DEGREE-BASED COMPARATIVES IN KTUNAXA

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1. Introduction

The goal of this paper is twofold, it aims (i) to provide a first description of Ktunaxa comparative constructions and show that they exhibit behaviour consistent with degree semantics (contra Reisinger, 2019), and (ii) to discuss how Beck *et al*'s 2009 parametric approach to crosslinguistic variation in the grammar of gradable expressions (*e.g. tall, taller, tallest*) provides a rich heuristic to investigate gradable expressions in understudied languages when it is complemented with Bochnak *et al*'s (2020) functional hypothesis. The paper is structured as follows: in section 2, I give a brief introduction to the Ktunaxa language; in section 3, I introduce basic theoretical notions used in the analysis of gradable expressions; in section 4, I provide a descriptive account of Ktunaxa comparative constructions. The description is followed in section 5 by a discussion of how models of crosslinguistic variation may and may not inform linguistic fieldwork. I conclude in section 6.

2. The Ktunaxa language

The Ktunaxa language is a language isolate traditionally spoken by the Ktunaxa people in the Columbia River Basin in Canada and in the United States. According to the 2018 First Peoples' Cultural Council *Report on the Status of First Nations Languages* in British Columbia (Dunlop *et al*, 2018), there are currently 31 fluent speakers of Ktunaxa in Canada. Ktunaxa communities also report many learners of all ages at different levels of proficiency both in Canada and in the United States.

The Ktunaxa language has been extensively documented by its communities, and the resulting documentation is available to Ktunaxa community members through the communities themselves. Beyond grassroot documentation efforts, there are two Ktunaxa grammars (Boas, 1926; Morgan, 1990), a dictionary Ktunaxa-English (Ksanka Pa·ktukaqwum), as well as several studies on various aspects of the grammar (a non-exhaustive list can be found at Ktunaxa Online Resources, 2020). In recent years, a group of linguists based at the University of British Columbia has been documenting the language from a formal perspective with the collaboration of the Paqam community, a Ktunaxa community located just outside of Cranbrook (BC). The current study has been conducted

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in that context with the support of several community members either as speaker-consultants or as facilitators.

3. Theoretical background

Gradability has traditionally been defined as a property of predicates that can be modified by comparative modifiers and intensifiers. These tests taken together differentiate gradable predicates like *tall* from non-gradable predicates like *municipal* as shown in (1).

- (1) a. Terry is taller than Kerry.
 - b. Terry is very tall.
 - c. *The school is more municipal than the pool.
 - d. *The school is very municipal.

It is worth noting right away that although the intensifier *very* has a somewhat restricted distribution—it can only modify adjectives—*more* has a wider distribution, it can modify nouns as in (2a) and verbs as in (2b).

- (2) a. I ate more apples than pears.
 - b. I run more than I walk.

The fact that *more* has a wide distribution calls into question the assumption that gradability is a property of adjectival predicates exclusively, as the distribution of *very* might lead us to conclude. I will get back to this point in section 5 upon discussing Bochnak *et al*'s functional hypothesis. Until then, I will assume traditional definition for the term gradability where it refers to a property of a special class of predicates.

There are currently two types of models that accounts for the properties of gradable predicates. Degree-based models argue that gradable predicates introduce a degree argument as the denotation for *tall* does in (3), and which states that an individual x is tall to a degree d (Cresswell, 1976; Kennedy, 1999; Heim, 2000). These models assign to gradable predicates a type involving degrees (either $\langle d(e,t) \rangle$ as in (3), or $\langle e,d \rangle$).

(3) $[tall] = \lambda d\lambda x.x$ is d-tall

Non degree-based models argue that gradable predicates are of type (e,t), they do not introduce a degree argument (Klein, 1980) as illustrated in (4).¹

(4) $[tall]^c = \lambda x.x$ counts as tall in c

¹ Note that in the denotation in (4), the expression *counts as tall in c* aims to encode the context sensitivity of relative gradable predicates. Imagine for instance that Marianne is 1.80 m tall. In most contexts, that makes her a tall woman. However, if Marianne is a basketball player, being 1.80 m tall doesn't make her tall in comparison to other female basketball players. Therefore, there are contexts in which Marianne counts as tall, and others where she does not. In degree-based models, contextual standards are encoded through the value assigned to the gradable predicate's degree argument.

