Microvariation in the grammar of comparison and measurement: Insights from Ch'ol

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Abstract Expressions of comparison and measure are subject to significant cross-linguistic variation. Beck et al. (2009) develop a parametric approach according to which such variation can be predicted via a limited set of dependent parameters. Despite the typological richness documented in theirs and subsequent work (Bochnak 2015; Deal & Hohaus 2019, among others.) little is known about Mayan languages. This paper addresses that gap with new data from Ch'ol (Mayan). We argue that while Ch'ol has a positive setting for the most embedded dependent parameter, our data indicate that there is finer-grained micro-variation within such parameter (English vs. Ch'ol) We formulate two novel generalizations: i) if a language has subcomparatives, it will also have Measure Phrases and degree wh-words directly modifying gradable predicates; ii) having subcomparatives entails having the largest inventory of degree expressions but lacking them is not indicative of the opposite. We propose an extension of Beck et al.'s (2009) model that can capture these small-scale differences.

1 Introduction

The[1] grammar of measurement and comparison is an area of well-known cross-linguistic variation (Ultan 1972; Stassen 1985). Languages not only differ in the morphosyntactic means they use to express comparison but also in the types of degree expressions that they allow in their inventories. For example, some languages will express comparison with a dedicated comparative morpheme like *-er/more* in English, whereas others will lack such a morpheme. Additionally, some languages seem to have constructions that express an exact measure, as *two feet* in *two feet tall*, but others do not. Beck et al. (2009) note that this variation is not arbitrary: they observe that certain degree and measure expressions pattern together across languages, and the presence or absence of those clusters of constructions triggers or blocks the availability of other related constructions. Thus, Beck et al. (2009) propose that cross-linguistic variation can be predicted via a set of implicational relations known as dependent parameters: if a language has the cluster of properties $\{a, b, c\}$, it will have the cluster $\{d, e, f\}$; and only if it has $\{d, e, f\}$, it will have $\{g, h, i\}$. Operating under a degree semantics framework (Cresswell 1976; von Stechow 1984), the first point of variation is whether languages make reference to degrees; that is, if the language is "degreeful" or "degree-

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less". Subsequent points of variation are possible depending on whether the language makes or not reference to degrees.

Despite how typologically rich the literature on the grammar of measurement and comparison is, very little is known about Mayan languages. In this paper, we hope to start to fill in this gap by providing a theoretically informed description of the grammar of measurement and comparison in Ch'ol (ISO 639: ctu), a Mayan language of the Ch'olan-Tseltan branch. Two examples of comparative constructions in Ch'ol are in (1) and (2): *ñumeñ*, as we aim to provide evidence for here, is the comparative morpheme equivalent to English *-er/more* and *kej* introduces the standard of comparison, like English *than*.[2]

(1) Jiñi alob **ñumeñ** chañ kej bajche' jiñi xk'äläl
DET boy more tall that how DET girl
'The boy is taller than the girl is' (*AP comparative*)

(2) AjJuana, **ñumeñ** juñ tyi i-pejkä tyi lunes kej bajche' ajMaria tyi martes.
Juana more book PFV A3-read PREP Monday that how Maria PREP Tuesday
'Juana read more books on Monday than Maria did on Tuesday.' (*NP comparative*)

We will discuss each part of the Ch'ol data below and provide evidence that *ñumeñ* is Ch'ol's cross-categorial comparative morpheme. This is the first in-depth description of *ñumeñ* in the literature.

We aim to test the predictions that Beck et al.'s (2009) parametric proposal make in order to determine where Ch'ol fits in their typology. We find that while Ch'ol largely fits within their approach, the data are significant in two ways. First, we show that while subcomparatives and Degree Questions (DegQs)/Degree Phrases (DegPs) directly modifying gradable predicates are part of the same large scale parameter (as originally proposed by Beck et al. 2009), it is possible for a language to have the latter but lack the former, contrary to the expectations from Beck et al. (2009). Secondly, based on this observation, the data suggest finer-grained micro-variation between the group of languages that have a rich inventory of degree expressions. This, we argue, is what makes Ch'ol different from languages like English. This is not an isolated finding, as similar observations have been reported on the opposite side of the degreefulness spectrum: degreeless languages, or, languages that do not make reference to degrees, are also subject to subtle variation (Bowler 2016; Deal & Hohaus 2019). Based on the Ch'ol findings and the available cross-linguistic data, we propose a modification of Beck et al.'s (2009) model that captures these small-scale differences within the spirit of their parametric approach.

The paper is structured as follows. In Section 2, we introduce Beck et al. (2009)'s framework

[2]Glosses: # = infelicitous relative to a given context; ✓= felicitous relative to a given context; 1 = first person; 2 = second person; 3 = third person; A = set A ergative/possessive; ADJ = adjective; AGT = agentivizer; AFF = affirmative marker; AP = Adjective Phrase; B = set B absolutive; CARD = cardinal; CLF = numeral classifier; COMPR = comparative; cm = centimeter; CP = complementizer phrase; DAP = Degree Abstraction Parameter; DEG = degree; DegP = Degree Phrase; DegPP = Degree Phrase Parameter; DegQ = Degree Question; DEM = demonstrative; DET = determiner; DSP = Degree Semantics Parameter; EXT = existential predicate; F = feminine; GP = Gradable Predicate; Ib. = Iberian Spanish; INSTR = instrumental; IPFV = imperfective; $\mathbb{L}$ = language; Lit. = literally; LV = light verb; M = masculine; m = meter; *max* = maximal; *min* = minimal; MIR = mirative; MP = Measure Phrase; NEG = negation marker; NML = nominalizer; NP = Noun Phrase; Par = Paraguayan Spanish; PC = Property Concept; PCL = Property Concept Lexeme; PFV = perfective; PL = plural; POSS = possessive; PREP = preposition; PRED = predicate; PRON = pronoun; PROS = prospective aspect; REL = relative clause marker; S = subject; VP = Verb Phrase; t = trace; TOP = topic marker; XP = X-Phrase

and provide examples illustrating the relevant constructions to be described in subsequent sections. In Section 3, we discuss the relevant background on Ch'ol morphosyntax and our methodology. In Section 4 we present the relevant Ch'ol data. In Section 5 we will discuss how Ch'ol fits into Beck et al. (2009)'s parametric framework and conclude by proposing a modified framework to capture micro-variation exhibited across languages.

2 BECK ET AL.'S (2009) PARAMETRIC APPROACH

Comparative constructions establish an ordering relation (i.e., *bigger*, *lesser*, or *equal*) between two objects along some scale and express the result of measuring those objects. Some examples are shown in (3) and (4) for English.

(3) [Gasol: 2.16 meters; Messi: 1.70 meters]
   a. Gasol is taller than Messi is.
   b. Gasol is 46 centimeters taller than Messi is.

(4) [Cooper: 4 coffees; Harry: 1 coffee]
   a. Cooper drank more coffees than Harry did.
   b. Cooper drank 3 more coffees than Harry did.

The English sentence in (3a) compares two individuals, Gasol and Messi, along a scale of height and orders their respective heights such that Gasol's exceeds Messi's. The sentence in (3b) also compares the same individuals along the same scale and expresses the exact difference between their respective heights: 46 centimeters. Likewise, (4) compares the (number of) coffees that Cooper drank and the ones that Harry drank along a cardinality scale. (4b) expresses the exact difference between the number of coffees that each person drank, in this case is three.

English establishes the ordering relation via dedicated comparative morphology: *-er/more*.[3] We refer to this morpheme as the "comparative morpheme", which marks the object and property being measured. *Than* introduces the standard of comparison which the object is measured against and found (un)equal to. We refer to this morpheme as the "standard morpheme." We represent English-type comparatives with the schema in (5), where we use "pivot" to refer to the constituent or constituents that immediately follow the standard morpheme. We refer to the constituent that the pivot is measured against as the "correlate of the pivot." In (3a), *Messi* is the pivot and *Gasol* is its correlate.

(5) schema for comparatives

		standard of comparison	
-er/more	AP/NP/VP	*than*	XP
comparative morpheme	compared category	standard morpheme	pivot

The expression of measurement and comparison exhibits much variation cross-linguistically (Stassen 1985). According to Beck et al. (2009), languages may differ in (at least) two respects: (i) the range of expressions that manipulate degree arguments (e.g., dedicated comparative/superlative/equative morphology, degree modifiers similar to *too/enough*); and, (ii) the range of expressions that make

[3]Following Beck et al. (2009) and Deal & Hohaus (2019), we understand the term "dedicated comparative morphology" to refer to a piece of morphology whose sole function is to mark comparison and establish an ordering relation between degrees in the semantics.

reference to degrees and combine with degree operators. Consider the Motu examples (ISO 639: hmo; Austronesian, Oceanic; Papua New Guinea, Beck et al. 2009) in (6), which do not have a morpheme corresponding to *more* or *than*.

(6) Mary na lata, to Frank na kwadōgi
Mary TOP tall but Frank TOP short
Lit.:'Mary is tall, but Frank is short.'
Intended.: 'Mary is taller than Frank.' (Beck et al. 2009)

$\underbrace{\textit{Mary na lata}}_{\text{Measurement 1}}$ *to* $\underbrace{\textit{Frank na kwadogi}}_{\text{Measurement 2}}$

The Motu example in (6) is an adjectival comparative. Unlike English, the adjective *lata* 'tall' appears bare and there is no trace of a comparative morpheme (at least overtly). There is no standard morpheme introducing the standard of comparison: the two measurements are expressed as separate clauses conjoined with the adversative conjunction *to* 'but'. In this type of conjoined comparative, the gradable adjectives in each conjunct are (lexical) antonyms (*tall* $\sim$ *short*), thus establishing what is called an "A-NOT-A pattern." This pattern can be found in other non-related languages. For example, Washo (ISO 639: was, isolate, United States; Bochnak 2015) and Warlpiri (ISO 639: wbp, Pama-Nyungan; Australia; Bowler 2016) also lack relevant dedicated comparative morphemes and comparison is expressed with a conjoined morphosyntactic structure.

The data raise the following questions: What is the range of possible cross-linguistic variation? How can we capture it? And where in the grammar is that variation located? A prominent set of answers in the literature has been provided by Beck et al. (2009) who argue that languages may differ along three different dimensions and that variation can be modelled in the form of semantic and syntactic parameters (Chomsky 1981; Chomsky & Lasnik 1993; Baker 1996, 2008a,b; Roberts & Holmberg 2010; Roberts 2012, 2019, and references therein). Before discussing Beck et al.'s (2009) model, we contextualize what a parameter is and how they are used in linguistic modeling. This will be relevant for understanding the rationale of the framework we adopt in subsequent sections.

We can think of a parameter as a bivalent (+/–) "switchbox" that the language faculty comes equipped with. The learner's task is to figure out the appropriate setting of the switch as on (+) or off (–). The parametric approach to cross-linguistic variation is grounded on the two assumptions in (7), based on Snyder (2007):

(7) a. Clustering: If the knowledge required for construction α is the same as the knowledge required for construction β, then α and β should pattern together.
b. Ordered (implicational) relations: If the knowledge required for construction α is a proper subset of the knowledge required for construction β, then the availability of β entails the availability of α.

