Lake Pátzcuaro P'urhepecha and the Semantic Typology of Degree Constructions[1]

Erik Zyman — *University of California, Santa Cruz*

Abstract. Degree constructions are an area of grammar characterized by considerable crosslinguistic variation (Beck et al. 2009, Bhatt and Takahashi 2011, a.o.). As part of the project of describing and understanding the variation and nonvariation in this domain, I investigate the degree system of the Lake Pátzcuaro variety of P'urhepecha, an indigenous language of Mexico which is an isolate. By applying to Lake Pátzcuaro P'urhepecha the diagnostics developed by Beck et al. (2009), I show that this language has positive settings for the Degree Semantics Parameter, the Degree Abstraction Parameter, and the Degree Phrase Parameter, just like English. This is captured by extending to Lake Pátzcuaro P'urhepecha the semantic analysis of some core English degree constructions developed in Heim (2001) and related work. A prediction of this analysis—namely, that some Degree Phrases should participate in scope ambiguities—is shown to be correct for Lake Pátzcuaro P'urhepecha. Comparison between Lake Pátzcuaro P'urhepecha and English shows that two languages can have extremely similar degree systems even if they differ considerably along a number of dimensions in other areas of grammar, suggesting that crosslinguistic variation in degree systems may be largely independent of variation in other grammatical domains.

1. Introduction

Degree constructions are an area of grammar characterized by considerable crosslinguistic variation (Kennedy 2007, Krasikova 2008, Beck et al. 2009, Bhatt and Takahashi 2011, Bochnak 2013, a.o.). To contribute to the project of understanding the variation and nonvariation in this domain, I investigate the degree system of the Lake Pátzcuaro variety of the Mexican language P'urhepecha and provide semantic analyses of a number of its degree constructions.

P'urhepecha is an indigenous language of Mexico spoken by over 120,000 people (INEGI 2010), primarily in the central-western state of Michoacán. It has a number of properties that make it interesting for the student of degree construction typology. First, it is an isolate; therefore, if striking similarities are found between P'urhepecha and better-studied languages, these cannot be dismissed as an expected correlate of historical kinship. Secondly, it is typologically quite differ-

ent from the languages that have received the most attention in formal linguistics, being a highly agglutinating language with fairly flexible constituent order (Capistrán 2002, Chamoreau 2007, Vázquez-Rojas Maldonado 2011). Finally, degree constructions display considerable variation *within* P'urhepecha, both cross-regionally and diachronically (see Chamoreau 2012 on MORE-comparatives); P'urhepecha therefore offers an opportunity for illuminating microcomparative work on degree constructions and their semantics.

The paper is organized as follows. Section 2 lays out the analysis of crosslinguistic variation in degree semantics put forth in Beck et al. (2009), and applies Beck *et al.*'s diagnostics to Lake Pátzcuaro P'urhepecha. The findings are accounted for in section 3, which extends to Lake Pátzcuaro P'urhepecha the semantic analysis of some English degree constructions developed in Heim (2001). Section 4 tests a prediction of this analysis—namely, that some Degree Phrases should participate in scope ambiguities—and shows that the prediction is correct for Lake Pátzcuaro P'urhepecha. Section 5 concludes.

2. How does Lake Pátzcuaro P'urhepecha fit into the typology of degree constructions?

2.1. Beck et al.'s (2009) analysis of crosslinguistic variation in degree constructions

Beck et al. (2009) analyze the degree constructions of 14 languages.[2] On the basis of their results, they propose that the degree systems of human languages are regulated by three parameters, which form the following hierarchy:

(1)   *Beck et al. (2009) parameter hierarchy*

---
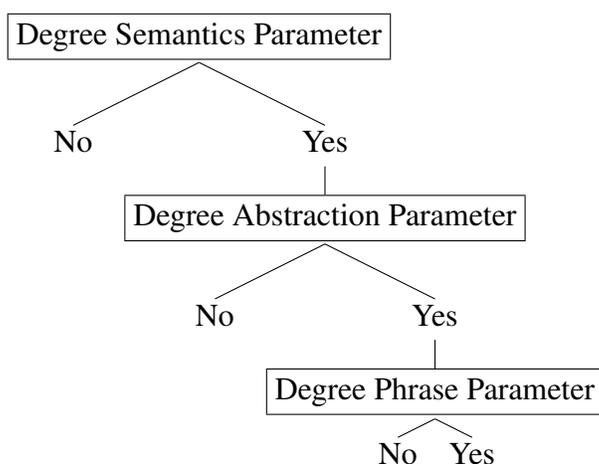
[2]Bulgarian, Guarani, Hindi-Urdu, Hungarian, Mandarin, Mooré, Motu, Romanian, Russian, Samoan, Spanish, Thai, Turkish, and Yoruba.

In the remainder of this section, I apply to Lake Pátzcuaro P'urhepecha Beck *et al.*'s diagnostics for determining what settings a language has for these three parameters, and by extension how it fits into the typology of degree constructions. When presenting the data, I will keep my commentary to a minimum; the implications of the findings will mostly be discussed after they have all been laid out.

2.2. The Degree Semantics Parameter

The first parameter in Beck *et al.*'s hierarchy is the Degree Semantics Parameter, whose content is the following:

(2)   A language {does/does not} have gradable predicates (type $\langle d,et \rangle$ and related), i.e., lexical items that introduce degree arguments.

If a language has the Degree Semantics Parameter set to "yes," it has predicates that take as one of their arguments an expression of type d (a degree argument). This will lead us to expect that the language may well have expressions that manipulate degree arguments. These may include comparative, superlative, and equative morphemes (such as English *-er*, *-est*, and *as*) and equivalents of *too* and *enough*.

Such expressions certainly exist in Lake Pátzcuaro P'urhepecha. For example, there is a comparative degree word *sanderu* ∼ *sandaru* ((3a-3b)) and an equative degree word *xani* ((3c)). These seem to correspond to English *-er* and *as* respectively. *Xani* also has a use as an "extreme degree" word, in which function it resembles English *so* ((3d)).[3]

(3)   a.   María sanderu iótasti eski Ána. (SFL)

María **sanderu** ióta-s-∅-ti   eski Ána.
Mary **-er**   be.tall-PFV-PRS-IND+3 SUB Anna
'Mary is taller than Anna.'

b.   Iasï sanderu aparekuaresïti eska uitsindekua. (J)

Iasï   **sanderu** apare-kuare-sï-∅-ti   eska uitsindekua.
today **-er**   be.hot-REFL-PFV-PRS-IND+3 SUB yesterday
'It's hotter today than it was yesterday.'