In degree-based models, comparative modifiers encode an ordering between entities based on the degree to which they hold a certain gradable property. For example, the denotation given for more/-er in (5a) states that an individual x, the associate, holds a property G of type $\langle d\langle e,t \rangle \rangle$ to a degree greater than the degree provided by the linguistically encoded standard, either another individual as in *Terry is taller than Kerry*, or a degree explicitly given as in *Terry is taller than 165cm*. (Note that the denotation given in (5a) involves the maximality operator given in (5b)).

(5) a.
$$[more/-er] = \lambda d\lambda G_{\langle d\langle e,t\rangle\rangle} \lambda x. Max(\lambda d. G(d)(x)) > d$$

b. $[MAX] = \lambda D_{\langle d,t\rangle}. 1d \in D[\forall d' \in D \rightarrow d \geq d']$

In non degree-based models, comparative modifiers encode an ordering between entities in relation to the contexts in which the associate and the standard satisfy the truth conditions of the gradable predicate. For instance, the denotation given for *more/-er* in (6) states that there is a context c' such that the property G of type $\langle e,t \rangle$ holds false of x and true of y. Assuming that the properties of x and y remain stable across contexts, x is G-er than y. That is, if there is a context such that Kerry counts as tall and Terry does not and their heights never change, it is true that Kerry is taller than Terry.

(6)
$$[more/-er]^c = \lambda x \lambda G_{(e,t)} \lambda y. \exists c' [G(c')(x) = 0 \& G(c')(y) = 1]$$

Gradable predicates and their modifiers have been shown to exhibit great variation crosslinguistically. On the one hand, some languages like English have a full inventory of morphologically-encoded gradable modifiers (e.g. comparatives, equatives, degree question words, measure phrases), while languages like Washo have none (Bochnak, 2015). In between those two extremes, we find languages that have a subset of the contructions found in English. To account for the range and type of crosslinguistic variation we observe in gradable constructions, Beck *et al* (2009) have proposed three parameters given below in (7) along with the kind of evidence that warrants a positive setting to each of them (examples of the constructions that constitute evidence for each parameter setting will be given in section 4)

(7) a. Degree semantic parameter (DSP)

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

[A language is considered [+DSP] if] it has a family of expressions that plausibly manipulate degree arguments: comparatives, superlatives, equative morphemes, items parallel to *too* and *enough*, [or if it] has expressions that plausibly refer to degrees and combine with degree operators: comparison with a degree, difference comparative. (Beck *et al* (2009):18)

b. Degree abstraction parameter (DAP)

A language {does/does not} have binding of degree variables in the syntax. (Beck *et al* (2009): 22).

A language is considered [+DAP] if it has clausal comparatives, subcomparatives, degree questions, and exhibits scope ambiguities in (at least) superlatives and comparatives.

c. Degree phrase parameter (DPP)

The degree argument position of a gradable predicate {may/may not} be overtly filled. (Beck *et al.* (2009):24).

A language is considered [+DPP] if it has measure phrases, degree questions and subcomparatives.

The parameters form an implicational hierarchy: languages that are typed [+DPP] are necessarily [+DAP, +DSP], and languages that are [+DAP] are necessarily [+DPP]. Taken together, the parameters derive 4 types of languages as shown in table 1.

Table 1. Beck <i>et al</i> 's	s (2009) typo	ology for grad	dable expressions
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Diagnostic	-DSP	+DSP	+DSP	+DSP
_		-DAP	+DAP	+DAP
		-DPP	-DPP	+DPP
Comparatives	Χ	✓	✓	✓
Superlatives	Χ	✓	✓	✓
Equatives	Χ	✓	✓	✓
Subcomparative	Χ	Χ	✓	✓
Measure phrases	Χ	Х	Χ	✓
Degree questions	Х	Х	Х	√

Reisinger (2019) found that Ktunaxa has none of the degree modifiers found in English. He concluded that Ktunaxa is a [-DSP, -DAP, -DPP] language just like Washo. In the next section, I introduce a new data set that supports a different hypothesis, namely that Ktunaxa is a [+DSP, +DAP], and possibly a [+DPP] language.