One of the advantages of this framework is its explanatory adequacy: instead of assuming that each linguistic phenomenon is governed by its own idiosyncratic set of rules, it establishes that various linguistic phenomena that may appear unrelated on the surface are actually encapsulated in a more abstract criterion—a parameter. Cross-linguistic variation can then be captured by a relatively small set of abstract parameters. These parameters may stand in an asymmetrical implicational relation with each other, in which case they are called "dependent parameters" (Roberts &

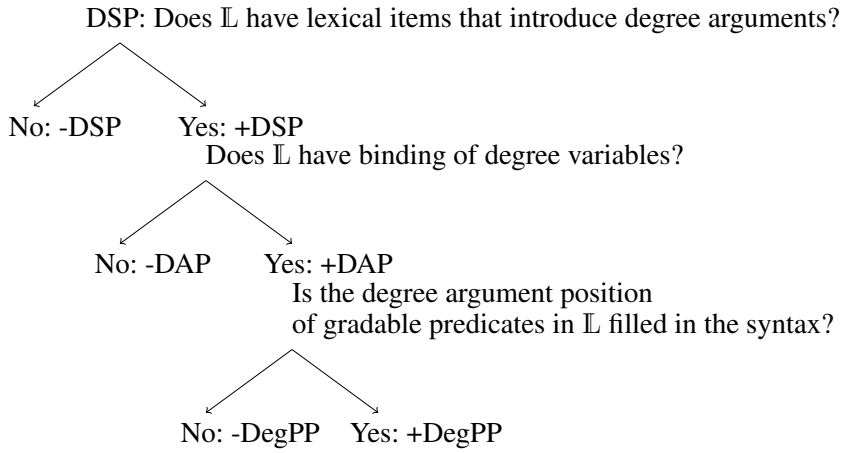
Holmberg 2010; Roberts 2012, 2019; Biberauer & Roberts 2015): a positive setting of a parameter X depends on a positive setting of a parameter Y, but not vice versa.

With this framework, Beck et al. (2009) propose that cross-linguistic variation in the expression of comparative constructions can be captured with the set of parameters shown in (8). It is worth noting that Beck et al.'s approach relies on a traditional degree semantics framework according to which some lexical items, such as gradable adjectives, denote relations between degrees and individuals (Cresswell 1976; von Stechow 1984; Heim 2000, among others). This means that there are categories that introduce in their syntactic structure, as part of their subcategorization properties, an argument whose label is a Degree. This position need not be overtly realized, however.

(8) a. [±Degree Semantics Parameter] (DSP)
A language {may/may not} have lexical items that introduce degree arguments.
b. [±Degree Abstraction Parameter] (DAP)
A language {does/does not} have binding of degree variables in the syntax.
c. [±Degree Phrase Parameter] (DegPP)
The degree argument position of a gradable predicate {may/may not} be overtly filled.

The parameters in (8) are dependent: they stand in an asymmetrical implicational hierarchy. That is, if [+DSP] is a proper subset of [+DAP], which itself is a proper subset of [+DegPP], the model predicts that it is only possible for a language to have a positive setting for the DegPP if the language has a positive setting for the DAP and the DSP. We can represent this dependency with the tree in Figure 1, where $\mathbb{L}$ stands for any given language.[4]

Figure 1: Implicational relations between the parameters proposed by Beck et al. (2009)



Given the hierarchical representation in Figure 1, languages will have a larger grammatical inventory of degree expressions, and thus be more marked, the more downwards we move in the hierarchy. Cross-linguistic variation can be accounted for based on the (de)activation of these parameters. We will adopt these parameters in this paper for our analysis of the Ch'ol facts.

[4]We will be stating the parameters as "yes/no" questions. As Roberts (2019: 6) indicates, "this is an essentially expository move, but it has the advantage of making their binary nature clear, and it reminds us that the parametric options represent ways in which the child interrogates the [Primary Linguistic Data]".

Each of the parameters in (8) encapsulates a series of constructions, summarized in Table 1; and given clustering in (7a), a parameter is set to its positive value if each of the relevant constructions are available in the language.

Table 1: Clustered constructions per parameter

DSP	DAP	DegPP
a. Dedicated degree morphology	a. Clausal standards	a. Degree questions
b. MP-comparatives	b. Negative islands	b. MPs with gradable predicates
c. Crisp judgments	c. Inverse scope over modals	c. Subcomparatives
d. Differential comparatives		

In the following subsections, we will discuss each parameter and how it is manifested cross-linguistically. For [DSP] and [DegPP], we exemplify each of the constructions in Table 1, but for the [DAP] we only provide data from clausal standards.[5] We provide examples of the constructions that will be discussed for Ch'ol in section 4.

2.1 [±DSP]

The DSP makes a split between languages that make reference to degrees in their grammar and languages that do not. The former are degreeful languages, and the latter degreeless. According to Beck et al.'s (2009) original proposal, a language will be degreeful, and thus have a positive setting of the parameter, if the set of constructions in Table 1 is available; it will be degreeless, otherwise.

English is an example of a [+DSP] language. It has dedicated comparative morphology (*-er/more*) in (9a); it allows MP-comparatives (e.g., MPs like *1.75 meters* appear inside the standard of comparison referencing a degree) in (9b); it allows crisp judgments, i.e., the difference between the standard and the compared individual is tiny (*1cm*) in (9c); and, it allows comparatives to host differential arguments expressing the exact difference between the two measurements (*50cm* in (9d)).

(9) a. Cooper is tall**er** than Audrey. (*Comparative*)
b. Cooper is taller **than 1.75 meters**. (*MP comparative*)
c. [Cooper is 1.80 meters. Bob is 1.81 meters] (*Crisp judgment*)
Bob is taller than Cooper.
d. Cooper is **50 centimeters** taller than Laura. (*Differential comparative*)

As opposed to English, Motu lacks all those properties as is thus degreeless, hence is [-DSP]. Crucially, (10a) is infelicitous if Mary is 1.81m but Frank is 1.80m, showing that crisp judgments are also not available. The data in (10) are taken from Beck et al. (2009: 18-19). The original source does not include how numbers or the units of measurement are pronounced in Motu.

[5] Beck et al. (2009) do not discuss crisp judgments in their original survey. However, subsequent research inspired by them (Bochnak 2015; Bowler 2016; Deal & Hohaus 2019) does. We go back to their relevance when addressing the [DSP].

(10) a. Mary na lata, to Frank na kwadōgi
Mary TOP tall but Frank TOP short
Intended: 'Mary is tall, but Frank is short.' (*Comparative*)

b. *Mary na lata 1.70m
Mary TOP tall 1.70 meters
Intended: 'Mary is taller than 1.70 meters.' (*MP Comparative*)

c. *Mary na lata 2 cm ai to Frank na kwadōgi
Mary TOP tall 2 cm by but Frank TOP short
Intended: 'Mary is 2cm taller than Frank' (*Differential comparative*)

For Beck et al. (2009), the parameters are absolute: if a language has one of the constructions, it should have them all. However, this has been shown to be too strong given languages like Warlpiri and Nez Perce (ISO 639: nez, Penutian, Sahaptian; USA). Like Motu, Warlpiri lacks dedicated degree morphology and differential comparatives; but unlike Motu, it allows the expression of crisp judgments (Bowler 2016). As reported by Deal & Hohaus (2019), Nez Perce patterns like English in two major respects: (i) it has dedicated comparative morphology, and (ii) crisp judgments are fully grammatical. On the other hand, Nez Perce disallows differential comparatives, which makes the language resemble Motu and Warlpiri. As a result, there are more nuanced differences within [-DSP] languages than originally expected by Beck et al. (2009).

Because of its lack of differential comparatives, Deal & Hohaus (2019) conclude that Nez Perce is degreeless. An important conclusion that can be drawn from Deal & Hohaus's analysis of Nez Perce is that what really makes a language degreeless is the absence of differential comparatives. This conclusion is consistent with the claim by von Stechow (1984) that differential comparatives require a type of measurement that supports addition: only degree scales support addition, whereas non-degree scales do not. In our analysis of Ch'ol, we will follow Deal & Hohaus (2019) and take the availability, or lack-thereof, of differential comparatives to be the crucial diagnostic determining the setting of the DSP.

2.2 [±DAP]

Languages that make reference to degrees (i.e., languages that have differential comparatives) show variation regarding quantificational binding of variables. Under a generative approach to syntax (Chomsky 1973, 1977; May 1977, and following work) certain elements such as quantifiers (*every, each, more*, etc.) and *wh*-elements are moved from their base syntactic position to a structurally higher one. That operation is assumed to leave a trace which is bound by the moved element. This is illustrated in (11) where XP is displaced and binds its trace, i.e., t_{XP}:

(11) a. $[_{\text{YP}}$ XP Y ZP$]$

b. XP $\ldots [_{\text{YP}}$ t_{XP} Y ZP$]$

Let's suppose that XP in (11) is a Degree Phrase (DegP), and semantically it is degree-denoting. For the DAP to be set to [+], XP has to move leaving a degree variable/trace (within YP) which it will bind from the structurally higher position, as in (11b). This binding operation is referred to as degree abstraction (Heim & Kratzer 1998).[6]

[6]According to Beck et al. (2009), the DAP refers to the availability of having binding of degrees in the Logical Form (LF) level of the representation as a result of a movement operation. If a language allows for such a movement,

The availability of *wh*-degree movement inside the standard of comparison is evidence for degree abstraction. Crucially, for *wh*-degree movement to be possible, the standard of comparison has to be a clause, rather than a bare noun or Prepositional Phrase. English is an example of such a language: it has clausal standards (Lechner 2001, 2004; Bhatt & Pancheva 2004; Bhatt & Takahashi 2011) and *wh*-movement of a DegP (Bresnan 1973; Chomsky 1977; Engdahl 1983). The movement may be overt, as shown by the *wh*-elements *what* and *however much* in (12).

(12) a. Ann is taller than (**what**) Bill is. (Chomsky 1977)
b. It's obviously worth less to the Orioles than **however much money** mega-beer wants to pay them.[7] (*clausal standard*)

In English, we know that the *wh*-phrase has moved to that position because it is island sensitive. This is shown below where movement out of a conjunct is ungrammatical in (13a) and movement from a complex nominal is also ungrammatical (13b). We return to this diagnostic for Ch'ol below.

(13) a. * Ann is taller than (**what**) Bill is [so long and __ wide]. (adapted from Bresnan 1975: ex. 123b)
b. * It's obviously worth less to the Orioles than **however much money** John shared [the rumor [that mega-beer wants to pay them __]].

2.3 [±DegPP]

According to Beck et al. (2009: 29), DSP and DAP are semantic parameters, whereas DegPP is a syntactic parameter.[8] The DegPP, in particular, is concerned with the possibility of gradable predicates having their degree argument position filled (overtly or covertly) with a syntactic constituent that is degree-denoting, i.e., DegP including measure phrases. Thus, a language may allow for binding of degrees at LF (i.e., [+DAP]) as a result of a movement operation, but it may not allow the degree argument position of a gradable predicate to be filled by one of these categories.[9] The constructions that are taken to support a positive setting of the DegPP include DegQs, DegPs (such as explicit measure words) directly modifying Gradable Predicates (GPs) such as adjectives, and subcomparatives.

Gradable adjectives may host degree-denoting constituents in their projected structure. In the case of questions, that position will be occupied by a DegP such as *how (much)* (Bresnan 1973; Corver 1993).[10]

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then they will have exhibit grammatical properties such as inverse scope effects, negative islands, clausal comparatives, etc.

[7] https://www.camdenchat.com/2016/2/20/11077050/oriole-park-at-camden-yards-natty-boh-cans-taken-away

[8] As Beck et al. (2009: 29) explain, (i) "the DAP is a semantic parameter that concerns the syntax/semantics interface, and the mechanisms of compositional interpretation that are available there"; and (ii) "the DegPP is a syntactic parameter, or perhaps a first approach to a family of syntactic constraints that may or may not be operative in a given language."

[9] This is the difference between Russian and English, (see Beck et al. 2009: 23–24).

[10] Bresnan (1973) observes that in cases of AP-ellipsis, *much* is obligatory. This is shown in (i).

(i) John is tall, but I wonder how much so.

Bresnan, and later on Wellwood (2015, 2019), have taken data like (i) to argue that the degree morpheme *much* is underlyingly present with adjectives in the positive form, even if it is not pronounced.

(14) a. How tall is John? (*Degree Question*)
b. $[_{AP}$ $\underbrace{\text{how}}_{\text{DegP}}$ $[_{A'}$ $\underbrace{\text{tall}}_{\text{A}}$]]

The same syntactic position that *how* occupies in (14b) can be occupied by other realizations of DegP. For instance, the DegP can be expressed by a vague numerical expression or a precise measure. An example from English is in (15).