---

[3]**Abbreviations:** ADV = adverbializer; COND = conditional; COP = copula; DIST = distal (demonstrative); FUT = future; HAB = habitual; IND = indicative; INF = infinitive; INT = interrogative; J = Janitzio P'urhepecha (spoken on the island of Janitzio on Lake Pátzcuaro); lit. = literally; LOC = locative; MED = medial (demonstrative); PFV = perfective; PL = plural; PRS = present; REFL = reflexive; SFL = Santa Fe de la Laguna P'urhepecha (spoken in the town of Santa Fe de la Laguna); SJV = subjunctive; SUB = subordinator; 3 = third person; 3pS = third person plural subject.

   c. Juanu xani iostarasti eska Petu. (J)

      Juanu **xani** iostara-s-∅-ti   eska Petu.

      John   **as**   be.tall-PFV-PRS-IND+3 SUB Peter

      'John is as tall as Peter.'

   d. ¡I japonda **xani** jauamesti! (J)

      ¡I   japonda **xani** jauame-s-∅-ti!

       this lake   so   be.deep-PFV-PRS-IND+3

      'This lake is so deep!'

If a language has a "yes" setting for the Degree Semantics Parameter, we may well expect it to also allow difference comparatives like *This wall is **six meters longer** than that one* (where *six meters* is analyzed as of type *d*). If the language has a "no" setting for this parameter, by contrast, it should not allow difference comparatives, since it will not have any predicates that can take the degree-denoting phrase as an argument.[4] Lake Pátzcuaro P'urhepecha does have difference comparatives:

  (4)   a. I tsïntsïkata kuimu metrhu sandaru iosïkasïti eska ima. (J)

        I   tsïntsïkata **kuimu metrhu sandaru** iosïka-sï-∅-ti   eska ima.

        this wall   **six**   **meter -er**   be.long-PFV-PRS-IND+3 SUB that(DIST)

        'This wall is six meters longer than that one.'

     b. María tsimáni *centímetru* sanderu iótasti eski Ána. (SFL)

        María **tsimáni** *centímetru* **sanderu** ióta-s-∅-ti   eski Ána.

        Mary **two**   **centimeter -er**   be.tall-PFV-PRS-IND+3 SUB Anna

        'Mary is 2 centimeters taller than Anna.'

Finally, a language with a "yes" setting for the Degree Semantics Parameter may also be expected to allow comparison with a degree, as in *This ant is longer **than one centimeter***. By contrast, a language with a "no" setting for this parameter should not allow comparison with a degree, because it will not have any predicates that can take the degree-denoting phrase (e.g., (*than*) *one centimeter*) as an argument. The reasoning here is precisely parallel to that reviewed in connection with difference comparatives. Like the constructions we have examined so far, comparison with a degree is available in Lake Pátzcuaro P'urhepecha ((5)). As in English, the degree-denoting phrase may either contain a unit-of-measurement word ((5a)) or not ((5b)).

---

[4]On Beck *et al.*'s analysis of difference comparatives, the degree-denoting phrase is an argument of the degree morpheme (e.g., English *-er*).

(5) a. Inde japonda sanderu jauamesti eska tembeni ts'eretakua. (J)

Inde   japonda sanderu jauame-s-∅-ti   **eska tembeni ts'eretakua**.
that(MED) lake   -er   be.deep-PFV-PRS-IND+3 SUB **ten   meter**
'That lake is deeper than ten meters.'

b. Kachukutarakua sanderu iosïkasïti eska jauanekua cajarhu. (J)

Kachukutarakua sanderu iosïka-sï-∅-ti   **eska jauanekua caja-rhu**.
knife   -er   be.long-PFV-PRS-IND+3 SUB **depth   drawer-**LOC
'The knife is longer than the depth of *[lit. 'in, at']* the drawer.'

2.3. The Degree Phrase Parameter

Although the Degree Semantics Parameter is followed in Beck *et al.*'s hierarchy by the Degree Abstraction Parameter, I will postpone discussion of the latter until section 2.4. The reason is that the evidence bearing on the setting of the Degree Abstraction Parameter in Lake Pátzcuaro P'urhepecha is less clear than that bearing on the setting in this language of the third parameter, the Degree Phrase Parameter ((6)), to which we now turn.

(6) The degree argument position of a gradable predicate {may/may not} be overtly filled.

If a language has the Degree Phrase Parameter set to "yes," we may well expect it to allow degree questions, such as ***How tall is Mary?*** In this question, the degree argument position of the gradable adjective *tall* ([Spec,AP] according to Heim 2001 and Beck et al. 2009) is occupied by the *wh*-word *how*. Importantly, if movement of *how* in English did not pied-pipe *tall* (contrary to fact), the degree argument slot of *tall* would be occupied by the unpronounced lowest copy of *how*, and would therefore still count as "overtly filled" in Beck *et al.*'s sense. Therefore, English-style degree questions count as evidence for a "yes" setting for the Degree Phrase Parameter regardless of whether they involve pied-piping of the gradable predicate or not.[5] Degree questions of this sort do appear to be available in Lake Pátzcuaro P'urhepecha. In this language, one can question the degree argument of a verb ((7a)), an adjective ((7b)), an adverb ((7c)), or a determiner ((7d)), at least.[6]

---

[5]If a degree argument position occupied by a silent copy of a *wh*-word counts as "overtly filled" in Beck *et al.*'s sense, what does it take for such a position to be present but *not* overtly filled? The answer, for the authors, is ellipsis. If a degree argument position that would otherwise be overtly filled is inside a constituent that has been elided, it will not count as overtly filled after all. Although these assumptions concerning what counts as an "overtly filled" degree argument position allow Beck et al. (2009) to account for their crosslinguistic data, they seem somewhat unnatural, suggesting that the Degree Phrase Parameter may have to be revised or split up into separate parameters—a possibility the authors consider on independent grounds.

[6]I assume that *na xani* in (7d) is questioning the degree argument not of *jauiri* 'hair' (which presumably does not have one) but rather of a silent version of the mass determiner *kanekua* 'much'. Note that *Juánu* 'John' has been topicalized past the moved *wh*-phrase *na xani*.