4. Ktunaxa comparatives

The data introduced in this section is based on original fieldwork conducted with members of the ?aqam Language Authority. Example sentences were either volunteered by Ktunaxa speakers through translation tasks or with the support of short, illustrated narratives, or created by myself and judged by Ktunaxa speakers. I begin by giving a short description of the basic morphosyntax of Ktunaxa comparatives and then proceed to show that each comparative morpheme in Ktunaxa exhibits behaviour consistent with the presence of degrees.

Ktunaxa possesses four comparative modifiers: $2a \cdot n$, 2isit, 2isnit, and qayaqanat. 2isit, 2isnit, and qayaqanat have a fixed overt syntactic position, they occur preverbally, between the subject and the verb as in (8a). $2a \cdot n$ has a wider syntactic distribution, it occurs

preverbally between the subject and the verb (cf. 8a), and it can also precede the complementizer, a position that is not available to the other comparative modifiers as shown in (8b). In comparative constructions, the associate, the entity being compared, is realized as the subject of the gradable predicate and the standard is introduced by a demonstrative particle. The examples presented here all involve the demonstrative particle $2is\phi$.

(8) a. Malyan ?a·n/?isit/?isnit/qayaqanat wuqatitqak-ni ?is¢ Mati-s.

Marianne ?a·n/?isit/?isnit/qayaqanat tall-IND DEM.OBV Mary-OBV

'Marianne is taller than Mary.'

b. Hun upxni ?a·n/*?isit/*?isnit/*qayaqanat k wuqatitqak 1.SBJ know-IND ?a·n/*?isit/*?isnit/*qayaqanat COMP wuqatitqak ?is¢ Matis Malyan.

DEM.OBV Mary-OBV Marianne
'I know that Marianne is taller than Mary.'

In section 4.1, I introduce two tests that target the distinction between explicit and implicit comparatives, a distinction that has been equated with the distinction between degree-based and non degree-based constructions. The tests introduced in section 4.2 focus on constructions involving degree binding.

4.1 Explicit comparatives in Ktunaxa

Degree-based comparatives such as English *more*/-*er* are what has been called in the literature explicit comparatives. They encode an ordering between individuals by comparing the degrees to which these individuals hold a certain gradable property *G*, in a manner consistent with the denotation in (5). Implicit comparatives, in contrast, manipulate the context such that the positive form holds true of the associate and false of the standard, in a manner similar to the denotation given in (6). Implicit comparative constructions might involve context-setters such as *compared to Mary*, as in (9) (Kennedy, 2007).

(9) Compared to Mary, Marianne is tall.

Whether a construction patterns like an explicit or implicit comparatives can be determined with two tests: crisp judgment tests and positive entailments.

4.1.1 Crisp judgments

Explicit comparatives are thought to be felicitous in crisp judgment contexts, contexts where the associate and the standard differ minimally. Implicit comparatives are infelicitous in these contexts. For instance, in the context given in (10), *more/-er* is felicitous (10a), and *compared to* is infelicitous (10b).

- (10) Context: Marianne is 1.65 m tall and Mary is 1.64 tall.
 - a. Marianne is taller than Mary.
 - b. #Marianne is tall compared to Mary.

Like English *more*/-*er*, Ktunaxa comparatives are felicitous with crisp judgment contexts, as shown in (11).

(11) Context: Marianne is 1.65 m tall and Mary is 1.64 m tall.

Malyan 7a·n/7isit/7isnit/qayaqanat wuqatitqak-ni 7is¢ Matis.
Marianne 7a·n/7isit/7isnit/qayaqanat tall-IND DEM.OBV Mary-OBV 'Marianne is taller than Mary.'

Although explicit comparatives are almost always analyzed as involving degrees, the mere fact that a construction is felicitous in crisp judgment contexts does not necessarily entail that it is degree-based. As Deal and Hohaus (2019) argue in their analysis of *ketu*, a comparative morpheme in Nez Perce, crisp judgment contexts merely require that a modifier encode a difference between two entities, however small that difference is. Nothing precludes degreeless comparatives of the sort given in (6) from achieving that.