(15) a. The table is {this (much)/ a little/ 3 meters} long. (*DegPs modifying AP*)
b. $[_{AP}$ $\underbrace{\{\text{this (much)/ a little/ 3 meters}\}}_{\text{DegP}}$ $[_{A'}$ $\underbrace{\text{long}}_{\text{A}}$]]

Lastly, subcomparatives are no different. These are constructions in which the gradable adjective inside the standard is lexically different from the one in the matrix clause. The gradable adjective inside the standard, however, still hosts a degree-denoting constituent, i.e., a DegP which has been deleted (Bresnan 1973, 1975; Grimshaw 1987; Izvorski 2000). On top of this, the dimension of measurement that each gradable adjective introduces must be the same.[11] This is illustrated in (16), where the DegP is stricken through to indicate it undergoes deletion:

(16) a. The river is longer than the lake is wide. (*Subcomparative*)
b. $[_{\text{standard}}$ than the lake is $[_{AP}$ $\underbrace{\{\sout{\text{that much/how much/to what extent}}\}}_{\text{DegP}}$ $[_{A'}$ wide]]

In (16), the gradable predicate *long* in the matrix clause is directly modified by *-er/more*. While the gradable predicate inside the standard is *wide*, the two measurements are compared on a scale of size/length. Crucially all the constructions in (14)-(16) share the structural property that the specifier position of the gradable predicate, e.g., the specifier of AP in this case, is occupied by a DegP. Since English allows all these constructions, it is classified as [+DegPP].

Other [+DAP] languages like Russian, which have clausal comparatives and thus binding of degree variables (Pancheva 2006), do not accept any of the constructions exemplified in (14)-(16) for English. Thus the data in (17), from Beck et al. (2009), support the observation that in Russian the degree argument position of the gradable predicate cannot be filled by a DegP in the syntax. This makes Russian [-DegPP].

(17) a. *Kakoj divan dlinnblij?
how.M sofa long.M
Intended: 'How long is the sofa?' (*Degree question*)
b. *Sveta 1.62 vysokaya
Sveta 1.62 tall.F
'Intended: Sveta is 1.62 tall' (*DegP modifying the AP*)
c. *Stola dol'she chjem dver' shirokaya
table long.COMPR what.INSTR door wide.F

[11] If the relevant scales do not match, ungrammaticality obtains (Kennedy 1997). See (i):

(i) *The river is $\underbrace{\text{longer}}_{\text{LENGTH/SIZE}}$ than the lake is $\underbrace{\text{old}}_{\text{AGE}}$

'Intended: The table is longer than the door is wide' (*Subcomparative*)

2.4 Summary & Predictions of Beck et al.'s parametric approach

We have shown that languages display a significant amount of variation in the range of degree and measure expressions they allow, and we have discussed a framework proposed by Beck et al. (2009), and subsequent research (Deal & Hohaus 2019), to capture such variation. The framework is couched in terms of the hypothesis that a large number of constructions in a language's grammar is encapsulated in the same abstract parameter. Variation stems from the values that the parameters are set to and the implicational dependencies between them. The typological predictions of this parametric approach are summarized in Table 2.

Table 2: Cross-linguistic variation in parameter settings (adapted from Hohaus et al. 2014)

	[±DSP]			**[±DAP]**	**[±DegPP]**		
	Crisp Judg	**Degree Morph.**	**Differential Compr.**	**Clausal Standard**	**DegQs.**	**DegP with GP**	**SubCompr.**
Motu/Washo	*	*	*	*	*	*	*
Warlpiri	✓	*	*	*	*	*	*
Nez Perce	✓	✓	*	*	*	*	*
Samoan	✓	✓	✓	*	*	*	*
Russian	✓	✓	✓	✓	*	*	*
English	✓	✓	✓	✓	✓	✓	✓

Table 2 indicates the unidirectional implicational ordering in (7b) that is characteristic of the approach. For a language to have binding of degrees (i.e., [+DAP]), it must have lexical items that introduce degree arguments, i.e., it must be [+DSP]; similarly, for a language to have the degree argument position of gradable predicates filled in the syntax (i.e., [+DegPP]) it must have binding of degree variables, i.e., it must be [+DAP]. Given these requirements, there is no language that is [+DegPP] but [-DAP].

Likewise, the clustering property in (7a) is also shown to follow, modulo the micro-variation within the [-DSP]. This micro-variation within [-DSP] languages is problematic for the approach sketched by Beck et al. But there is a solution to the issue, which we propose here. Given the finer-grained differences within [-DSP] languages, we might want to consider these three parameters {[DSP], [DAP], [DegPP]} as macro-parameters in the sense of Baker (1996, 2008a): the parameters that are directly associated with the underpinnings for human language and have the largest impact on the grammatical architecture. In the case at hand, these parameters are formulated in relation to very general requirements on the formal realization and expression of degrees in a given language. As Baker (2008a) argues, the model can still accommodate finer-grained variation by combining macro-parameters and micro-parameters. The latter strongly restricts what can vary to a small, usually lexically, defined subclass of expressions. Such a way of thinking makes further implicational predictions, as illustrated in (18):

(18) a. Macro-parametric generalization: If a language has differential comparatives, i.e., it is [+DSP], it will also have dedicated comparative morphology and crisp judgments.

b. Micro-parametric generalization: If a language is [-DSP], i.e., it lacks differential comparatives, but has a dedicated comparative morpheme, it will also have crisp judgments.

The hierarchical implicational dependencies first proposed by Beck et al. (2009) and those in (18), based on Deal & Hohaus (2019), make the parametric approach attractive for modeling variation. In the remainder of the paper, we apply this parametric approach to Ch'ol in order to accomplish the two goals mentioned in Section 1: (i) provide a theoretically informed description of Ch'ol grammar of measurement and comparison, and (ii) determine Ch'ol's place in the typological space and the implications for the parametric approach in Beck et al. (2009). We conclude by proposing an updated approach that combines macro-parameters identified by Beck et al. with a series of micro-parameters, which, in tandem, can capture the cross-linguistic variation we observe.

3 Background and methodology

3.1 General background

The empirical base of this study is Ch'ol, a Mayan language of the Ch'olan-Tseltalan subgrouping spoken in southern Mexico. According to the recent Mexican census, there are about 254,000 speakers (INEGI 2020) in the states of Tabasco, Campeche and Chiapas, with Chiapas being the state with the largest Ch'ol-speaking population. Though Ch'ol is still being learned by multiple generations, it is being replaced by Spanish in many contexts, such as in the proceedings of local governments.

Like other Mayan languages, Ch'ol is verb-initial, head-marking and ergative-absolutive (see England 1991; Aissen et al. 2017 for overviews of Mayan languages). Agreement for internal and external arguments is indexed on verbs. We use theory-neutral Mayanist labels for person markers: "set A" forms mark possessives and ergative arguments and "set B" forms index absolutive arguments, exemplified in (19).

(19) a. Tyi majli-**yety**.
PFV go-**B2**
'You left.'

b. Tyi **j-**k'ele**-yety**.
PFV **A1**-see-**B2**
'I saw you.'

Third person set B markers are null and we do not include them in the glosses. Stem-internal morphology that is not relevant to the discussion at hand (e.g., derivational morphemes, stem-final "status suffixes", and name prefixes such as *x-* or *aj-*, which appear on proper names) will not be fully parsed out.

Ch'ol is a predicate-initial language (Coon 2010; Vázquez Álvarez 2011). The basic constituent order for transitive clauses is VOS for when an object appears without any overt determiners or D-like elements such as demonstratives or overt possessors (Coon 2010; Little 2020), shown in (20a). When the object has material in the determiner layer or an overt possessor, VSO constituent order is triggered instead (Coon 2010; Little 2020), as illustrated in (20b). We do not gloss these out in the paper for simplicity.

(20) a. Tyi [$_V$ i-kuchu] [$_O$ si'] [$_S$ xRosa].
PFV A3-carry wood Rosa
'Rosa carried wood.' VOS

b. Tyi [$_V$ i-kuchu] [$_S$ xRosa] [$_O$ jiñi si'].
PFV A3-carry Rosa DET wood
'Rosa carried the wood.' VSO

The predicate-initial status of Ch'ol is also maintained in copular constructions. For instance, in each example in (21) the copula is null and the predicate—in each case an AP—precedes the NP, which is the subject of the predication.

(21) a. [$_{PRED}$ Chañ] [$_S$ xWañ].
tall Juan
'Juan is tall.'

b. [$_{PRED}$ Weñ ch'och'ok] [$_S$ ili xch'e'].
very small DEM bird
'This bird is very small.

There are number of factors including, but not limited to, focus, topic, givenness, and definiteness that can have effects on the canonical predicate-initiality. For example, when the subject is focussed, it appears before the predicate in the specificational copular structures illustrated in (22).

(22) [$_S$ **AjMaria**] [$_{PRED}$ jiñi ajchoñ-waj].
Maria DET AGT.sell-tortilla
'The tortilla-seller is Maria.' Coon & Martinović (2023: ex. 19b)

This pre-predicative position is also associated with topic or *wh*-movement in Mayan languages, as discussed in Aissen (2017). These constituent order facts are relevant as we will often find that the subject of the sentences in comparative structures appears before the predicate (e.g., verbal or adjectival). This is likely due to the fact that the individual being compared is (pragmatically) focused or topicalized in many cases.

3.2 Data and methodology

Cited data and insight come from a selection of documents such as pedagogical materials in Ch'ol, naturalistic speech, the Ch'ol-Spanish dictionary (Aulie & Aulie 1978), and other texts, such as Whittaker & Warkentin (1965). Uncited data come from original fieldwork across three fieldwork trips occurring between 2022 and 2024. These data include elicited data, naturally occurring data, and data from two production tasks that were transcribed and translated by native speakers. While we recognize that translated documents from Spanish may have influenced comparatives – Spanish has a rich comparative morphology (Price 1990; Brucart 2003; Beck et al. 2009; among others) – we have tried to supplement facts found in translated documents with elicitations with monolingual and bilingual speakers.

We conducted context-based elicitations in Chiapas, Mexico, following guidelines in Matthewson (2004) and Bochnak & Matthewson (2020), with three groups of speakers, including monolingual Ch'ol speakers, from two places. The initial elicitation in 2022 was conducted in Ch'ol at the home a couple, husband and wife, and their daughter. We are grateful to Enrique Arcos

López, Celia Álvaro Arcos, and Shenia Arcos Álvaro for their discussion of the Ch'ol data. We also gratefully acknowledge discussion of the data with Morelia Vázquez Martínez and Nicolás Arcos López, both bilingual in Spanish and Ch'ol. We found degree morphology with all speakers. Initial context-based elicitations sessions were conducted in 2022, with follow up sessions to check data or gather new data in 2023 and 2024.

We used a storyboard, "The Real Winner", housed at Tübingen-Manchester Elicitation Materials for Linguistic Fieldwork, with two speakers who speak Spanish.[12] We translated the storyboard text into Spanish, then narrated the story in Spanish with the accompanying pictures and text. The speakers saw the pictures again, this time with no text and without hearing the Spanish, and narrated the story back to us in Ch'ol.

3.3 Basics of the comparative structure in Ch'ol

Kockelman (2019)'s recent study on Q'eqchi's borrowing of Spanish *más* 'more' is the most in-depth piece of work we have found on comparision and degrees in a Mayan language. Other than that, we have not found any other dedicated work on comparison and degree constructions in Mayan languages. Vázquez Álvarez (2011), the most recent and comprehensive grammar of Ch'ol, does not discuss comparative constructions. Martínez Cruz (2007: 95-96), investigating the Tila dialect of Ch'ol, discusses adjectives and property concepts and illustrates an A-NOT-A comparative strategy, similar to the Motu case from (6). An example is given in (23) from Martínez Cruz (2007), where *ñoj* is an intensifier.[13] Note that the subject *joñoñ* 'I' is in the pre-predicate focus position.