(7) a. ¿Naxani iostarasïki Maria? (J)

    ¿Na-xani   iostara-sï-∅-ki   Maria?
     how-XANI be.tall-PFV-PRS-INT Mary

    'How tall is Mary?'

b. ¿Naxani miritsïski Xumo? (J)

    ¿Na-xani   miritsï-i-s-∅-ki   Xumo?
     how-XANI forgetful-COP-PFV-PRS-INT Xumo
    'How forgetful is Xumo?'

c. ¿Naxani uinani ua uiriani Maria? (J)

    ¿Na-xani   uina-ni   u-a-∅-∅   uiria-ni Maria?
     how-XANI strong-ADV be.able-FUT-PRS-INT run-INF Mary

    'How fast can Mary run?'

d. ¿Juánu na xani jauiri jukáski? (SFL)

    ¿Juánu na   xani jauiri juká-s-∅-ki?
     John how XANI hair   wear-PFV-PRS-INT

    'How much hair does John have?'

Secondly, if a language has a "yes" setting for the Degree Phrase Parameter, we may also expect it to allow measure phrase constructions like *Katie is **six feet** tall*, where the degree argument position of the gradable predicate *tall* is occupied by the type-*d* phrase *six feet*. A language with a "no" setting for the Degree Phrase Parameter will not allow this position to be overtly filled, and hence will not allow measure phrase constructions. These constructions are robustly possible in Lake Pátzcuaro P'urhepecha; two examples follow.

(8) a. Kurucha tanimu sentimetrhu iosïkasïti. (J)

    Kurucha **tanimu sentimetrhu** iosïka-sï-∅-ti.
    fish   **three   centimeter** be.long-PFV-PRS-IND+3
    'The fish is three centimeters long.'

b. Juánu tsimáni *métru* iótasti. (SFL)

    Juánu **tsimáni *métru*** ióta-s-∅-ti.
    John **two   meter** be.tall-PFV-PRS-IND+3
    'John is 2 meters tall.'

Thirdly, a language with a "yes" setting for the Degree Phrase Parameter may also be expected to allow subcomparatives, such as *The lake is deeper than the wall is long*. In this construction, the degree argument slot of the gradable predicate in the embedded clause is occupied by the lowest copy of a moved degree operator: <u>*...than Op₁ the wall is t₁ long*</u>. Here, the degree argument slot of

long counts as "overtly filled" in Beck *et al.*'s sense. Therefore, a language with a "no" setting for the Degree Phrase Parameter should not allow English-style subcomparatives. These constructions are available in Lake Pátzcuaro P'urhepecha:

(9) a. Luisï sanderu iostarasïti eska koskaka kojtsïtarakua. (J)

Luisï sanderu iostara-sï-∅-ti   eska koska-∅-∅-ka   kojtsïtarakua.
Louis -er   be.tall-PFV-PRS-IND+3 SUB be.wide-PFV-PRS-SJV table
'Louis is taller than the table is wide.'

b. I xanaru sanderu iuakurasïti eska iorhekua jauameka. (J)

I   xanaru sanderu iuakura-sï-∅-ti   eska iorhekua jauame-∅-∅-ka.
this street -er   be.long-PFV-PRS-IND+3 SUB river   be.deep-PFV-PRS-SJV
'This street is longer than the river is deep.'

Another construction, minimally different from the subcomparative, can also be used to diagnose a language's setting for the Degree Phrase Parameter. This is the subequative, identical to the subcomparative except that its main-clause degree word is AS rather than -ER.[7] By the same logic discussed in connection with subcomparatives, a language with a "yes" setting for the Degree Phrase Parameter may well be expected to allow subequatives, whereas a language with a "no" setting for this parameter certainly will not. Lake Pátzcuaro P'urhepecha does allow subequatives: changing *sanderu* '-er' to *xani* 'as' in (9a-9b) yields perfectly acceptable sentences meaning, respectively, 'Louis is as tall as the table is wide' and 'The street is as long as the river is deep.'

2.4. The Degree Abstraction Parameter

Now let us return to the middle parameter in Beck *et al.*'s hierarchy: the Degree Abstraction Parameter ((10)).

(10)   A language {does/does not} have binding of degree variables in the syntax.

In languages with a "yes" setting for this parameter, the degree argument slot of a gradable predicate can be filled by a phrase that moves, leaving a trace (or lowest copy) of type d. When the moving element merges with a constituent of type τ, this produces a λ-abstract of type $\langle d, \tau \rangle$. If Beck et al. (2009) are right to posit a Degree Abstraction Parameter, this type of derivation—which results in a trace of type d that is bound by some higher element—is available only in some languages, not in all.

---

[7]In English, the element introducing the embedded clause is also different: *as* rather than *than*.

One type of evidence bearing on the setting of the Degree Abstraction Parameter has to do with scope ambiguities involving modals. Consider the sentence in (11) (adapted from Heim 2001:224), which is, at least for some speakers, two-ways ambiguous:

(11)   [Context: I hand you a 10-page paper. You say...]

        Your paper has to be exactly 5 pages longer than this.

        a) $\forall w \in \text{ACC}$: [[exactly 5 pages -er than 10 pages]$_1$ λ_1 your paper is t_1 long in w]

           $\rightarrow$ In every world in which the rules are followed, my paper is 15 pages long. A 20-page paper will not be accepted.

        b) [exactly 5 pages -er than 10 pages]$_1$ λ_1 [$\forall w \in \text{ACC}$: [your paper is t_1 long in w]]

           $\rightarrow$ The maximum degree d such that, in every world in which the rules are followed, my paper is at least d-long is exactly 5 pages longer than 10 pages. In other words, a 20-page paper may be acceptable.

The ambiguity can be captured by positing that the degree expression *exactly 5 pages -er than this* (where *this* = 10 pages) can take scope either below or above the modal *has to*. Assuming that the inverse scope reading ((11b)) can only come about if [*exactly 5 pages -er than 10 pages*] moves covertly to a position above the modal, and binds its type-d trace long-distance, this reading will certainly not be available in a language that does not allow binding of degree variables (i.e., has a negative setting for the Degree Abstraction Parameter). I have not been able to reproduce this kind of scope ambiguity in Lake Pátzcuaro P'urhepecha: sentences analogous to (11) seem to have only the surface scope reading ((11a)). The question of how this fact should be interpreted will be addressed shortly.[8]

Let us take stock of what we have learned about the Lake Pátzcuaro P'urhepecha degree system by applying Beck *et al.*'s (2009) diagnostics. The results we have obtained so far are summarized in (12).

---

[8]Beck et al. (2009) also provide a second diagnostic for determining a language's setting for the Degree Abstraction Parameter. In languages with a positive setting for this parameter, the embedded clause in a clausal comparative should show negative island effects (note, for example, the unacceptability of **Katie is taller than nobody is* and ***The lake is deeper than the wall isn't long*). I have been unable to run this test in Lake Pátzcuaro P'urhepecha, owing to the presence of a variety of confounds.