4.1.2 Positive entailments

Because implicit comparatives involve the positive form of a gradable predicate (the unmodified form of a gradable predicate), they give rise to positive entailments: the comparative construction entails that the gradable predicate holds true of the associate. Again, the fact that a construction gives rise to a positive entailment does not necessarily rule out a degree semantics for gradable predicates, but it suggests that the comparative construction itself does not rely on degree semantics to encode an ordering between entities.

Whether a construction gives rise to a positive entailment can be tested in two ways. If a construction gives rise to a positive entailment, denying that entailment should lead to a contradiction. This is shown in (12a) which involves a conjoined comparative, a type of implicit comparatives found in many languages (Stassen, 2013), including Ktunaxa (Reisinger, 2019). As shown by the acceptability of the statement in (12b) *more/-er* comparatives do not give rise to positive entailments.

- (12) a. #Marianne is tall and Mary is short, but Marianne is not tall.
 - b. Marianne is taller than Mary, but she is not tall.

Positive entailments can also be tested through felicity judgments. For instance, in a context where Marianne is 1.55 m tall and Mary is 1.50 m tall (both heights being well below the average for Canadian women), it should be infelicitous to say of either of them

that they are tall. In such a context, the conjoined comparative in (13a) is infelicitous, and the *more/-er* comparative in (13b) is felicitous.

- (13) Context: Marianne is 1.55 m tall, and Mary is 1.50 m tall, both are short in comparison to most Canadian women.
 - a. #Marianne is tall and Mary is short.
 - b. Marianne is taller than Mary.

Ktunaxa comparatives pattern like explicit comparatives in that they do not give rise to positive entailments as shown by the fact that denying a positive entailment for the predicate wuqatitqak 'tall' as in (14) does not lead to a contradictory statement.

(14) Malyan ?a·n/?isit/?isnit/qayaqanat wuqatitqak-ni ?is¢ Matis.

Marianne ?a·n/?isit/?isnit/qayaqanat tall-IND DEM.OBV Mary-OBV san qa wuqatitqak.

but NEG tall

'Marianne is taller than Mary but she is not tall.'

Similarly, in the context illustrated in figure 1, all four Ktunaxa comparative modifiers are acceptable when the construction targets the two shortest individuals in the picture, as shown in (15).

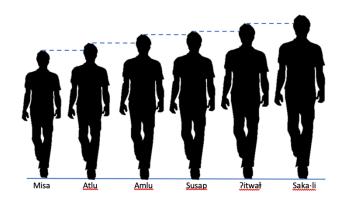


Figure 1. Visual support for positive entailment test

(15) Atlu ?a·n/?isił/?isnił/qayaqanał wuqałiłqakni 'is¢ Misa-s.
Andrew ?a·n/?isił/?isnił/qayaqanał tall-IND DEM.OBV Michael-OBV 'Andrew is taller than Michael.'

If we assume that explicit comparatives require degree semantics, then the tests presented in this section support a degree-based analysis for all four Ktunaxa comparative

modifiers. This means that, contra Reisinger (2019), Ktunaxa has a positive setting to the DSP parameter. The next section is dedicated to tests showing that Ktunaxa allows for degree binding.

4.2 Degree binding in Ktunaxa comparatives

Degree binding is involved in the derivation of clausal standards as the ones given in (16) for which I assume the structures given in (17).

- (16) a. Mary is taller than I thought (she was tall).
 - b. The door is taller than it is wide.
- (17) a. Marianne is taller [than MAX λd I thought Mary was d-tall].
 - b. The door is taller [than MAX λd it is d-wide]

As seen in (17), clausal standards (in bolded characters in (16) and between brackets in (17)) involve a clause-initial lambda operator that binds the degree argument of the gradable predicate, and a maximality operator which yields the maximal degree to which an individual holds a certain gradable property. This maximal degree constitutes the standard (in the case of 16a, the maximal degree of tallness I thought Mary had, and in the case of 16b, the maximal degree of width of the door).

As shown in (18), Ktunaxa allows for clausal standards which suggests strongly that Ktunaxa comparatives involve degree binding.

