition that is violated in English cross-polar anomalies:

(107) $\llbracket [-ve] \rrbracket = \lambda d_{d_{thin}}.\lambda M_{dt}.\delta_{\iota M} R_{\iota M} d$.

This analysis of course requires that the comparative complement of clausal comparatives denote a thin degree. I propose that this is due to the interpretation of *-a* nominalizations in comparative constructions, where a covert nominalizer NLZ_{thin} denotes a function that maps a property of fat degrees to the definite description of thin degrees, as exemplified in (108):

(108) $\llbracket \text{NLZ}_{thin} \rrbracket = \lambda M_{dt}.\iota M$
 $= \lambda M_{dt}.\delta_{\iota M}$

Let us illustrate this analysis with example (109). After nominalization, the comparative complement denotes Maria's height, which is a thin degree. The matrix clause argument of *-ve* denotes the property of fat degrees d that is satisfied only if d is the pair that consists of Maria's

height and the greater than relation on spatial distances. Combining *-ve* with these two arguments produces the truth-conditions in (111): the sentence is true if and only if Juan’s height is greater than Maria’s height:

- (109) Juan yvate-ve Maria i-karape’i-a gui.
 Juan tall-more Maria B3-short-NLZ from
 ‘Juan is taller than the degree to which Maria is short’
- (110) $\llbracket \text{NLZ Maria ikarape’i-a} \rrbracket = {}^1(\text{id} : \llbracket \text{ikarape’i} \rrbracket(\mathbf{Maria})(d)) = \mu_{\text{HEIGHT}}(\mathbf{Maria})$
- (111) $\llbracket [-\text{ve} [\text{NLZ}_{\text{thin}} 1 \text{ Maria } t_1 \text{ ikarapei’}a \text{ gui}]] 1 [\text{ Juan yvate } t_1]] \rrbracket = \mu_{\text{HEIGHT}}(\mathbf{Juan}) > \mu_{\text{HEIGHT}}(\mathbf{Maria})$

Importantly, (111) does not suffer from presupposition failure, hence it is not a cross-polar anomaly. However, this analysis does not capture the evaluativity of negative gradable predicates in comparative complements. Indeed, (109)’s entailment that Maria is short is not captured in (111). In the next subsection, we will see how to add evaluativity to the analysis.

4.3 Adding evaluativity

In order to account for the evaluativity of comparative complements with negative adjectives, I will show how to integrate Rett’s (2008) theory of evaluativity with the analysis of comparison that was presented in the previous subsection. I begin with an informal discussion of Rett’s ideas, and then I propose a formalization of these ideas in the current framework, following Heim (2009).

Rett (2008) proposes that evaluativity is due to the presence of a covert operator, which modifies a predicate of degree and conveys that its degree argument is greater than some contextually given standard. According to Rett, the use of the EVAL operator is optional at the level of syntactic and semantic composition, i.e. there are no syntactic or type-theoretic principles that force the modification of a degree predicate by EVAL. However, its use is subject to pragmatic constraints that may force its inclusion in some derivations.

In order to explain the nature of these constraints, let us consider first example (112). The gradable adjective *tall* is optionally modified by EVAL. In both its evaluative (modified by EVAL) and its non-evaluative (unmodified by EVAL) parses, the sentence presupposes that John has a height, a presupposition which is triggered by the gradable adjective *tall*. In its evaluative parse, it asserts that John’s height is greater than some contextually salient standard of height. In its non-evaluative parse, it only asserts that John has a height. Consequently, only the evaluative parse of the sentence is informative: under its non-evaluative parse, the sentence ends up asserting what it presupposes.

- (112) John is (EVAL) tall.
- a. With EVAL: presupposes that John has a height, asserts that John’s height is more than some standard of height.
 - b. Without EVAL: presupposes that John has a height, asserts that John has a height.

In other constructions, a non-evaluative parse is not trivial, which explains why a non-evaluative reading is available. This is the case in comparisons. Consider for instance (113). In its evaluative reading, this sentence presupposes that John has a height, and it asserts that John’s

height is more than some contextually salient standard and is more than 5'11". In its non-evaluative reading, this sentence presupposes that John has a height, and it asserts that John's height is more than 5'11". The sentence is informative in both readings, hence the non-evaluative reading is not ruled out. Note furthermore that its non-evaluative reading is weaker than its evaluative reading, which according to Rett explains why the sentence is perceived as non-evaluative.

(113) John is (EVAL) taller than 5'11".

- a. With EVAL: presupposes that John has a height, asserts that John's height is more than some standard of height and is more than 5'11".
- b. Without EVAL: presupposes that John has a height, asserts that John's height is more than 5'11"

In negative comparative constructions, the reasoning is the same except that the order relation that relates the degree argument of the gradable predicate to the standard of comparison is inverted. To do so, we must ensure that EVAL is sensitive to the polarity of the predicate it modifies. This will be accounted for in the reformulation of Rett's proposal that will be presented at the end of this subsection.