(12)   *The Lake Pátzcuaro P'urhepecha degree system, as revealed by Beck et al.'s diagnostics*

Parameter		Consequences of "Yes" setting	LPP
Degree Semantics Parameter	a.	expressions that plausibly manipulate degree arguments	✓
	b.	difference comparatives	✓
	c.	comparison with a degree	✓
Degree Abstraction Parameter	a.	-ER able to outscope a surface–c-commanding modal	✗
	b.	negative islands	?
Degree Phrase Parameter	a.	degree questions	✓
	b.	measure phrases	✓
	c.	subcomparatives	✓
	d.	subequatives	✓

It might seem at first that Lake Pátzcuaro P'urhepecha has positive settings for the Degree Semantics Parameter and the Degree Phrase Parameter, but a negative setting for the Degree Abstraction Parameter ([+DSP, –DAP, +DegPP]). According to Beck et al. (2009), this is an impossible parameter setting (cf. the hierarchy in (1)). Does Lake Pátzcuaro P'urhepecha challenge this view?

I suggest that the answer is no. The main piece of evidence in (12) that might suggest a negative setting for the Degree Abstraction Parameter in Lake Pátzcuaro P'urhepecha is the apparent inability of a comparative Degree Phrase to outscope a modal that c-commands it in surface syntax. But this in itself does not *entail* a [–Degree Abstraction Parameter] setting. Even in English, the scope ambiguity only shows up with some modals: *has to* allows it, but *should* does not (Heim 2001). Therefore, the seeming unavailability of inverse scope in the relevant sentences of Lake Pátzcuaro P'urhepecha may be due to a peculiarity of the modals involved—or to something else—rather than to a [–Degree Abstraction Parameter] setting for the language as a whole.

There is, then, no compelling evidence that Lake Pátzcuaro P'urhepecha has a negative setting for the Degree Abstraction Parameter. But the language allows at least three degree constructions—degree questions, subcomparatives, and subequatives—that on the analysis of Heim (2001) and Beck et al. (2009) crucially involve abstraction over degrees. This fact suggests that Lake Pátzcuaro P'urhepecha in fact has a positive setting for the Degree Abstraction Parameter, and hence for all three Beck *et al.* parameters, exactly like English.

If Lake Pátzcuaro P'urhepecha really does have a positive setting for the Degree Abstraction Parameter, then we may expect at least *some* of its Degree Phrases to participate in scope ambiguities —a prediction I return to in section 4.

3. The semantics of Lake Pátzcuaro P'urhepecha degree constructions

We have just concluded that Lake Pátzcuaro P'urhepecha has positive settings for the Degree Semantics Parameter, the Degree Abstraction Parameter, and the Degree Phrase Parameter, just like English. If this is so, we may well expect to be able to extend to at least some of the language's degree constructions the analysis (or an analysis) that has been offered for their English counterparts. In this section, I show briefly that the approach to the semantics of English degree constructions put forth by Heim (2001) and adopted in Beck et al. (2009) extends readily to some of the core degree constructions we have examined in Lake Pátzcuaro P'urhepecha. A prediction of this analysis having to do with scope ambiguities will be tested in section 4.

On Heim's analysis, as alluded to above, gradable predicates are of type $\langle d, et \rangle$. For example, the predicate *iosïka-* 'be long' has the denotation in (13).[9] When a gradable predicate like *iosïka-* is given two individual arguments—one of type d and one of type e—the result is a measure phrase construction like (14a), which has the truth conditions given in (14b).

(13) $[\![\textbf{iosïka-}]\!] = \lambda d \, . \, \lambda x \, . \, \delta_{\text{long}}(x) \geq d$

(14)   a.   Kurucha tanimu sentimetrhu iosïkasïti. (J) (= (8a))
            Kurucha tanimu sentimetrhu iosïka-sï-∅-ti.
            fish   three   centimeter be.long-PFV-PRS-IND+3
            'The fish is three centimeters long.'

       b.   *Truth conditions:* (14a) is true iff…
            $\delta_{\text{long}}(\iota x \, [\textbf{fish}'(x)]) \geq 3 \text{ cm}$

Next it will be useful to consider subcomparatives such as (15). As is standard, I assume that the embedded clause in (15), *eska tsïntsïkata iosïkaka* 'than the wall is long', is the complement of the degree word *sanderu* '-er', but has been extraposed. In other words, (15) derives from a more remote structure along the lines of (16).

(15)   Japonda sanderu jauamesti eska tsïntsïkata iosïkaka. (J)

       Japonda sanderu jauame-s-∅-ti   eska tsïntsïkata iosïka-∅-∅-ka.
       lake   -er   be.deep-PFV-PRS-IND+3   SUB wall   be.long-PFV-PRS-SJV
       'The lake is deeper than the wall is long.'

---

[9] δ_{long} is the measure function that maps every individual to the maximal degree to which it is long.