- (18) a. Malyan ?a·n/?isit/?isnit/qayaqanat wuqatitqak-ni ?is¢ k-hu qatwi.

 Marianne ?a·n/?isit/?isnit/qayaqanat tall-IND DEM.OBV COMP-1.SBJ think

 'Marianne is taller than I thought.'
 - b. ?a·n/?isit/?isnit/qayaqanat wuqni ?is¢ k ati ?in taqanxunat ?a·n/?isit/?isnit/qayaqanat long DEM.OBV COMP wide DEM door 'This door is longer than it is wide.'

Further evidence of degree binding comes from negative island effects in clausal standards, exemplified for English *more*/-*er* in (19a) for which I assume the structure in (19b).

- (19) a. *The door is taller than it is not wide.
 - b. *The door is taller [than MAX λd it is not d-wide]

The most widely received explanation for negative island effects in comparatives is that negative clausal standards denote an undefined degree. Indeed, if the clausal standard in (19a) involves a maximality operator, this maximality operator takes as its argument the set of degrees to which the door is *not* wide. That set of degrees is infinite and therefore

has no maximum, hence the clausal standard denotes an undefined value, and the sentence is uninterpretable (Rullmann, 1995).

All four Ktunaxa comparative modifiers give rise to negative island effects, as shown in (20).

(20) *7a·n/?isił/?isnił/qayaqanał wuqni ?is¢ k qa ałi łaqanxunał ?a·n/?isił/?isnił/qayaqanał long DEM.OBV COMP NEG wide door 'The door is longer than it is not wide.'

The data presented above provide strong evidence that Ktunaxa comparative constructions involve degrees and degree binding, making Ktunaxa a [+DSP, +DAP] language.

4.3 Summary

The tests presented in section 4 and their results are summarized in Table 2 below, which also includes, for comparison, how English *more*/-*er* fares with respect to the same tests, as well as the kind of pattern we expect for degree-based comparatives.

Table 2. Summary of degree diagnostics for Ktunaxa comparative modifiers

Diagnostic	qayaqana l	?isni l	?isiŧ	?a∙n	more	Degree-based comparatives
Crisp judgments	✓	√	✓	√	√	✓
Positive entailment	X	Χ	X	X	X	X
Clausal standard	✓	√	✓	√	√	✓
Subcomparative	√	√	✓	√	√	√
Negative island	√	√	√	√	√	√

Beck *et al* (2009) argue that subcomparatives provide evidence for a positive setting to the DPP.² Hence, despite lacking measure phrases and degree questions (two constructions expected in languages with a positive setting to the DPP), Ktunaxa offers evidence of being

² My understanding of their argument is that clausal standards in subcomparatives and elsewhere involve a filled degree phrase that hosts the trace of the predicate's degree argument (cf. the structure in (17b)).

a [+DSP, +DAP, +DPP] language, just like English.³ Variation between the two languages seems to concern the inventory of lexical items instantiating degrees, nothing more.

5. Discussion

Couched within Beck *et a*l's framework, Reisinger (2019) had originally determined Ktunaxa to be a [-DSP, -DAP, -DPP] language. I believe the dramatic difference between Reisinger's conclusion and mine stems from how both studies implement Beck *et al*'s typology as a heuristic for fieldwork. Following Beck *et al*'s exact formulation for the DSP (given above in (7a)), Reisinger focused on eliciting a *family* of degree constructions. He therefore assumed that having morphologically encoded explicit comparatives did not meet the threshold of evidence for degrees. As the current study has shown, an in-depth description of a single type of construction (like *e.g.* comparatives) does provide sufficient evidence for the presence of degrees in the ontology of a language. To the extent that it is necessary, the DSP could be amended as in (21) which states that a positive setting to the DSP merely requires that a language has *some* expression that plausibly manipulates degree arguments.