(114) John is less (EVAL) tall than 5'11".

- a. With EVAL: presupposes that John has a height, asserts that John's height is less than some standard of height and is less than 5'11".
- b. Without EVAL: presupposes that John has a height, asserts that John's height is less than 5'11"

So far, we have only examined polar invariant constructions, such as positive uses of gradable predicates, illustrated in (112). The evaluativity of polar invariant constructions does not depend on the polarity of their gradable predicate. To wit, substituting *tall* by *short* in (113) results in the non-evaluative (or rather, optionally evaluative) sentence (114), i.e. the pattern of evaluativity is unchanged. Degree questions on the other hand are polar variant constructions. Degree questions with positive predicates are non-evaluative while those with negative predicates are evaluative, as illustrated in (115) and (116).

(115) How tall is Bill?

(116) How short is Bill?

Rett (2008) observes that in polar variant constructions, the evaluative sentence is always the one with the negative gradable predicate. In order to explain this asymmetry, Rett proposes that the use of negative and positive members of pairs of gradable antonyms is subject to a pragmatic competition, which is grounded in a markedness constraint against the use of negative members of the pairs. Let us formulate this markedness constraint as in (117). According to this definition, the principle of markedness triggers a global competition between sentences. Rett (2008) argues that this competition is localized below the level of degree projections (Deg'). For the sake of conciseness, I will ignore this complication and work with the simpler definition in (117). The reader is referred to Rett (2008) for a more careful discussion of the competition between antonyms.

(117) Markedness of negative gradable predicates:

Don't use the negative form A^- of an adjective in a sentence S , if the alternative sentence S' that is obtained by substituting this instance of A^- by its antonym A^+ is contextually equivalent to S .

Armed with this principle, we can now explain the contrast between the evaluativity of (116) and the non-evaluativity of (115), repeated as (118) and (119):

(118) How (EVAL) tall is John?

- a. With EVAL: What is the degree d such that John's height is d and d is more than some standard of height?
- b. With EVAL: What is the degree d such that John's height is d ?

(119) How (EVAL) short is John?

- a. With EVAL: What is the degree d such that John's height is d and d is less than some standard of height?
- b. Without EVAL: What is the degree d such that John's height is d ? *Markedness!*

The non-evaluative reading of (119) is equivalent to the non-evaluative reading of (118), hence it is ruled out by (117). On the other hand, the evaluative readings of (118) and (119) are not equivalent, which means that the evaluative reading of the latter is not ruled out. Consequently, the only acceptable interpretation of (119) is its evaluative one. On the contrary, (118) can be freely interpreted as an evaluative question or as a non-evaluative one. Since the non-evaluative reading is weaker, it will be the salient interpretation of the positive form.

Let us now go back to Mbyá and see how Rett's account can be incorporated in the analysis of comparative constructions that was proposed in the previous subsection. I will begin by an informal discussion of the data, and then present a formal account. Consider the pair of sentences in (120) and (121):

(120) Juan (EVAL) yvate-ve Maria (EVAL) yvate-a gui.
 Juan tall-more Pedro tall-NLZ from
 'Juan is taller than Maria.'

- a. Matrix and subordinated EVAL: Juan's height is greater than Maria's height and both Juan's and Maria's heights are greater than some standard of height.
- b. Matrix EVAL only: Juan's height is greater than Maria's height and Juan's height is greater than some standard of height.
- c. Subordinated EVAL only: Juan's height is greater than Maria's height and Maria's height is greater than some standard of height.
- d. Without EVAL: Juan's height is greater than Maria's height.

(121) Juan (EVAL) yvate-ve Maria (EVAL) i-karape'i-a gui.
 Juan tall-more Pedro 3-short-NLZ from
 'Juan is taller than Maria's height, and Maria is short.'

- a. Matrix and subordinated EVAL: Juan's height is greater than Maria's height, Juan's height is greater than some standard of height, and Maria's height is less than some standard of height.

- b. Matrix EVAL only: Juan's height is greater than Maria's height and Juan's height is greater than some standard of height.
- c. Subordinated EVAL only: Juan's height is greater than Maria's height and Maria's height is less than some standard of height.
- d. Without EVAL: Juan's height is greater than Maria's height.

Let us examine each of the parses (a) to (d) of (121). There is only one instance of a negative predicate in (121). Therefore, each parse of (121) must be compared to the same parse, with the positive predicate in place of the negative one. I.e. parse (a) of (121) must be compared to parse (a) of (120), and so on. Parses (b) and (d) of (121) are equivalent to parses (b) and (d) of (120), respectively, therefore they are ruled out by the markedness principle. Parses (a) and (c) of (121) are not equivalent to the similar parses of (120), hence they are allowed. What this means is that (121) is optionally evaluative in the matrix predicate, and obligatorily evaluative in the subordinated predicate. Since the non-evaluative reading of the matrix predicate is weaker, the sentence will be perceived as non-evaluative on its matrix predicate. However, it will be perceived as evaluative on its subordinated predicate. Rett's calculus of evaluativity allows us to account for the evaluativity of cross-polar comparisons in Mbyá.