(23) Joñoñ ñoj kolem-oñ jatyety ma'añ.
PRON.1 very big-B1 PRON.2 NEG
Lit. 'I am very big, you are not'
'I am bigger than you.' Martínez Cruz (2007: 96)

As we will show in subsequent sections in more detail, Ch'ol does have a comparative construction that requires the presence of dedicated comparative morphology, instantiated by both the comparative marker and the standard marker. An example of this construction is in (24), adapted from a primary school textbook in Ch'ol.[14]

(24) Jiñi sajk' **ñumeñ** sejb (**kej**) bajche' sajbiñ tyi ajñel.
DET grasshopper more fast than how weasel PREP run
'The grasshopper is faster than the weasel at running.'[15]

[12] https://fieldworkhub.wordpress.com/2018/03/12/the-real-winner/.

[13] We also see the strategy of using the intensifier *ñoj* in superlatives, as in (i), from a recording of the storyboard "The Real Winner'. The data is from the Tila dialect.

(i) ñoj chañ=bä tye' mi i-k'äjkel jiñ mi i-jotye'.
very tall-REL tree IPFV A3-climb DET IPFV A3-win
'Who climbs the tallest tree wins.'

[14] The original source does not have *kej* 'that/than' overtly. But when we checked with native speakers whether overt *kej* was grammatical in (24), all our consultants agreed it is. Thus, we have adapted the example from the original source accordingly to reflect native speaker judgments.

[15] https://dgei.basica.sep.gob.mx/files/fondo-editorial/lengua-materna-lengua-indigena/libros-de-literatura/lmli_ll_00003.pdf.

The example in (24) is an adjectival comparative: the compared category is the AP *sejb* 'fast'. Ch'ol expresses comparison periphrastically, rather than synthetically on the category being compared. *Ñumen* 'er/more' is the comparative morpheme and the standard of comparison is [*kej bajche'... ajñel*]. In this case the standard morpheme *kej* 'than', which is optional, introduces the standard of comparison.[16] The example is comparing the grasshopper's speed to the weasel's.

Morphologically, *ñumeñ* is made up of the root *ñum* 'pass' and *-eñ*, which derives stative (participial) readings (Vázquez Álvarez 2011: 128).[17] We note that the strategy used in Ch'ol—the root *ñum* for 'pass' plus additional derivational morphology—is a common one cross-linguistically. As reported in Kuteva et al. (2019: 311), the word for 'pass' in many languages grammaticalizes into a comparative.[18]

The word *ñumeñ* is not found in the dictionary of Aulie & Aulie (1978), but Whittaker & Warkentin (1965) list *ñumeñ* in their glossary of *Chol texts of the Supernatural* and translate it into Spanish as *más* 'more'. Occurrences of *ñumeñ* can be found in the translation of the New Testament in Ch'ol, first published in 1960 with a third edition published in 2010 (Wycliffe & La Liga Bíblica 2010), given in (25).

(25) a. Tyal=tyo tyi k-paty **ñumeñ** p'ätyäl=bä.
come=STLL PREP A1-back more strong=REL
'The stronger one is coming after me.' Wycliffe & La Liga Bíblica (2010: 4)

b. **Ñumeñ** mi kaj iy-ubiñ-ob wokol tyi i-k'iñilel tyoj-mulil jiñi wiñik-ob
more IMPFV PROS A3-feel-PL difficult PREP A3-day pay-debt DET man-PL
x'ixik-ob ...
woman-PL
'The men and women will have more hardship on the day of judgement.' Wycliffe & La Liga Bíblica (2010: 16)

To our knowledge, Proto-Mayan did not have a comparative morpheme—we did not find one in Kaufman & Justeson (2003)'s *Preliminary Mayan Etymological Dictionary*. Tseltal, a closely related Mayan language, also of the Ch'olan-Tseltalan subgrouping spoken in the same region as Ch'ol, does not seem to have a dedicated comparative morpheme like *ñumeñ*; instead, it utilizes the A-NOT-A strategy, borrows the clausal comparative strategy from Spanish *mas...kej* (*más...que*, 'more than'), or employs *xan* 'again' (Polian 2013: 772).

[16] *kej* comes from the Spanish complementizer *que* 'that'.

[17] *Ñumeñ* can also appear as a prefix to a verb, shown in (i), from a book written in Ch'ol on orthographic conventions.

(i) Cha'añ mi la-k-**ñumeñ**-ch'ämbeñ i-sujm.
so.that IPFV PL.IN-A1-more-take A3-truth
'So that we better understand.' (INALI 2011: 23)

We discuss *ñumeñ* as a free morpheme rather than its status inside the verbal domain.

[18] As a reviewer suggests, given its distribution it seems that *ñumeñ* is not a verb meaning 'exceed' or 'surpass'. Thus, this construction, though related to the root 'pass', is not an exceed-comparative construction. We are grateful to this reviewer for this observation.

4 PARAMETER SETTINGS FOR CH'OL

Below we present evidence that Ch'ol has a positive value for all the parameter settings described in section 2 from Beck et al. (2009). We will focus primarily on Tila Ch'ol but we also discuss San Miguel Ch'ol (Tumbalá) when relevant.

4.1 Ch'ol is [+DSP] and [+DAP]

Motivating a positive setting of the [DSP] As formulated in (18a) based on Deal & Hohaus's (2019) findings, the crucial property for a positive setting of the DSP macro-parameter is the availability of differential comparatives. Here we show that, in addition to differential comparatives, Ch'ol has the other hallmark properties included in Table 6 (e.g., dedicated comparative morphology, and crisp judgments).

We have already observed that Ch'ol has dedicated comparative morphology, i.e., *ñumeñ* and *kej*. *Ñumeñ* is not found in any other syntactic context. Its sole function is to mark comparison and establish an ordering relation between two properties. Besides, like most comparative morphemes across languages, *ñumeñ* can occur cross-categorically: it can be used in AP, NP and VP comparatives, shown in (26)-(28).[19]

Kej introduces the standard of comparison, and while it may be optionally null there is a preference for it being overtly expressed.

(26) Jiñi alob, **ñumeñ** chañ **kej** bajche' jiñi xk'äläl
DET boy more tall that how DET girl
'The boy is taller than the girl' (*AP comparative*)

(27) AjJuana, **ñumeñ** juñ tyi i-pejkä tyi lunes **kej** bajche' ajMaria tyi martes.
Juana more book PFV A3-read PREP Monday that how Maria PREP Tuesday
'Juana read more books on Monday than Maria did on Tuesday.' (*NP comparative*)

(28) **Ñumeñ** mi a-cha'leñ ajñel tyi lunes **kej** bajche' ajRosa tyi martes.
more IPFV A2-LV run PREP Monday that how Rosa PREP Tuesday
'You run more on Mondays than Rosa does on Tuesdays.' (*VP comparative*)

In (26), *ñumeñ* is modifying the AP *chañ* 'tall', and the correlate of the pivot is *jiñi xk'äläl* 'the girl' and the referent compared to the pivot is the definite NP *jiñi alob* 'the boy', in the matrix clause. In (27), *ñumeñ* is modifying the NP *juñ* 'book', which is countable and number neutral; the pivots are *ajMaria* 'Maria' and *tyi martes* 'on Tuesday' whose matrix clause correlates are *AjJuana*

[19]There were four main consultants for the Tumbalá dialect. Three came from San Miguel, Salto de Agua. We found that only the San Miguel speakers allow the standard to be introduced with *yik'oty*, a coordinator as in (ia). If comparing between two speech act participants, *yik'oty* may appear with different agreement markers as in (ib) where it appears with set A and set B markers. This is in contrast to (ib) where *ik'oty* appears with third person agreement. Given the dialectal variation of *yik'oty* as introducing the standard, we leave this issue for future research.

(i) a. Jiñi alob ñumeñ chañ **y-ik'oty** jiñi xk'äläl
DET boy more tall A3-with DET girl
'The boy is taller than the girl'

b. Ñumeñ chañ-oñ **k-ik'oty-ety**.
more tall-B1 A1-with-B2
'I am taller than you.' (*San Miguel dialect only*)

'Juana' and *tyi lunes* 'on Monday'. What is being compared is the number of books that Juana read on Monday and the number of books that Maria read on Tuesday. In (28), the compared category is the VP, the pivots are *ajRosa* 'Rosa' and *tyi martes*, and their correlates are the null second person pronoun and *tyi lunes*. In all the three examples, *ñumeñ* precedes the compared category, which in the case of (28) is the whole VP complex. These word patterns are summarized in (29), where > is read as 'linearly precedes.'

(29) a. *ñumeñ* > AP/NP.
b. *ñumeñ* > Aspect > light V > lexical V.

The comparative morpheme *ñumeñ* may not always be overt. In fact, it can be null as long as the standard of comparison is overt. This is illustrated in (30).

(30) [There are two cats: an orange cat and a black one]
k'äñk'äb=bä mix ñoj bojyem=ix y-ilal [$_{\text{standard}}$ **kej bajche'** i'ik'=bä]
yellow=REL cat very tired=already A3-seem that how black=REL
'The orange cat seems a bit more tired than the black one.'

In (30), *ñumeñ* is not overt but the standard of comparison introduced by *kej* is.[20] The fact that the standard of comparison in (30) is overt is enough for Ch'ol speakers to interpret the sentence as a comparative. However, if neither *ñumeñ* nor the standard of comparison are overt, the sentence lacks a comparative interpretation. In other words, at least one of the two pieces that morphosyntactically mark comparison must be overt for the construction to be considered a comparative. This is not an uncommon strategy cross-linguistically (Hindi, Bhatt & Takahashi 2011; Samoan, Hohaus 2015; Hebrew, Schwarzschild 2014; Nez Perce, Deal & Hohaus 2019). The relevant Ch'ol example is shown in (31).

(31) [The same two cats from (30). The black one seems tired.]
a. K'äñk'äñ=bä mix ñoj bojyem=ix y-ilal
yellow=REL cat very tired=already A3-seem
#'The orange cat seems a bit more tired (than the black one).'
✓'The orange cat seems a bit tired.'
b. I'ik'=bä mix ñoj bojyem=ix y-ilal
black=REL cat very tired=already A3-seem
#'The black cat seems a bit more tired (than the orange one).'
✓'The black cat seems a bit tired.'
c. I'ik'=bä mix ñoj **ñumeñ** bojyem=ix y-ilal
black=REL cat very more tired=already A3-seem
✓'The black cat seems a bit more tired (than the orange one).'
#'The black cat seems a bit tired.'

[20] *kej* introducing the standard may still be null in examples like this. Like in languages such as Russian, the standard of comparison may be directly marked by the *wh*-expression and the pivot(s). *Bajche'* can appear with set B markers or introduce the full pronoun, as shown in (i), also from the San Miguel dialect.

(i) Ñumeñ chañ-oñ bajche'-ety / bajche' jatyety.
more tall-B1 how-B2 how PRON.2
'I am taller than you'

d. I'ik'=bä mix ñoj bojyem=ix y-ilal **kej bajche' k'äñk'äñ=bä**
black=REL cat very tired=already A3-seem than how yellow=REL
✓'The black cat seems a bit more tired than the orange one.'
#'The black cat seems a bit tired.'

(31a) lacks both *ñumeñ* and the *kej*-standard and it is unacceptable with a comparative interpretation. (31b) is parallel to (31a) except that it uses the 'black cat' as subject. This is to show, following a suggestion from an reviewer, that this sentence also lacks a comparative reading in the given context. In (31c), *ñumeñ* is overt and the standard of comparison is absent. Crucially, the comparative interpretation is available. Likewise, if the *kej*-standard is overt but *ñumeñ* is absent, as in (31d), the same comparative interpretation is obtained.

In addition to having dedicated comparative morphology, Ch'ol allows for crisp judgments. While the sentence in (26) is felicitous in a context where the boy is 1.90 meters tall and the girl is 1.70 meters tall, it is also felicitous in a context where the boy is 1.90 meters tall and the girl is 1.89 meters. That is, it is acceptable to utter (26) even if there is a minute difference between the tallness of the correlate and that of the pivot. Crucially, the fact that the correlate (i.e., *the boy*) is taller than the pivot (i.e., *the girl*) does not entail that the pivot is not tall. This is also evidenced by example (32) where the comparison by height is followed by asserting that the pivot is in fact tall. It is also possible to assert that the correlate, Juan, is not tall.