(16)

```
                                    ┌──────────────┴──────────────┐
                                   DP                             VP
                                  /  \                           /  \
                              japonda                      DegP⟨dt,t⟩    V'⟨d,et⟩
                              the.lake                     /    \       jauamesti
                                                  Deg⟨dt,⟨dt,t⟩⟩  CP⟨d,t⟩    is.deep
                                                    sanderu      /    \
                                                      -er       C      MoodP⟨d,t⟩
                                                              eska    /    \
                                                                 Op₁ tsïntsïkata t₁ iosïkaka
                                                                 Op₁ the.wall t₁ is.long
```
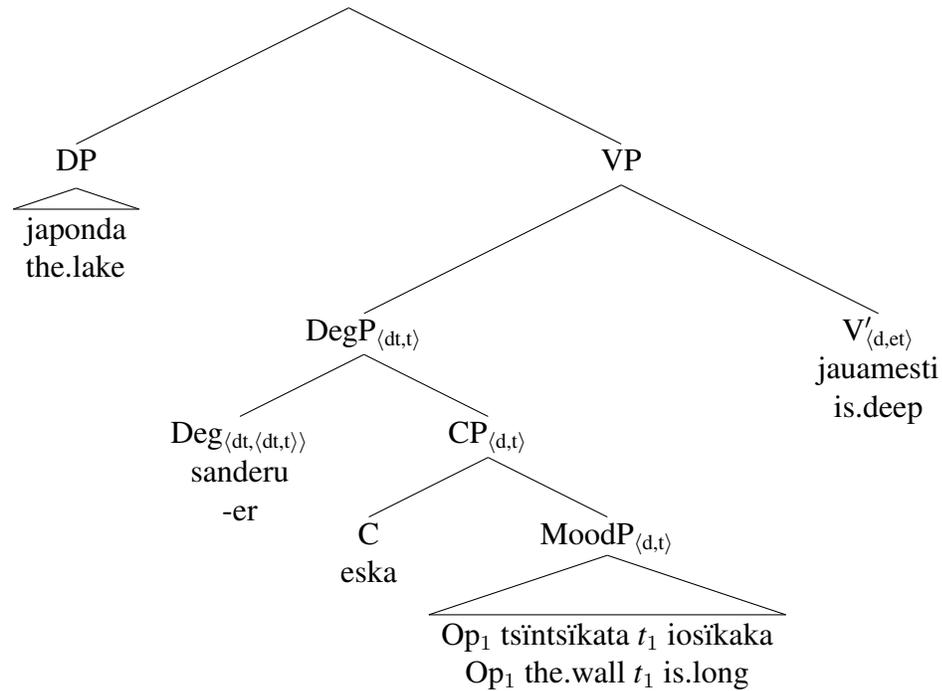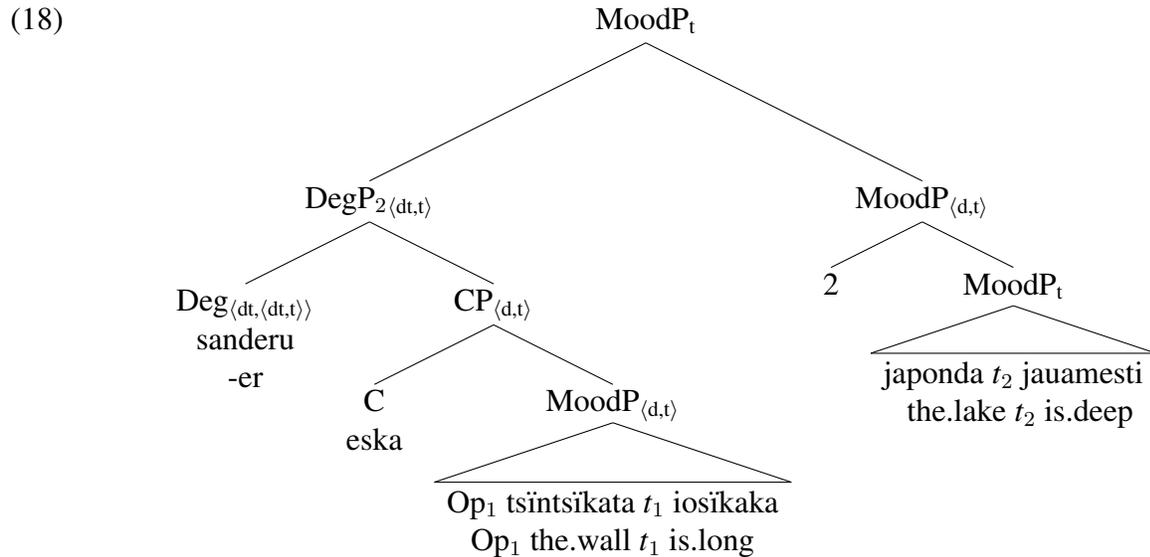
Suppose we extend to the *sanderu* in subcomparatives the denotation proposed by Heim (2001) and Beck et al. (2009) for the *-er* in English subcomparatives, as in (17).[10]

(17) $[\![\textbf{sanderu}]\!] = \lambda P_{\langle d,t\rangle} \,.\, \lambda Q_{\langle d,t\rangle} \,.\, \max(Q) > \max(P)$ [adapted from Beck et al. 2009, (6b)]

Then, there is a type clash in (16), because $[\![\textbf{DegP}]\!]$ (type $\langle dt,t\rangle$) cannot compose with the denotation of its sister ($[\![\textbf{V}']\!]$), which is of type $\langle d,et\rangle$. This problem can be solved by (covertly) QRing DegP to the root of the tree, producing the following LF:

---

[10]With "max" defined as follows (Heim 2001:216):

(1) $\max(P) := \iota d \,.\, P(d) = 1 \,\&\, \forall d' \, [P(d') \rightarrow d' \leq d]$

(18)

                                          MoodP$_t$
                                        /   \
                                       /   \
                            DegP$_{2\langle dt,t\rangle}$ MoodP$_{\langle d,t\rangle}$
                             /   \   /   \
                            /   \   2   MoodP$_t$
                    Deg$_{\langle dt,\langle dt,t\rangle\rangle}$ CP$_{\langle d,t\rangle}$ /   \
                    sanderu   /   \   japonda t_2 jauamesti
                    -er   /   \   the.lake t_2 is.deep
                                      C   MoodP$_{\langle d,t\rangle}$
                                    eska   /   \
                                              /   \
                                   Op$_1$ tsïntsïkata t_1 iosïkaka
                                   Op$_1$ the.wall t_1 is.long

The covert movement of the DegP leaves a trace (t_2) which is interpreted as a variable of type *d*. The sister of DegP is interpreted (by Predicate Abstraction) as a λ-abstract of type $\langle d,t\rangle$. This is precisely the type of argument that the DegP (type $\langle dt,t\rangle$) needs, so the type clash has been fixed.

The complement of *eska* in (18) denotes the characteristic function of the set of degrees *d* such that the wall is at least *d*-long. Assuming that *eska* is semantically vacuous, this denotation percolates up to CP. The sister of DegP denotes the characteristic function of the set of degrees d' such that the lake is at least d'-deep. Putting all this together with the denotation of *sanderu* ((17)), we get the following truth conditions for the subcomparative sentence in (15):

(19) *Truth conditions:* (15)/(18) is true iff. . .

  $\max(\lambda d'$. the lake is d'-deep$) > \max(\lambda d$. the wall is d-long$)$

Changing *sanderu* '-er' to *xani* 'as' in (15) produces the (impeccable) subequative sentence *Japonda **xani** jauamesti eska tsïntsïkata iosïkaka* 'The lake is as deep as the wall is long.' Suppose that the *xani* found in subequatives has the denotation in (20a).[11] Then the syntacticosemantic derivation for this subequative sentence will be precisely parallel to that for the subcomparative in (15), yielding the truth conditions in (20b).

(20) a. $[\![\textbf{xani}]\!] = \lambda P_{\langle d,t\rangle}$. $\lambda Q_{\langle d,t\rangle}$. $\max(Q) \geq \max(P)$

---

[11]An important empirical question here is whether the (in)equality relation in *xani*-equatives is $\boxed{\geq}$ (as in (20a)) or $\boxed{=}$. Negated equatives, equatives in yes/no questions, and equatives in quantifier restrictors reveal that the answer is $\boxed{\geq}$.

b. *Truth conditions:* <u>Japonda xani jauamesti eska tsïntsïkata iosïkaka</u> is true iff. . .