Finally, let us see how we can implement Rett's theory of evaluativity given the analysis of comparison that was proposed in the previous subsection. Here, I will follow Heim's (2009) reformulation of Rett's analysis using fat degrees. First of all, we define the evaluativity operator in (122). This operator combines intersectively with a property of fat degrees, and relate these degrees to a contextually salient standard s_c with the order relation that they provide. The use of EVAL is illustrated in (123). In this logical form, the sister of EVAL denotes a property of fat degrees d such that d is the pair that consists of Maria's height and the shorter-than relation. There is only one degree that satisfies this property and it comes with the less-than relations on spatial distances. Therefore, (123) denotes the property of fat degrees d such that the measurement member of d is less than some standard of height s_c and d is the pair that consists of Maria's height and the shorter-than relation.

$$(122) \quad \llbracket \text{EVAL} \rrbracket = \lambda d. \exists u \exists R [d = \langle u, R \rangle \wedge u R s_c]$$

$$(123) \quad \llbracket \text{EVAL } 1 \text{ Maria } d_1 \text{ ikarape' i} \rrbracket \\ = \lambda d. \exists u \exists R [d = \langle u, R \rangle \wedge u R s_c \wedge \llbracket \text{ikarape' i} \rrbracket (\mathbf{Maria})(d)] \\ = \lambda d. d = \langle \mu_{\text{HEIGHT}}(\mathbf{Maria}), < \rangle \wedge \mu_{\text{HEIGHT}}(\mathbf{Maria}) < s_c$$

This property of degrees is then combined with the degree nominalizer NLZ_{thin} in (124). The output is a thin degree that is identical to the measurement member of the unique degree that satisfies the property of degree in (123).

$$(124) \quad \llbracket \text{NLZ}_{thin} [\text{EVAL } 1 \text{ Maria } d_1 \text{ ikarape' i}] \rrbracket \\ = {}^1(\lambda d. d = \langle \mu_{\text{HEIGHT}}(\mathbf{Maria}), < \rangle \wedge \mu_{\text{HEIGHT}}(\mathbf{Maria}) < s_c)$$

Finally, we can merge this comparative complement in a cross-polar comparative sentence, as illustrated in (125). This sentence is true if and only if Juan's height is greater than Maria's height. Note that if Maria's height is not less than the standard s_c , the output of the nominalization is undefined. In this case, the truth-value of (125) cannot be computed. In other words, (125) has a truth-value only if Maria is shorter than the contextually given standard of height. This derives

the evaluativity of (125) as a presupposition. Note that the alternative to (125) that is obtained by substituting the subordinated predicate by its antonym is not contextually equivalent to (125), since it is defined in contexts where Maria is not shorter than the standard of height. Hence, (125) is not ruled out by the markedness principle.

$$(125) \quad \llbracket [-ve_{thin} [NLZ_{thin} [EVAL\ 1\ Maria\ d_1\ ikarape'i]]] \ 2 \ [\text{Juan}\ yvate\ d_2] \rrbracket \\ = \mu_{\text{HEIGHT}}(\mathbf{Juan}) > {}^1(\lambda d.d = \langle \mu_{\text{HEIGHT}}(\mathbf{Maria}), < \rangle \wedge \mu_{\text{HEIGHT}}(\mathbf{Maria}) < s_c)$$

5 Conclusion

I have argued that the distribution and the interpretation of cross-polar comparisons in Mbyá follows from the possibility to interpret the nominalization of comparative complements as a mapping from properties of fat degrees to descriptions of thin degrees. Since the distribution of cross-polar comparisons is more restricted in English, some aspect of the compositional interpretation of comparative constructions must differ in the two languages. I propose that the shift from fat degrees to thin degrees is unavailable in the compositional interpretation of English comparative sub-deletions. Likewise, norm-related nominalizations such as *tallness* and *shortness* or *warmth* and *coldness* cannot be descriptions of thin-degrees, since they are evaluative both with positive and with negative adjectives. This leaves us with *height*-type nominalizations. Insofar as they are not evaluative, they can be analyzed as descriptions of thin degrees. If we assume that all gradable predicates are born denoting properties of fat degrees, this means that there is actually an operation mapping fat degrees to thick degrees in the lexicon of English. However, it appears that *height*-type nominalizations are restricted to positive adjectives (e.g. *height*, *weight*, *depth*, *width*, *length*). If these observations are on the right track, the crucial difference between English and Mbyá is not whether operators mapping fat degrees to thin degrees are attested in these languages, but whether the use of these operators is fully productive. In English, there are strong lexical restrictions on such mappings. In Mbyá, *-a* nominalizations in comparative clauses are productively interpreted as descriptions of thin degrees. There is of course much more work to be done on this topic both in English and in Mbyá.

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