(32) [the boy in (26) = Juan; the girl in (26) = Maria]

a. XWañ ñumeñ chañ kej bajche' ajMaria
Juan more tall that how Maria
'Juan is taller than Maria . . . '

b. Pe ajMaria mach=me pek', chañ=äch ja'el
but Maria not=MIR short tall=AFF also
'. . . But Maria isn't short, she is also tall.' possible continuation 1

c. Pe xWañ mach=me chañ
but Juan NEG=MIR tall
'. . . But Juan is not tall' possible continuation 2

The crucial property to determine whether Ch'ol is [+DSP] or not is differential comparatives. If they are grammatical, we can confidently set the parameter to a positive value (Deal & Hohaus 2019). As illustrated in (33), Ch'ol comparatives allow overt expression of the difference between two measurements.

(33) [Juana read 4 books and Maria read 2]
AjJuana, ñumeñ [(**tyi**) **ts'äkä cha'-p'ej**] juñ tyi i-pejkä kej bajche' ajMaría.
Juana more PREP exactly two-CLF book PFV A3-read that how Maria

'Juana read exactly two more books than Maria.'

In (33), we see the active players of the comparative constructions we have presented so far: *ñumeñ* and the standard of comparison introduced by *kej*. Additionally, we observe the constituent *tyi ts'äkä cha'-p'ej* 'PREP exactly two-CLF'. This constituent denotes the exact difference between the number of books Juana read and the number of books Maria did. In this case, the number is 2.

[21] Therefore, it is the differential argument of *ñumen* and it is composed of a numeral, its classifier and the adverbial *ts'äkä* 'exactly'. The differential may be optionally introduced by the preposition *tyi*. Preposition drop is an independently attested phenomenon in closely related languages (p.c. Gilles Polian, December 2023). Our findings reveal that the presence or absence of *tyi* does not have an impact on the constituent's status as *ñumeñ*'s differential.

[21] A reviewer wonders why we must take measuring of cardinalities as evidence for the language being degreeful, commenting that in order to determine whether a language makes reference to degrees, one must focus on expressions that introduce non-cardinal dimensions of measurement such as volume, weight, length or height among others. We follow Fox & Hackl (2006); Bale (2008); Bale & Barner (2009); Wellwood (2019) who argue that cardinality involves a relation between pluralities and degrees. As observed by Rullmann (1995) and Fox & Hackl (2006) *wh*-phrases that invoke degrees cannot move across negation due to a violation of a maximality requirement. Thus, if only non-cardinality dimensions invoke degrees, we expect an asymmetry. As the Ch'ol examples in (i) and (ii) show, the prediction is not borne out: *wh*-phrases that invoke both a cardinality and a non-cardinality interpretation are unacceptable across negation.

(i) a. Bajche' y-oñ-lel kajpe' mi i-jap ajMaria tyi säk'añ?
how A3-much-NML coffee IPFV A3-drink Maria PREP morning
'How much coffee does Maria drink in the morning?' (volume, #cardinality)

b. ??Bajche' y-oñ-lel kajpe' ma'añik mi jap ajMaria tyi säk'añ?
how A3-much-NML coffee NEG IPFV A3-drink Maria PREP morning
'How much coffee does Maria not drink in the morning?'
Speaker comment: it's weird, you need to really think about that, it doesn't make sense . Translated from the Ch'ol: *Lekojach, much' mi aweñ ña'tyañ mach jiñbä isujmlel*.

(ii) a. Jay-p'ej juñ mi i-pejkañ ajMaria tyi ak'lel?
how.CARD-CLF book IPFV A3-read Maria PREP night
'How many books does Maria read at night?' (#volume, cardinality)

b. ??Jay-p'ej juñ ma'añik mi i-pejkañ ajMaria tyi ak'lel?
how.CARD-CLF book NEG IPFV A3-read Maria PREP night
'How many books does Maria not read at night?'
Speaker comment: Cannot respond *cha'p'ej* 'two-CLF', it is strange, how do we know if she didn't read two? how do we know, it's weird...it's like we feel it sounds ok, but it's not. Translated from the Ch'ol: *meru ts'itya' raro, bajche' mi lakäl che' cha'p'ej mi ma'añik mi ileeriñ, beje lakujil, lekojach...weñ lakubiñ pe ma'añik.*

We can refer to these *wh*-phrases as *wh*-degree expressions. They contrast with other *wh*-phrases that do not invoke degrees such as *what* in (iii).

(iii) a. Chuki ma'añik mi ijap ajMaria tyi säk'añ?
what NEG IPFV A3-drink Maria PREP morning

'What does Maria not drink in the morning?'
Possible answer: *kajpe'* 'coffee'

b. Chuki ma'añik mi i-pejkañ ajMaria tyi ak'lel?
what NEG IPFV A3-read Maria PREP night
What does Maria not read at night?
Possible answer: *juñ* 'books'

Based on the data we conclude that eliciting data with comparatives or quantity adjectives whose interpretation is in terms of cardinality is as strong evidence for the availability of degrees as the counterpart data whose interpretation is in terms of non-cardinality.

In addition to differential comparatives, Ch'ol can make reference to degrees via MP-comparatives: the standard of comparison introduces an MP as its complement. In fact, Ch'ol has a dedicated MP-comparative structure. While the comparative morpheme is still *ñumeñ*, the morpheme introducing the standard is not the complementizer *kej*, but the preposition *tyi*. As opposed to *kej*-standards, *tyi*-standards are more restricted: they are incompatible with *bajche'* and are acceptable if and only if their complement is an MP. These contrasts are shown in (34).

(34) a. AjJuana, ñumeñ [**tyi** cha'-p'ej juñ] tyi i-pejkä.
Juana more PREP two-CLF book PFV A3-read
'As for Juana, the number of books that she read was more than two (books).'

b. *AjJuana, ñumeñ [tyi bajche' cha'-p'ej juñ] tyi i-pejkä.
Juana more PREP how two-CLF book PFV A3-read
Intended: 'As for Juana, the number of books that she read was more than two (books).'

c. *AjJuana, ñumeñ juñ [tyi bajche' ajCarol] tyi i-pejkä.
Juana more book PREP how Carol PFV A3-read

d. *AjJuana, ñumeñ juñ [tyi ajCarol] tyi i-pejkä.
Juana more book PREP Carol PFV A3-read
Intended: 'Juana read more books than Carol did.'

The MP can be realized by a numerically modified count noun as in (34a). But it can also be realized by a numeral plus classifier alone as in (35), and by a numerically modified measure nouns as in (36). All these properties make the Ch'ol MP-comparatives resemble MP-comparatives in other languages (Pancheva 2006; Toquero-Pérez 2023).[22]

(35) [Talking about books.]

Ñumeñ [tyi cha'-k'ejl] ta' k-pejka juñ ak'bi.
more PREP two-CLF PFV A1-read book yesterday

'I read more books than two.' (*Num*-CLF)

(36) ñumeñ [tyi cha-p'ej metru]
more PREP two-CLF meter
'more than two meters' (*Num*-CLF + *Measure N*)

Motivating a positive setting of the [DAP] In order to determine if Ch'ol is [+DAP] we need to find evidence for Degree Abstraction. An important diagnostic was the availability of clausal standards that exhibit the displacement of a *wh*-word binding a degree variable created after the

[22]It is worth noting that the meanings of (34a) and (35) are truth-conditionally equivalent modulo the participants involved. An accurate paraphrase for both sentences is the following: the number of books that the reader read was bigger than 2 books. In other words, the sentences can be uttered if the reader read 3 or more books. However, the sentences are both false, and ungrammatical, if what is intended is that the reader read 2 books and something else (maybe a magazine or a newspaper). These constructions, which are interpreted along a cardinality scale, have been argued to involve two identical NPs, one of which may be deleted: *more books than 2 books*. Thus, as Toquero-Pérez (2023: 22) puts it, what we are comparing is "the degree of cardinality that *n*-books have to the degree of cardinality that *n'*-books have [where *n* stands for a cardinal number]."

movement.

With the exception of MP-comparatives whose standard is introduced by *tyi*, in all the other examples we have provided so far, the standard of comparison may be introduced by *kej* which is followed by the *wh*-element *bajche'* 'how'. This standard of comparison is always a full clause. First, *wh*-words in Ch'ol like *bajche'*, must move to the left periphery of the clause in regular interrogative sentences (see discussion in Vázquez Álvarez & Coon 2021). Extracting *bajche'* out of a conjunct (introduced by *yik'oty* 'and' in Ch'ol) results in ungrammaticality, as expected if this operation involves movement. This is shown in the pair in (37), from the Tumbala dialect.

(37) a. [Bajche' y-oñ-lel waj]$_i$ ta' a-k'uxu _$_i$?
how A3-much-NML tortilla PFV A2-eat
'How many tortillas did you eat?'

b. *[Bajche' y-oñ-lel waj]$_i$ ta' a-k'uxu [gayeta yik'oty _$_i$] ?
how A3-much-NML tortilla PFV A2-eat cookie and
*'How many tortillas did you eat cookies and ?'

We can then hypothesize that the situation with *bajche'* inside the standard parallels movement of *bajche'* in matrix questions. Evidence for the fact that *bajche'* moves to this position inside the standard of comparison comes from island violations. In (38), we observe that extracting *bajche' (NP)* from one of the conjuncts results in ungrammaticality, as per the ungrammatical (38b).

(38) a. Ñumeñ juñ ta' k-mäñä [kej bajche'$_i$ chu ta' a-mäñä _$_i$].
more book PFV A1-buy that how what PFV A2-buy
'I bought more books than {what/ however many} you bought.'

b. *Ñumeñ juñ ta' k-mäñä [kej bajche'$_i$ chu ta' a-mäñä [revista yik'oty _$_i$]].
more book PFV A1-buy that how what PFV A2-buy magazine and
*'I bought more books than {what/ however many} you bought magazines and .'

This data is similar to the island data we discussed for English in (13). We can thus safely conclude that the *wh*-element moves and binds the degree variable left in its base position.

Additional evidence that *kej*-standard phrases are clausal is based on two other facts: the standard can host multiple pivots, as in (24), (27) and (28); and it can also host non-nominal pivots. In (39), the pivot is a temporal PP. None of these properties would be possible if *kej* did not introduce a clause (Lechner 2001, 2004, 2020; Bhatt & Takahashi 2011). Given these sets of facts, we can conclude that Ch'ol is also [+DAP].[23]

(39) [I sold 10 potatoes on Monday; I sold 5 on Tuesday]

Ñumeñ tyi k-choño papas tyi lunes kej bajche' tyi martes.
more PFV A1-sell potatoes PREP Mon that how PREP Tues

'I sold more potatoes on Monday than on Tuesday.'

The parameter settings demonstrated for Ch'ol up to this point are in Table 3. Ch'ol, regardless

[23]In addition, in (26) the copula is null and the subject of the predication is preceded by its predicate, which is as expected given the canonical predicate initial order in the language.

of the variety, allows differential comparatives supporting a positive value for [DSP]. In addition, it has dedicated comparative morphology and crisp judgments. Overt displacement of *bajche'* binding a degree variable within the clausal standard supports a positive setting for [DAP] in Ch'ol as well.[24]

Table 3: Parameter settings for Ch'ol (to be updated)

	[±DSP]			[±DAP]	[±DegPP]		
	Crisp Judg.	**Degree Morph**	**Differential Compr.**	**Clausal Standard**	**DegQs.**	**DegPs with GP**	**SubCompr.**
Ch'ol	✓	✓	✓	✓	TBD	TBD	TBD

A note on Spanish *más*. Though we do not concentrate on it, we would like to mention that Spanish comparative morpheme *más* has been borrowed into Ch'ol as *mas*, but does not behave like a comparative morpheme in Ch'ol. This claim is based on three arguments.[25] First, *mas* can only modify adjectives in Ch'ol, as seen in (40). This restricted distribution contrasts with the cross-categorial status of *ñumeñ*, as seen in (26)-(28). As we will show below, the example in (40a) is unacceptable with a comparative meaning.