$\max(\lambda d' \ . \ \text{the lake is } d'\text{-deep}) \geq \max(\lambda d \ . \ \text{the wall is } d\text{-long})$

Now consider comparison with a degree, as in (21). Let us attempt to extend to this construction the kind of analysis we have given for Lake Pátzcuaro P'urhepecha subcomparatives and subequatives. Pursuing this approach, we are led to posit for (21) the LF in (22).

(21)   I sïruki sanderu iosïkasïti eska ma sentimetrhu. (J)

I   sïruki sanderu iosïka-sï-∅-ti   eska ma sentimetrhu.
this ant   -er   be.long-PFV-PRS-IND+3 SUB one centimeter
'This ant is longer than one centimeter.'

(22)
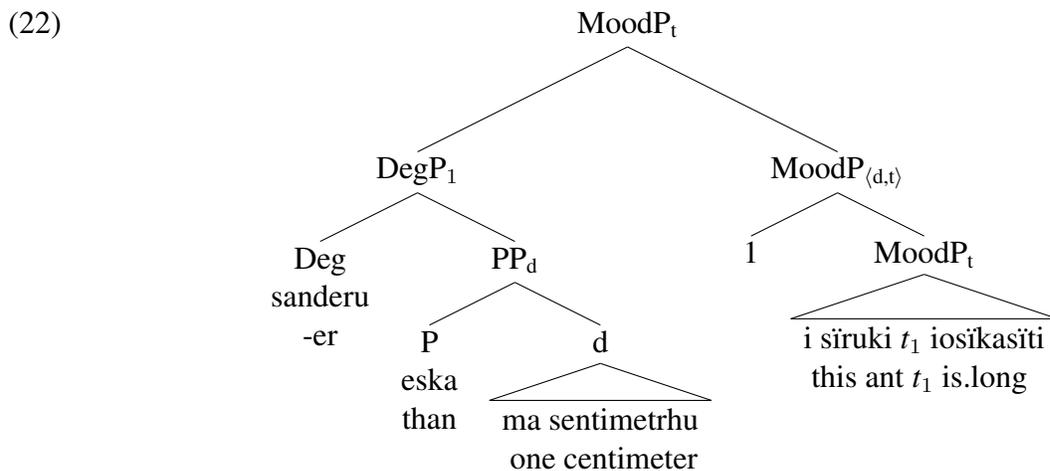
The phrase *ma sentimetrhu* 'one centimeter' denotes a particular degree on the scale of linear extent. Assuming (as above) that *eska* is semantically vacuous, this denotation is inherited by the PP. The sister of the QRed DegP denotes the function $\lambda d \ . \ \textit{this ant is d-long}$. To complete the analysis, all we need to assume is that the *sanderu* '-er' in comparison-with-a-degree constructions has a slightly different denotation than the one in subcomparatives—namely, that in (23a).[12] This yields the truth conditions in (23b).

(23)   a. $[\![\textbf{sanderu}]\!] = \lambda d \ . \ \lambda Q_{\langle d,t \rangle} \ . \ \max(Q) > d$ (cf. Beck et al. 2009, (6a))

b.   *Truth conditions:* (21)/(22) is true iff. . .

$\max(\lambda d \ . \ \text{this ant is } d\text{-long}) > 1 \ \text{cm}$

_____

[12]Alternatively, as pointed out to me by Amy Rose Deal, it could be that there is only one *sanderu*, with the type-$\langle dt, \langle dt,t \rangle \rangle$ denotation given in (17), and the *eska* found in comparison-with-a-degree constructions maps the denotation of its complement, which is a particular degree *d*, to some set of degrees of which *d* is the maximum.

Although I have certainly not provided a detailed compositional semantics for every degree construction in Lake Pátzcuaro P'urhepecha that we have seen here, I have shown that standard analyses of core English degree constructions—measure phrase constructions, subcomparatives, subequatives, and comparison with a degree—carry over directly to Lake Pátzcuaro P'urhepecha. This is no surprise if, as we concluded in section 2, the degree systems of the two languages are governed by the same parameter settings.

4. A prediction: scopally ambiguous DegPs

Let us now turn to a prediction of the Heim (2001)/Beck et al. (2009) analysis of degree constructions that we have just extended to Lake Pátzcuaro P'urhepecha. On this analysis, many degree constructions involve a constituent called DegP, which often consists of a degree word (Deg^0) and its (frequently surface-extraposed) complement. As we have seen, a DegP often has a denotation of type $\langle dt,t \rangle$—i.e., it is a generalized degree quantifier. When a DegP of type $\langle dt,t \rangle$ is merged in the degree argument slot of a gradable predicate (of type $\langle d,et \rangle$), it must QR for interpretability.

All a constituent needs to be interpretable is access to a syntactic position where its denotation can compose with that of its sister. Because there are often positions of this sort available both below and above particular scope-bearing elements in the structure, the DegPs-as-generalized-degree-quantifiers analysis predicts that at least some DegPs should participate in scope ambiguities, exactly like generalized individual quantifiers (type $\langle et,t \rangle$) (Heim 2001). We can test this prediction in Lake Pátzcuaro P'urhepecha to gain some insight into whether our analysis is on the right track.

The prediction, it turns out, is borne out in Lake Pátzcuaro P'urhepecha. To see this, consider the language's result construction, exemplified in (24).

(24)   Juchiti uakasï xani k'erisïti eska uatsapicha cheresïndiksï. (J)

Juchiti uakasï **xani** k'eri-i-sï-∅-ti   **eska** uatsapi-cha
my   cow   **so** big-COP-PFV-PRS-IND+3 SUB child-PL
chere-sïn-∅-ti=ksï.
be.afraid.of-HAB-PRS-IND+3=3pS
'My cow is so big that the children are afraid of it.'

The Lake Pátzcuaro P'urhepecha *xani*–result construction is a degree construction involving a main-clause degree word *xani* (in this usage apparently similar to English *so*) and an extraposed gapless clause which is the complement to *xani*, introduced by the subordinator *eska* (apparently similar to English *that*).

The *xani*–result construction has at least three semantic components. First, it entails the truth of the corresponding "absolute" or "positive" sentence. Secondly, it entails the truth of its result clause. Finally, it conveys—informally speaking—that there is a causal relation between the content of the

main clause (cause) and the content of the embedded clause (effect). For example, (24) conveys the following: **1)** My cow is big. **2)** The children are afraid of my cow. **3)** The children are afraid of my cow *because* it's big.