(21) Degree semantic parameter (DSP)

A language {does/does not} have gradable predicates (type $\langle d, \langle e, t \rangle \rangle$ and related), i.e. lexical items that introduce degree arguments, whether the language has **some** expressions that plausibly manipulate degree arguments: comparatives, superlatives, equative morphemes, items parallel to *too* and *enough*. (Adapted from Beck *et al* (2009):18)

The predictive power of Beck *et al*'s typology concerns the availability of some constructions and the implicational relations between the different parameters. This limits its potential as a fieldwork heuristic since it makes few predictions regarding the range of variation within the properties of modifiers that encode similar meanings. This limitation explains at least partially one puzzling conclusion of the current study: as shown in Table 2, Ktunaxa has four modifiers that are seemingly the exact counterparts to English *more*/-*er*.⁴ A more comprehensive study of comparative constructions in Ktunaxa, one that would lead to uncovering the differences between all four modifiers, requires a different kind of model of crosslinguistic variation to structure it.

As an alternative to Beck et al's parametric approach, Bochnak et al (2020) have suggested that crosslinguistic variation in the grammar of gradable expressions originates

³ In elicitation sessions, speakers sometimes volunteer constructions for measure phrases and degree questions. However, these constructions are often judged forced or unnatural by the same speakers who volunteered them. It is unclear if the difficulty in eliciting consistent data when targeting measure phrases and degree questions comes from flaws in the methodology or if it stems from the constructions not being supported by the grammar of Ktunaxa. Further research is necessary to assess the status of these constructions in Ktunaxa.

⁴ Note that English *more*/*-er* gives rise to scope ambiguities which has lead Heim (2000) to propose that it is quantificational. I have not tested the Ktunaxa modifiers for scope ambiguities yet.

in differences in the functional inventory of languages. Their proposal differs from Beck et al's approach in that it assumes that degrees are introduced by functional elements. These functional elements are instantiated by degree modifiers like, among others, comparative morphemes. The functional hypothesis thus predicts that modifiers within a single language may have different distributions not based on their semantics but based on their morphosyntactic selectional properties. This prediction provides a fruitful way to further the investigation of Ktunaxa comparative modifiers. While qayaqanat, ?a·n, ?isit, and ?isnit can all modify stative predicates, as shown in (22) where the stative marker is bolded, only qayaqanat can modify eventive predicates as shown in (23). In that case, qayaqanat can be used to encode a comparison between various aspects of an event (e.g. frequency, amounts of the object, etc.).

- (22) qayaqanat/?a·n/?isit/?isnit yunaqa?ni kakpuk k-hu his qayaqanat/?a·n/?isit/?isnit be.plentiful pear feed COMP-1.SBJ ka kqallaxal¢in ?is¢ kanuhusnana-s. 1.POSS horse apple-OBV DEM.OBV 'The pears I feed my horse are more plentiful than the apples (I feed my horse)' 'I feed my horse more pears than apples.'
- (23) Hun qayaqanat/*?a·n/?isit/?isnit his-i ka kqattaxat¢in kakpuk-s
 1.SBJ qayaqanat/*?a·n/?isit/?isnit feed-IND 1.POSS horse pear-OBV
 ?is¢ kanuhusnana-s.

 DEM.OBV apple-OBV
 'I feed my horse more pears than apples.'

Note that, although the functional hypothesis is introduced by its authors as an alternative to the parametric hypothesis, it is not fundamentally at odds with a parametric approach to variation. It is possible to retain Beck *et al*'s parameters and amend the DSP parameter so that it applies to modifiers or functional categories rather than predicates. Once this change has been made, the tests to diagnose the presence of degrees remain the same, and a language will have a positive setting to the DSP if the presence of degrees is supported by the data. A hybrid model of the sort has the benefit of targeting gross differences across languages by looking at families of constructions as well as fine-grained distinctions regarding the morphosyntactic properties of degree modifiers.

6. Conclusion

In this paper, I have introduced a first description of comparative constructions in Ktunaxa. I have provided strong evidence that these constructions involve degrees and degree-binding and minimal evidence that Ktunaxa allows degree phrases to be filled. This means that Ktunaxa is a [+DSP, +DAP, +DPP] language within Beck *et al*'s crosslinguistic typology of comparison constructions. I have also discussed some limitations of using Beck *et al*'s model of crosslinguistic variation as a fieldwork heuristic for understudied

languages, and I have suggested that these limitations can be alleviated by integrating to the typology the functional perspective proposed by Bochnak *et al* (2020).

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