(40) a. mas chañ(=ix)
MÁS tall=already
'taller'
✓'very/incredibly tall'
b. *mas juñ
MÁS book

Second, when an adjective is modified by *mas*, the positive meaning of the adjective is entailed. This is evidenced by the fact that (41) cannot be followed by 'but he is not tall' without giving rise

[24]The A-not-A strategy exists in Ch'ol as well, show in (i)

(i) [Comparing two three-year old girls (Alice & Carolita) who are very close in height. Alice is just a little taller (≈1cm) than Carolita]

Chañ ajAlice, pek' xCarolita.
tall Alice short Carolita

Lit. 'Alice is tall, Carolita is short.' (*A*-NOT-*A*)
'Alice is taller than Carolita.'

As the focus of this paper is on *ñumeñ*, for reasons of space we simply note that this other strategy exists.

[25]We have found that both monolingual and bilingual speakers use *ñumeñ*. Certain sociolinguistic factors of using *ñumeñ* versus *mas* also seem to be at play. When speaking in Ch'ol with a bilingual speaker, one of the authors noticed a possible instance of correction with *mas* versus *ñumeñ*, suggesting an awareness of the "correct" Ch'ol way to express comparatives. When driving down a road, talking about the state of the road, which was narrow, the speaker said *añ* ***mas*** *pimbä* 'there are wider ones' then seemed to correct *mas* to *ñumeñ*, saying—*jiñi....añ* ***ñumeñ*** *pimbä* 'I mean...there are wider ones'.

to a contradiction. The presence of *ñoj* in (41) is not driving the entailment. If we change *mas* to *ñumeñ* the entailment disappears, as shown in (42).[26]

(41) a. ñoj mas chañ=ix ajWañ
very MÁS tall=already Juan
'Juan is so tall...'

b. #Pe ajWañ mach=me chañ
but Juan NEG=MIR tall
'but Juan is not tall.'

(42) a. ñoj ñumeñ chañ=ix ajWañ
very more tall=already Juan
'Juan is so much taller.'

b. Pe ajWañ mach=me chañ
but Juan NEG=MIR tall
'But he is not tall.'

The examples in (41) are thus crucially different from the *ñumeñ*-based comparatives in (32) and (42). The latter with *ñumeñ* did not entail that the individual instantiated the property denoted by the positive form of the adjective.

The third property is that *mas* cannot introduce a standard of comparison like *ñumeñ* does. For example, it is ungrammatical with *tyi*-standards, as illustrated in (43).

(43) *mas tyi cha-p'ej metru
MÁS PREP two-CLF meter
Intended 'more than 2 meters'

While it looks like *mas* can itself introduce *kej*-standards in (44), this is only apparent. We observed in (31) that *ñumeñ* may be null as long as the standard is overt. When *mas* occurs with a clausal standard, the meaning is that of a differential comparative with an intensifier; this contrasts with (30). Additionally, this is the same interpretation that arises when both *mas* and *ñumeñ* co-occur, as seen in (45).

(44) k'äñk'äb=bä mix ñoj **mas** bojyem=ix y-ilal [kej bajche' i'ik'=bä]
yellow=REL cat very MÁS tired=already A3-seem that how black=REL
'The orange cat seems so much more tired than the black one.'

(45) [Both Juan and Maria bought cars yesterday]

Abi ajWañ tyi i-mäñä juñ-kojty karu pe **mas ñumeñ** chañ [kej bajche'
yesterday Juan PFV A3-buy one-CLF car but MÁS more tall that how

[26]Note that the same is true for English. The presence or absence of degree intensifier *so* does not affect the entailment pattern of the positive form of the adjective:

(i) a. This baby giraffe is (so) incredibly tall, but #he is not tall.
b. That other baby giraffe is so much taller, but he's not tall.

ta'=bä i-mäñä sajmäl i-cha'añ ajMaria]
PFV=REL A3-buy earlier A3-PREP Maria

'Yesterday Juan bought a car much taller than the one that Maria bought yesterday.'

Based on these facts, we can safely conclude that *mas* does not have comparative syntax and semantics in Ch'ol. Instead, we speculate that *mas* has been borrowed as an intensifier. This is very much like the situation reported by Kockelman (2019) for *mas* in Q'eqchi, a Mayan language spoken in Guatemala.

4.2 Ch'ol is [+DegPP]

We have observed in the previous section that Ch'ol has degrees in its ontology, as indicated by the availability of differential comparatives. Comparison in Ch'ol may be expressed overtly via a dedicated comparative morpheme *ñumeñ*; it enables overt displacement of a *wh*-degree morpheme, *bajche'*, triggering degree abstraction in the clausal standard of comparison. Now the question is whether Ch'ol gradable predicates allow their degree argument to be saturated by a DegP, that is, by *wh*-degree phrases, mensural nouns, numerals, or numerically modified nouns among other constituent types.

Ch'ol distinguishes morphosyntactically between adjectival and nominal gradable predicates. The former occur "bare", with no special morphological marking, like *chañ* 'tall' or *tyam* 'deep'. The latter are morphologically marked. A nominalizing suffix *-(l)el*, which has possessive semantics (Little 2018), is attached to what looks like the positive form of the adjective. These nominal gradable predicates obligatorily have a possessor prefix when used predicatively. This is exemplified in Table 4, where *i-/y-* is the third person possessive prefix.

Table 4: Nominalized gradable predicates

	Ch'ol	**Translation**
a.	i-chañ-lel	'its height'
	A3-tall-NML	
b.	i-tyam-lel	'its depth'
	A3-deep-NML	
c.	y-oñ-lel	'its amount'
	A3-much-NML	

If the language is [+DegPP], we expect DegPs to occupy the degree argument position of the nominalized gradable predicate. In other words, we would expect DegPs to be part of the constituent that contains the overtly possessed gradable predicate. We show that this prediction is borne out.

The nominalized gradable predicates from Table 4 can participate in the formation of DegQs. DegQs in Ch'ol can be introduced by two *wh*-words: *bajche'* and *jay-*, the interrogative numeral expression. Starting with *bajche'*, this *wh*-element can appear with the nominalized gradable predicate. This is shown in (46) where the base of the nominalized gradable predicate is the quantity adjective *oñ* 'much/many'.

(46) [Bajche' **y-oñ-lel** koya'] tyi y-otsä ajMaria tyi sopa?
how A3-much-NML tomato PFV A3-put Maria PREP soup
'{How much/What amount of} tomato did Maria put in the soup?' (volume, #cardinality)

As in languages like English, the *wh*-element in (46) directly modifies the possessed gradable predicate: the constituent headed by the gradable predicate *y-oñ-lel* 'amount', including its inalienable possessor argument *koya'* 'tomato', is pied-piped to the front of the clause with *bajche'*. The question is asking for the volume of tomato-stuff that Maria put in the soup. Thus, a possible answer is something like *3 kilos-worth* and not *3 individual tomatoes*.

In addition to the question formation strategy with *bajche'* and a nominalized gradable predicate (marked with *-(l)el*), a degree question may be introduced by the numeral *wh*-word *jay-*. There are two interesting differences between *jay-* and *bajche'*-DegQs: (i) *jay-* must co-occur with the numerical classifier while *bajche'* cannot; and (ii) only *jay*-CLF may be overtly followed by a mensural noun. These differences are shown in (47) and (48) respectively.

(47) a. Jay*(-**p'ej**) i-chañ-lel ajWañ?
how.CARD-CLF A3-tall-NML Juan
Lit. 'How many is Juan's height?'

'How many meters tall is Juan?'

b. Bajche'(* **-p'ej**) i-chañ-lel ajWañ?
how -CLF A3-tall-NML Juan
Lit. 'How is Juan's height?'

'How tall is Juan?'

(48) a. Jay-p'ej **metru** i-chañ-lel ajWañ?
how.CARD-CLF meter A3-tall-NML Juan
Lit. 'How many meters is Juan's height?'

'How many meters tall is Juan?'

b. *Bajche' **metru** i-chañ-lel ajWañ?
how meter A3-tall-NML Juan
Lit. 'How meter is Juan's height?'

Intended 'How many meters tall is Juan?'

These differences are not surprising if the *wh*-words are lexicalizing (i.e., spelling out) different parts of the DegP: *jay* is lexicalizing the numeral constituent within the DegP, and that is why the classifier is overtly attached to it (Ch'ol numerals require the classifier, see Bale & Coon (2014); Little et al. (2022)), followed by the mensural noun denoting the unit of measurement; but, *bajche'* is lexicalizing the whole DegP, and not just solely the numeral. This accounts for why (i) the classifier cannot co-occur with *bajche'*, and for why (ii) the mensural noun cannot be overt either. A schematic representation of the differences in lexicalization is in (49).

(49) a. $[_{\text{DegP}}$ <u>Numeral-CLF Mensural Noun</u>$]$
bajche'

b. $[_{\text{DegP}}$ <u>Numeral</u> -CLF Mensural Noun$]$
jay

Supporting evidence for the schemas in (49) comes from the possible fragment answers, which are taken to be a reflection of syntactic constituency (Merchant 2004; Stigliano 2022). It is possible to answer a *bajche'* question with any of the expressions in (50) which include an affixed degree intensifier, a full comparative constituent or a precise measure expression. All of these can be taken to instantiate full DegPs (Bresnan 1973; Corver 1997, 2021; Bhatt & Pancheva 2004; Svenonius & Kennedy 2006). However, when prompted with *jay-p'ej*, speakers do not accept answers like (50a) and have a strong preference to only accept numerical answers like *2 meters* in (50c), and, to a lesser extent, a full comparative constituent.

(50) a. chañ-ix
tall-already
'quite tall' **jay-p'ej, ✓bajche'*

b. ñumeñ-ix bajche' xRosa
more-already how Rosa
'taller than Rosa' *?jay-p'ej, ✓bajche'*

c. cha'-p'ej metru
2-CLF meter
'2 meter tall' *✓jay-p'ej, ✓bajche'*

Interrogative DegPs are not the only degree-denoting constituents that can directly modify gradable predicates. A DegP that expresses a precise measurement such as *two meters* can appear in this position in a declarative clause. An example is given in (51).

(51) Cha'-p'ej metru i-chañ-lel jiñ tye'.
two-CLF meter A3-tall-NML DET tree
'The tree is two meters high'.

The surface order in (51) has the DegP with the measure expression in the predicate initial position. In addition, the surface parse of the sentence is akin to 'the tree's height is two meters'. While these observations seem to suggest that *cha'p'ej metro* '2 meters' is an independent constituent from the nominalized possessed gradable predicate *i-chañ-lel jiñ tye'* 'the tree's height', there is evidence that the nominalized possessed gradable predicate forms a unit with the DegP, i.e., it can be directly modified by the DegP.

This evidence comes from examples like those in (46) where the nominalized gradable predicate *y-oñ-lel* 'amount' and its possessor are pied-piped with *bajche'*. In addition, measure terms like *kilo*, borrowed from Spanish, can be nominalized and possessed, shown in (52). The measure term in (52) is pied-piped with *bajche'* from the complement position of the predicate *yom* 'need.' Again, the question in (52) is probing for the volume of onions in kilos, rather than the cardinality of kilo-units containing onions.[27]

[27]In the English translation, the quantity adjective surfaces as *many* not because the dimension of measurement may be cardinality, but because the quantity adjective agrees in plural number with the head-noun *kilos*. See Toquero-Pérez

(52) [Bajche' **i-kilo-lel** seboya]$_i$ y-om t_i tyi sopa?
how A3-kilo-NML onion A3-need PREP soup
'How many kilos of onions are needed in the soup?' (volume, #cardinality)

In the above-mentioned examples, for the nominalized gradable predicate, including its possessor argument, to be pied-piped with the *wh*-degree word, the nominalized gradable predicate must form a constituent. In other words, the nominalized possessed gradable predicate is directly modified by the DegP composed of *bajche'* (or *jay-p'ej*).