Suppose that, in (24), the underlying DegP *xani eska uatsapicha cheresïndiksï* 'so. . .that the children are afraid of it' is a generalized degree quantifier (type $\langle dt,t\rangle$) that QRs for interpretability. Then the LF of (24) is (25). This LF, combined with the (intensional) denotation for result *xani* given in (26a), yields the truth conditions in (26b).

(25)
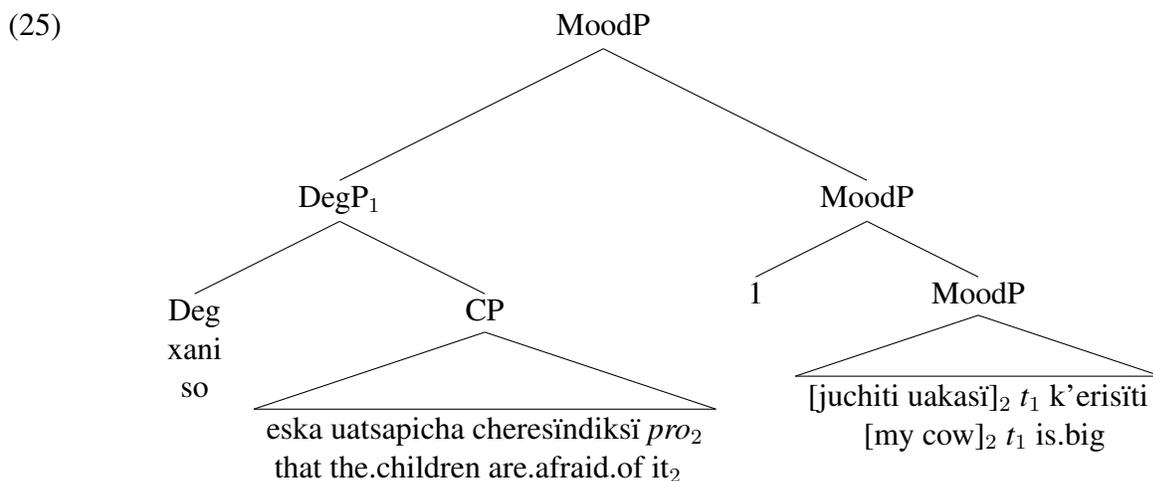
(26) a. $[\![\mathbf{xani}]\!]^{\mathrm{w}} = \lambda p_{\langle s,t\rangle} \cdot \lambda P_{\langle d,\langle s,t\rangle\rangle} \cdot \exists d\ [d > d_{\mathrm{standard}}\ \&\ P_w(d)\ \&\ \mathrm{CAUSE}_w(P(d))(p)]$

b. *Truth conditions:* (24)/(25) is true in a world w iff. . .
$\exists d\ [d > d_{\mathrm{standard}}{}^{13}\ \&\ \text{my cow is d-big in w}\ \&\ \mathrm{CAUSE}_w(\{w' : \text{my cow is d-big in } w'\})$
$(\{w'' : \text{the children are afraid of my cow in } w''\})]$

Now suppose that we embed a *xani*–result construction under the intensional verb *uekasïndi* 'wants'. All else being equal, the DegP headed by *xani* should be able to QR to the left edge of its own clause or to the left edge of the higher clause. Therefore, it should be possible to interpret it either within or outside the scope of *uekasïndi*, yielding a scope ambiguity.

This prediction is correct. Consider the following minimal pair:[14]

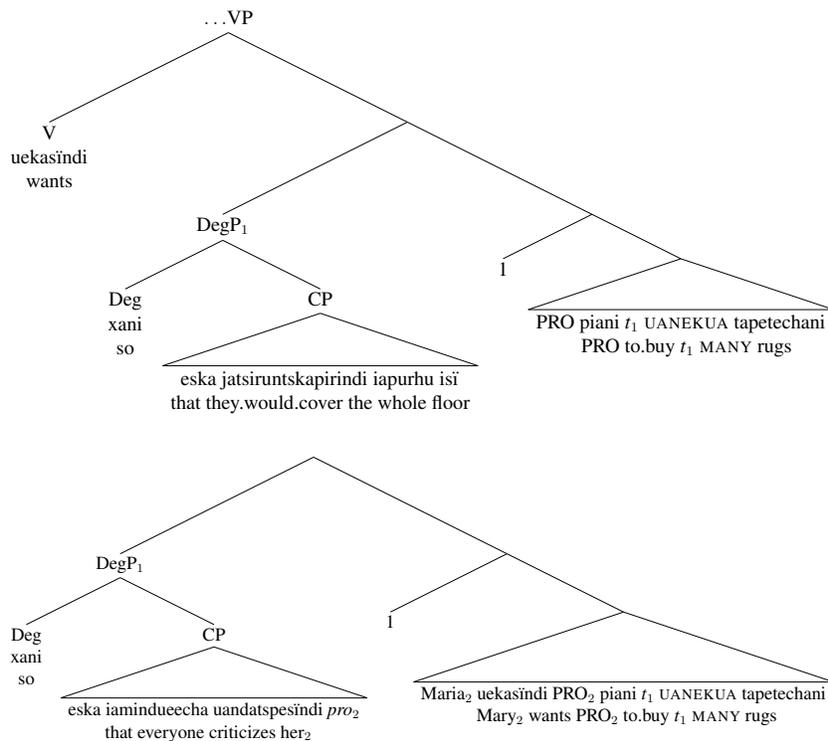[13]Cf. Kennedy's (1997:158-160) analysis of absolute constructions with no overt measure phrase.

[14]See Meier (2003:99-100) for discussion of a similar case in English.

(27)   a. [Context: Mary doesn't like the floor of her house, because it's dirty and covered in stains. She wants to buy carpets in order to be able to cover it all.]

Maria uekasïndi piani xani tapetechani eska jatsiruntskapirindi iapurhu isï. (J)

Maria **ueka-sïn-∅-ti**   pia-ni   **xani** tapete-cha-ni eska
Mary **want**-HAB-PRS-IND+3 buy-INF **so**   rug-PL-ACC SUB
jatsiruntska-pirin-∅-ti   iapurhu isï.
cover-COND-PRS-IND+3 wherever thus

'Mary wants to buy so many rugs that they would cover the whole floor.'

b. [Context: Everyone criticizes Mary, because she's said that she wants to buy 500 rugs, and they think that doing such a thing would be a ridiculous excess.]

Maria uekasïndi piani xani tapetechani eska iamindueecha uandatspesïndi. (J)

Maria **ueka-sïn-∅-ti**   pia-ni   **xani** tapete-cha-ni eska iamindu-eecha
Mary **want**-HAB-PRS-IND+3 buy-INF **so**   rug-PL-ACC SUB all-PL
uandatspe-sïn-∅-ti.
criticize-HAB-PRS-IND+3

'Mary wants to buy so many rugs that everyone criticizes her.'

The sentence in (27a) could be paraphrased as follows: "In every possible world that's compatible with Mary's desires, she buys a lot of rugs, they would cover the whole floor (under particular circumstances—i.e., if she laid them out on the floor), and they would cover the floor *because* she bought a lot of rugs." The causal relation contributed by *xani* 'so' holds between Mary buying a lot of rugs and it being the case that they would cover the whole floor. Mary's wanting something is not one of the causal relata; rather, the causal relation holds in every possible world compatible with Mary's desires. This indicates that the *xani*-DegP is interpreted within the scope of 'wants'.

In (27b), by contrast, everyone criticizes Mary not because she's bought a lot of rugs (which, indeed, the context doesn't say has happened) but because she *wants* to buy a lot of rugs. Her desire to do this is one of the causal relata, indicating that, in this example, the *xani*-DegP takes scope higher than *uekasïndi* 'wants'. If we were to argue that, in this example, *xani eska iamindueecha uandatspesïndi* 'so…that everyone criticizes her' is interpreted within its clause of origin, and hence inside the scope of *uekasïndi* 'wants', we would be claiming, implausibly, that (27b) conveys that Mary wants everyone to criticize her, which is not what the context suggests at all.

These considerations suggest that (27a) and (27b) have the following LFs, respectively:

$\ldots$VP

V
uekasïndi
wants

DegP_1

Deg
xani
so

CP

eska jatsiruntskapirindi iapurhu isï
that they.would.cover the whole floor

1

PRO piani t_1 UANEKUA tapetechani
PRO to.buy t_1 MANY rugs

DegP_1

Deg
xani
so

CP

eska iamindueecha uandatspesïndi *pro$_2$*
that everyone criticizes her$_2$

1

Maria$_2$ uekasïndi PRO$_2$ piani t_1 UANEKUA tapetechani
Mary$_2$ wants PRO$_2$ to.buy t_1 MANY rugs

The argument that DegPs in Lake Pátzcuaro P'urhepecha can participate in scope ambiguities depends crucially on the existence of sentences such as (27b), in which a DegP is interpreted higher than a scope-bearing element that c-commands it in surface syntax. It is therefore worth noting that sentences of this type were accepted without reservation, in contexts like the one given for (27b), on a number of different occasions. This lends support to the semantic analysis proposed here, according to which Lake Pátzcuaro P'urhepecha has DegPs that QR for interpretability.

5. Conclusion

Although it is a regional variety of a language isolate, and differs typologically from English along a number of dimensions, Lake Pátzcuaro P'urhepecha has a degree system that is very similar to that of English in its overall architecture. In particular, it makes full use of degrees as a basic semantic type and of abstraction over degrees. In the terms of Beck et al. (2009), it has positive settings for the Degree Semantics Parameter, the Degree Abstraction Parameter, and the Degree Phrase Parameter, just like English. These observations were captured here by extending to Lake Pátzcuaro P'urhepecha Heim's (2001) analysis of some core English degree constructions, a move that correctly predicted that Lake Pátzcuaro P'urhepecha should have Degree Phrases that participate in scope ambiguities. That Lake Pátzcuaro P'urhepecha and English have such similar degree systems is an interesting finding, because if we are to learn about the nature and limits of semantic variation, we must take into account not only those cases in which understudied languages diverge from familiar ones but also those in which they do not. The striking similarity between the degree systems of these two languages, which differ along numerous dimensions in other domains, may

be a clue that the parameters regulating languages' degree systems—however they ultimately turn out to be best stated—may be largely independent of those governing other areas of grammar.

References

Beck, S., S. Krasikova, D. Fleischer, R. Gergel, S. Hofstetter, C. Savelsberg, J. Vanderelst, and E. Villalta (2009). Crosslinguistic Variation in Comparison Constructions. *Linguistic Variation Yearbook 9*(1), 1–66.

Bhatt, R. and S. Takahashi (2011). Reduced and unreduced phrasal comparatives. *Natural Language & Linguistic Theory 29*(3), 581–620.

Bochnak, M. R. (2013). The Non-Universal Status of Degrees: Evidence from Washo. In S. Keine and S. Sloggett (Eds.), *Proceedings of NELS*, Volume 42, Amherst, MA, pp. 79–92. GLSA.

Capistrán, A. (2002). Variaciones de orden de constituyentes en p'orhépecha. Topicalización y focalización. In P. Levy (Ed.), *Del cora al maya yucateco: estudios lingüísticos sobre algunas lenguas indígenas mexicanas*, Estudios sobre lenguas americanas, pp. 349–402. UNAM.

Chamoreau, C. (2007). Looking for a new participant. The Purepecha passive. In Z. Estrada Fernández, S. Wichmann, C. Chamoreau, and A. Álvarez González (Eds.), *Studies in Voice and Transitivity*, pp. 127–145. Munich: LINCOM Europa.

Chamoreau, C. (2012). Contact-induced change as an innovation. *Dynamics of Contact-Induced Language Change*, 53–76.

Heim, I. (2001). Degree Operators and Scope. In C. Féry and W. Sternefeld (Eds.), *Audiatur Vox Sapientiae: A Festschrift for Arnim von Stechow*, pp. 214–239. Berlin: Akademie Verlag.

INEGI (2010). Lenguas indígenas en México y hablantes (de 5 años y más) al 2010. 11. Feb. 2014. ⟨http://cuentame.inegi.org.mx/hipertexto/todas_lenguas.htm⟩.

Kennedy, C. (1997). *Projecting the Adjective: The Syntax and Semantics of Gradability and Comparison*. Ph. D. thesis, University of California, Santa Cruz.

Kennedy, C. (2007). Modes of Comparison. In M. Elliott, J. Kirby, O. Sawada, E. Staraki, and S. Yoon (Eds.), *Proceedings from the Annual Meeting of the Chicago Linguistic Society*, Volume 43, pp. 141–165.

Krasikova, S. (2008). Comparison in Chinese. *Empirical Issues in Syntax and Semantics 7*, 263–281.

Meier, C. (2003). The meaning of *Too*, *Enough*, and *So…That*. *Natural Language Semantics 11*(1), 69–107.

Vázquez-Rojas Maldonado, V. (2011). Case Marking and Semantic Incorporation in Tarascan. Volume 41, pp. 259–278. UMOP (UMass Occasional Papers in Linguistics).