This claim receives independent support from the way possessed predicates are built in the syntax of Ch'ol. Unlike in English, where possessors are structurally higher than numerical modifiers or DegPs introducing measure phrases (e.g., in *John's 3 books*, *John's 3 boxes of books*), possessors in Ch'ol seem to be structurally closer to the possessum than numeral-classifier phrases or other DegPs. Little (2018, 2022) reports that Ch'ol possessed nouns modified by numerals do not trigger maximality entailments; the phrase in (53) does not entail that Rosa has only two books. This contrasts with English where *Rosa's two books* is maximal—her only two books. This entails that schematically the structure for possessed NPs that are also modified by numerals is as in (53):

(53) [[cha'-pej]$_{DegP}$ [[i-juñ]$_N$ [ajRosa]$_{PossP}$]$_{N'}$]$_{NP}$
2-CLF A3-book Rosa
'Rosa's two books'

For the cases with nominalized gradable predicates discussed here, the noun that bears the property denoted by the gradable predicate is also the possessor. This is indicated by the overt set A agreement marker on the nominalized gradable predicate. Given what we know about the structure of possessed NPs, we can hypothesize the following: (i) the gradable predicate heads the whole nominal; (ii) it is then related to an individual who is the possessor of the property; and (iii) the DegP indicates the degree to which the individual instantiates that property. In other words, the DegP occupies the degree argument position of the possessed gradable predicate. This entails that the meaning of a sentence like (51) is along the following lines: 'the tree has a height of two meters' or 'the tree has a tallness of two meters'.

We propose, following Menon & Pancheva (2014, 2016) and Grano & Zhang (2020), that this is possible if the gradable predicates (both bare and nominalized) in Ch'ol are built on the bases of Property Concepts (PCs). A "property concept", in a narrow semantic sense (Dixon 1982; Thompson 1989), refers to properties, qualities or characteristics of their referents. In a wider sense, properties are a special type of individual, and can be predicated of other individuals by a predication relation (Chierchia & Turner 1988). In other words, they can be summarized in the schema in (54), where B represents the quality or characteristic.

(54) A has property B.

The reason to analyze nominalized gradable predicates in Table 4 and bare adjectives as Property Concept Lexemes (PCLs) is based on the following hypothesis from Menon & Pancheva (2016): property concept predication is encoded by (overt or covert) possession. In other words, it is possessive marking on PC roots that makes these predicates gradable. As observed by the data in this section, the gradable predicates that allow direct DegP modification are all possessive-marked with

(2024) for agreement facts of quantity adjectives cross-linguistically.

-(l)el; additionally, the possessor is the bearer of the PC property. For instance in (51), the tree has the property of tallness.

For Ch'ol, we adopt the proposal in Menon & Pancheva (2014, 2016) that PCs enter a language via acategorial roots represented as in (55), represented by $\sqrt{PC}$, to which additional morphosyntactic structure is added. This entails that both positive adjectives, functioning as gradable predicates, and nominalized gradable predicates are morphosyntactically complex: they consist of a root and a category bearing head. In addition, the choice of categorizer indicated by the subscript A for adjectives, and the subscript N for nouns, will have an impact on the lexical semantics of the complex PCL.

We can represent the respective structures of adjectival and nominal PCLs as in (56) and (57) with their corresponding paraphrases. The examples to follow have multiple lines: the first one is always the morphosyntactic structure; the second one represents the phonological exponents of each morpheme in Ch'ol; the third is the corresponding gloss, and finally the appropriate paraphrase.

(55) $\sqrt{\text{PC}}$ = 'the property of the concept denoted by the root'

(56) PCL: bare adjective

a. $\sqrt{\text{CHAÑ}}$ = 'the property of tallness'

b. [$\sqrt{\text{CHAÑ}}$ A_{POSS}]$_{\text{A}}$
chañ -Ø
tall -ADJ
'having tallness to a certain degree'

(57) PCL: *(l)el*-marked noun

a. $\sqrt{\text{CHAÑ}}$ = 'the property of tallness'

b. [$\sqrt{\text{CHAÑ}}$ N_{POSS}]$_{\text{N}}$
chañ -lel
tall -NML
'{being an instance of/having} tallness to a certain degree'

c. [[$\sqrt{\text{CHAÑ}}$ N_{POSS}]$_{\text{N}}$ Possessor]$_{\text{NP}}$
i-chañ -lel jiñ tye'
A3-tall -NML DET tree
'The tree's {being an instance of/having} tallness to a certain degree'

According to (56), the adjectival categorizer A encodes the possession relation in the semantics, and is not mapped to an overt exponent in the phonology. This is an instance of "canonical" predication via PCLs as adjectives. On the other hand, the nominalizer in (57) maps the property denoted by the root to an instance of that property and relates that property to an individual via a possession relation. This nominalizer is spelled out as *-(l)el*. In other words, the result is a subject-predicate relationship that is structurally mediated by the nominalizing suffix *-(l)el*. Given Menon and Pancheva's hypothesis, the possessor *-(l)el* is in charge of making the predicate gradable and thus must enable a degree argument position in the syntax. This degree argument position is occupied by the DegP which will be introduced above the subject of the predication, i.e., the overt possessor. The DegP then modifies the possessed gradable predicate as schematically represented

in (58).[28]

(58) [DegP [[$\sqrt{\text{CHAÑ}}$ N_{POSS}]$_{\text{N}}$ Possessor]$_{\text{NP}}$]$_{\text{NP}}$
[[cha'-p'ej metru]$_{\text{DegP}}$ [[i-$\sqrt{\text{CHAÑ}}$ -lel]$_{\text{N}}$ jiñ tye']$_{\text{NP}}$]$_{\text{NP}}$
2-CLF meter A3-tall -NML DET tree

Subcomparatives. Although Ch'ol has overt DegPs directly modifying Ch'ol's gradable predicates in various constructions, the language lacks subcomparatives—e.g., *the lake is wider than the river is long*. Attempts at eliciting subcomparatives generally result in the consultant saying that it is not possible to say. This occurred both when we asked for Ch'ol translations of subcomparatives from Spanish—which does allow subcomparatives (Reglero 2006)—and when prompted with scenarios like the following: the river is ten meters long but the lake is five meters wide. We also did not find any textual examples of subcomparatives.

Based on the data discussed in this section, we update the parameter settings for Ch'ol. The final updated settings are shown in Table 5.

[28]We suggest that the *ñumeñ – iñumel* alternation is also the result of a different lexicalization pattern imposed by the morphosyntax. Just like the other PCs discussed in the main text, the PC root $\sqrt{\text{ÑUM}}$ can combine with an adjectivizer or a nominalizer. When $\sqrt{\text{ÑUM}}$ combines with an A categorizer, it functions as an adjectival predicate and its distribution is limited to AP/NP/VP internal constituents. The possession relation is encoded by the A_{POSS}. This A_{POSS} is in turn mapped to the exponent *-eñ*. On the contrary, when $\sqrt{\text{ÑUM}}$ combines with N_{POSS}, the situation is as in (57). As a result, it has the same syntactic distribution as a nominal predicate. In both cases, we can further assume that what makes *ñum*-based PCLs different from others is the presence of an additional Degree layer on top of A/N, abbreviated as Deg below. This Deg head is responsible for introducing the ordering relation between degrees in the semantics. Schematically this is illustrated in (i). If this is on the right track, degree morphemes in Ch'ol must also be PCLs.

(i) a. [$\sqrt{\text{ÑUM}}$ A_{POSS}]$_{\text{A}}$ Deg]$_{\text{Deg}}$
ñum -eñ -Ø
pass -ADJ.POSS COMPR

b. [[$\sqrt{\text{ÑUM}}$ N_{POSS}]$_{\text{N}}$ Deg]$_{\text{Deg}}$
i-ñum -el -Ø
A3-pass -NML -COMPR

The overt possessor, *ajAlice* in (ii), would occupy the specifier position of N_{POSS}. That is, the possessor is a phrasal constituent higher than N but lower than Deg. This is exactly the same position as *the tree* in (58).

(ii) [Alice is 86 centimeters tall and Rosa is 84 centimeters tall]

Añ i-ñum-el (tyi) cha'-p'ej sentimetru ajAlice
EXT A3-pass-NML PREP two-CLF centimeter Alice

'Alice is two centimeters more (i.e., taller).'

Table 5: Parameter settings for Ch'ol (final version)

	[±DSP]			[±DAP]	[±DegPP]		
	Crisp Judg.	**Degree Morph**	**Differential Compr.**	**Clausal Standard**	**DegQs**	**DegPs with GP**	**SubCompr.**
Ch'ol	✓	✓	✓	✓	✓	✓	*

5 Implications for the parametric approach and conclusion

After the detailed description of the different constructions surveyed, we are ready to determine Ch'ol's place in the typological space and the implications for the parametric approach advanced in Beck et al. (2009). We begin by offering some implications from Ch'ol and end with some broader cross-linguistic ones.

We have shown that Ch'ol is not degreeless, as opposed to languages like Washo, Motu, or Nez Perce. The crucial piece of data was the possibility of expressing the exact difference between the two measurements of a comparative, i.e., differential comparatives. The availability of differential comparatives is crucial to a positive setting of the [DSP]: differential comparatives require the notion of addition, and degrees form scales that enable such an operation (von Stechow 1984; Deal & Hohaus 2019). What is more, in MP-comparatives, the standard denotes the degree (of cardinality, length, height, etc.) that some noun or unit has (Bhatt & Homer 2019; Toquero-Pérez 2023). In this regard, MP-comparatives are no different than differential comparatives: both the differential argument and the MP inside the standard of comparison saturate a degree argument. In addition, we have shown that Ch'ol has dedicated comparative morphology and allows crisp judgments.

The positive setting of the DSP enables Ch'ol to potentially have a positive setting of the [DAP] as well. Ch'ol has clausal standards inside of which an overt degree *wh*-element *bajche'* can appear displaced, immediately following the standard morpheme. The displaced element triggers binding of a degree variable. This (overt) displacement operation inside the clausal standard is identical to what we see in languages that have been argued to be [+DAP]. These include English, as illustrated in (12), and others like Russian (Pancheva 2006; Beck et al. 2009) or Greek (Merchant 2009). Therefore, Ch'ol, just like these other languages, must be [+DAP].

Up until this point, the parametric theory proposed by Beck et al. (2009)—and slightly amended by Deal & Hohaus (2019)—makes the right predictions: If a language has differential comparatives, it is [+DSP] and will also have degree morphology and crisp judgments. If a language has binding of degree variables (as evidenced, for instance, by the overt *wh*-movement inside the clausal standard), it must be [+DAP]. This entails that the language must also have differential comparatives, degree morphology and crisp judgments, i.e., the language must be [+DSP]. Both of these implicational statements hold for Ch'ol. Thus, the hierarchical relation established between parameters is supported.

When it comes to the DegPP, there is substantial evidence for a positive setting based on the distribution of DegPs with gradable predicates. These DegPs directly modify gradable predicates both in question and non-question environments. This is just like we see in English: *how tall?, two meters tall*.

These facts about DegPs lead to the expectation, given clustering, that subcomparatives are

also possible in the language. However, this is not the case: subcomparatives are unacceptable. We now face a challenge. We could take the strong version of clustering, in the spirit of Beck et al. (2009), and classify Ch'ol as [-DegPP]: the three parameters are absolute and there are no finer-grained distinctions within them, in which case we need to find an independent explanation for the availability of DegPs and degree questions.

We advocate for the alternative here: not all constructions encapsulated in a parameter have to be grammatical in order for the parameter to be set to a positive value. As a result, we propose that the three parameters should be regarded as macro-parameters that may be decomposed into finer-grained micro-parameters allowing to capture the variation. In the case of the [DegPP] setting, we can conclude that a positive setting is guaranteed as long as there is evidence for the degree argument position to be filled. The micro-variation seems to be in the inventory of grammatical expressions that are available to do that. In Ch'ol, the conditions for the positive setting of the [DegPP] are satisfied via direct DegP modification (in declarative and interrogative contexts). Thus, Ch'ol must be [+DegPP], independently of subcomparatives. The conclusion we can draw, given the Ch'ol facts, is that having subcomparatives is not a requirement for a positive setting of the DegPP parameter.

The situation in Ch'ol is not isolated typologically. In fact, it resembles the variation found across varieties of Spanish. While all varieties of Spanish are [+DSP, +DAP], allowing for the full spectrum of constructions encapsulated in each parameter (e.g., {differential comparatives, dedicated comparative morphology, crisp judgments}, and {clausal standards with degree abstraction inside them}, Price 1990; Brucart 2003; Mendia 2020; Toquero-Pérez 2023), Spanishes differ in the range of [+DegPP] constructions they allow. Some varieties, such as Iberian Spanish, accept all the constructions in (59), while others, namely Paraguayan (educated Asunción variety) and Peruvian (educated Lima variety), only accept (59a) and (59b).[29]

(59) a. tres metros de { alto / altura}
three meters of high height
'three meters high'

b. { Qué tan / Cuán} alto es Juan? Cuánta altura tiene Juan?
what as.much how.much tall is Juan how.how height has Juan?
'How tall is Juan? 'How much height does Juan have?

c. La mesa es más ancha que { larga / la puerta larga }
the table is more wide that long the door long
'The table is wider than {it is long/ the door is long}'

In (59a), the DegP directly modifies the gradable predicate (e.g Eguren & Pastor 2014). In degree questions such as (59b), a degree *wh*-word moves and pied-pipes the gradable predicate (e.g Eguren 2020). Subcomparatives require that (i) everything inside the standard is deleted but the lexically distinct gradable predicate; or (ii) gapping of the verb (e.g., Reglero 2006). Paraguayan and Peruvian speakers find both strategies in (59c) ungrammatical.

We conclude then that Ch'ol must be [+DegPP] because the degree-argument position of a gradable predicate in Ch'ol can be filled (overtly) in the syntax even if there are no subcomparatives. Given the discussion of subcomparatives in Section 2.3, (i.e., the specifier of the gradable

[29]We thank Maria Luisa Zubizarreta and Jaime Castillo-Gamboa for the Paraguayan and Peruvian Spanish judgments respectively.

predicate was occupied by a DegP, which is the same configuration that we find in degree questions) this is a surprising finding because the structural description of the parameter is met. Why is it the case then that subcomparatives are ruled out? While we do not have a definitive answer, we can speculate that this is due to the availability or lack-there-of of subdeletion processes in the language (Bresnan 1975; Grimshaw 1987; Bacskai-Atkari 2018; Erlewine 2018). In most, if not all, cases of subcomparatives across languages, the gradable predicates in matrix clause and clausal standard differ lexically. However, where languages differ is in the patterns of deletion. That said, these observations seem to point to the conclusion that the availability of subcomparatives more generally is determined by a constraint on comparative subdeletion, which is dependent on the language being [+DegPP].

Above all the data highlight that clustering of all DegPs and degree questions directly modifying gradable predicates and subcomparatives is not required for a positive setting of the macro-parameter. The Ch'ol findings, together with the cross-linguistic variation of Spanish mentioned in the paper, are summarized in Table 6.

Table 6: Cross-linguistic variation in parameter settings

	[±DSP]			**[±DAP]**	**[±DegPP]**		
	Crisp Judg.	**Degree Morph.**	**Differential Compr.**	**Clausal Standard**	**DegQs.**	**DegP with GP**	**SubCompr.**
$\text{Spanish}_{\text{Par/Peru}}$	✓	✓	✓	✓	✓	✓	*
Ch'ol	✓	✓	✓	✓	✓	✓	*
$\text{Spanish}_{\text{Ib.}}$	✓	✓	✓	✓	✓	✓	✓

Focusing only on [+DegPP] languages on Table 6, we can observe that what all languages in the group (Ch'ol, Asunción Paraguayan and Lima Peruvian Spanish, Iberian Spanish and English) share is the availability of DegP modifiers and degree questions. Crucially, there is no language in the sample that has subcomparatives but lacks the DegP modifiers and/or degree questions under discussion. We capture this with the descriptive generalization in (60).

(60) **The subcomparative-DegP generalization**
If a language has subcomparatives, it will also have DegP modifiers and *wh*-degree operators directly modifying gradable predicates.

In addition to this, the data indicate a deeper hierarchical implication concerned with what it means for a language to have or not have subcomparatives. To account for this, we propose the generalization in (61).

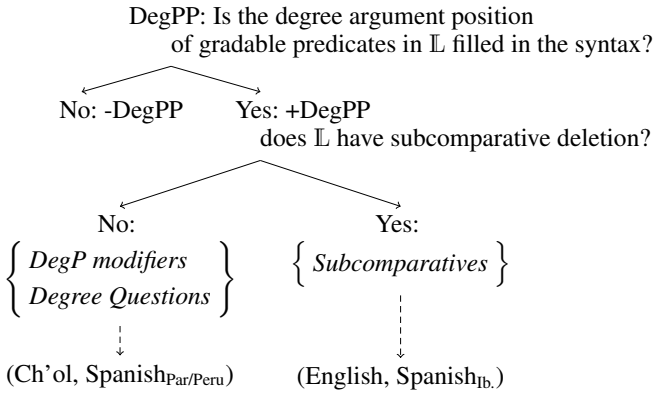
(61) **Subcomparative deletion generalization**
The availability of subcomparatives entails [+DegPP], but their unavailability is not indicative of the opposite.

The generalization in (61) presupposes that there are two loci for cross-linguistic variation. On the one hand, macro-variation can be captured based on the implicational hierarchy we represented in Figure 1 in Section 2. On the other hand, languages belonging to a macro-parameter will

differ depending on the implicational hierarchical relations that exist between the constructions encapsulated in that macro-parameter. This is how we can account for micro-variation.

At the DegPP level, the generalizations in (60) and (61) suggest the hierarchical parameter organization in Figure 2. The most marked language is one that has subcomparatives, whose availability is contingent on there being DegP modifiers/DeQs directly modifying gradable predicates. However, a language can lack subcomparatives and still be [+DegPP] (though less markedly so), e.g., Ch'ol. This is how we can account for the micro-variation across languages within the macro-parameter. Our findings, thus, foreground previously unnoticed variation within and the diversity of [+DegPP] languages.

Figure 2: Implicational relations within DegPP based on Ch'ol

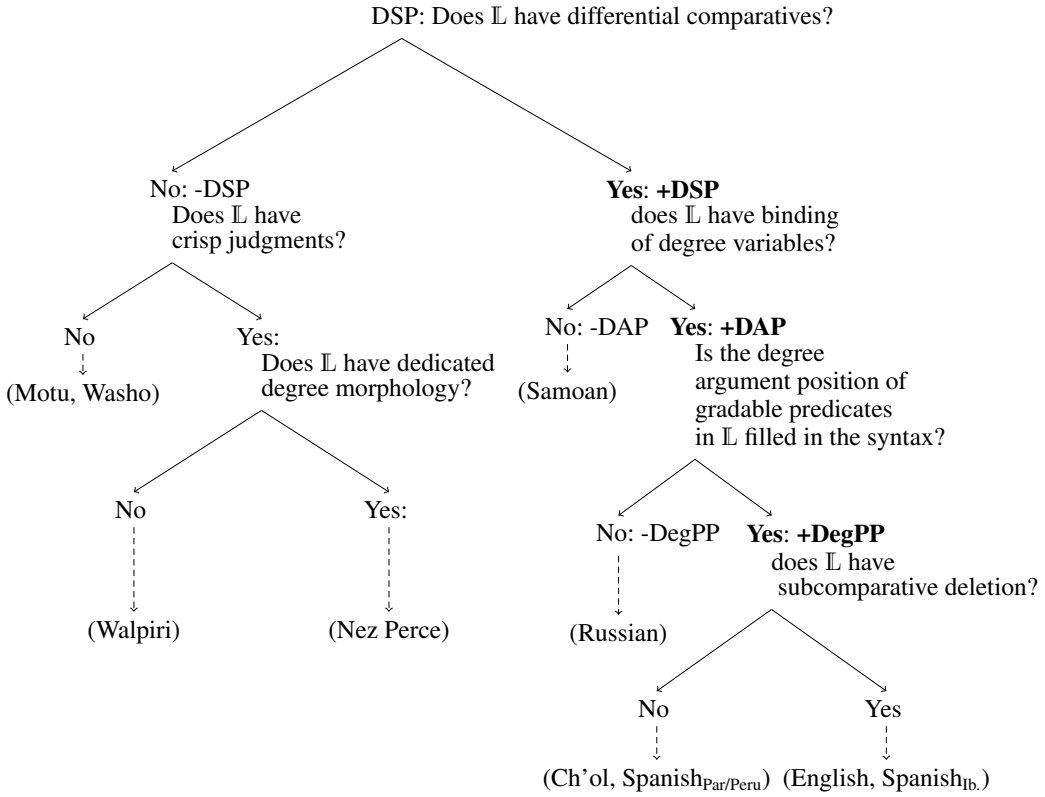


The proposal to consider Beck et al.'s (2009) as macro-parameters is novel, and so is the observation that there is fine-grained variation within [+DegPP] languages, e.g.(60) and (61). We are now in a position to account for the cross-linguistic variation observed within other parameter settings, such as the [-DSP]. In particular, based on Deal & Hohaus (2019)'s observations from Nez Perce and Bowler's (2016) observations from Warlpiri, we can tentatively capture the hierarchical organization within [-DSP] as well with the micro-parameter in (18b): if a language is [-DSP], i.e., it lacks differential comparatives, but has a dedicated comparative morpheme, it will also have crisp judgments.[30]

Given the findings and implications discussed in this section, we are now in a position to update the general parameter hierarchy in Figure 1. We provide the complete hierarchy of dependent parameters in Figure 3, where the positive setting of each macro-parameter has been bolded.

[30]We do not make any claims about micro-variation within the [±DAP] because (i) we have not probed the implicational relations that may exist between the constructions it encompasses and (ii) we are unaware of any implicational statements that may have been made in this domain.

Figure 3: Implicational relations between parameters (final)



First, the hierarchical representation of the negative setting of the DSP parameter in Figure 3 accounts for Deal & Hohaus (2019) observation: what it means for a language to make reference to degrees is to have differential comparatives. Moreover, it also captures the micro-variation within [-DSP] (Beck et al. 2009; Bochnak 2015; Bowler 2016; Deal & Hohaus 2019): Washo vs. Warlpiri and Nez Perce, on the one hand; Washo and Warlpiri vs. Nez Perce, on the other. What divides the first group of languages is whether they allow crisp judgments. What divides the second group is the following unidirectional entailment: having dedicated degree/comparative morphology entails having crisp judgments. Second, the hierarchical representation of the positive setting of the DegPP is also appropriate: all the languages allow their degree argument position to be filled but differ in whether they allow for subcomparative deletion.

This paper contributes to the broader typological literature on how languages express degrees by providing the first in-depth description of degree structures in Ch'ol. We have shown that that Ch'ol largely patterns with English in being [+DegPP], but with a crucial difference: Ch'ol lacks subcomparatives. Enlarging the typology of languages is of special importance given the finer-grained micro-variation that we have observed and that has been reported previously. Ch'ol provides insight into the extent of variation in the grammar of comparison as it shows that having degree questions and DegPs directly modifying gradable predicates, but no subcomparatives, suffices for a positive setting of the [DegPP]. That is, just like there is micro-variation within one of the macro-parameters, i.e., [-DSP] languages, we show that micro-variation is also available within another. We proposed to model this micro-variation, amending the original parameter hierarchy developed by Beck et al. (2009). The Ch'ol findings on subcomparatives as well as the

variation within Spanish dialects, foreground previously unnoticed variation within and diversity of [+DegPP] languages. We hope this spurs further work in the area of degrees and comparison in under-documented languages.

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