Quantification, degrees, and *beyond* in Navajo

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Abstract

This paper explores the interaction of degree and quantification in Navajo. We argue that Navajo comparative standard markers should be analyzed as quantifiers over degrees ($\langle\langle d,t\rangle,\langle\langle d,t\rangle,t\rangle\rangle$) despite the language apparently only allowing phrasal (non-clausal) standards of comparison. Our primary evidence comes from novel exploration of superlative meaning in Navajo, which is conveyed via the combination of a comparative standard marker and an existential affix that obligatorily takes lowest scope, a configuration which our analysis of standard markers makes possible. We develop a compositional analysis that resolves the quantificational meanings of standard markers with non-clausal standards. By positing degree quantifiers in Navajo, we challenge earlier analyses which took Navajo to lack expressions of quantificational determiner type. We posit that such meanings exist only in the domain of degrees because degree arguments are the only type of argument position in Navajo that are not obligatorily saturated by verbal prefixes.

1 Introduction

Intuitively, the comparison of objects along a gradient dimension seems like a cognitively basic ability that should be universally available and communicable (Sapir, 1944).[1] However, we also find great diversity in the kinds of structures that individual languages use to express these meanings (Stassen, 1985). Recent crosslinguistic investigation has found that even in languages that use rather similar morphosyntactic strategies to express comparison, the semantics and syntax of comparative structures in individual languages diverge in subtle, but still perceptible, ways.

A particularly rich line of investigation has probed the syntax of standards of comparison and its interplay with the semantics of the comparative marker (Hoeksema, 1983; Heim, 1985; Kennedy, 1997; Lechner, 2004; Pancheva, 2006; Bhatt & Takahashi, 2011; Beck et al., 2012). In terms of syntax, the key question is whether the standard of comparison contains elided clausal structure in cases where it is not visible. Since Bresnan (1973), it has been usual to analyze sentences like (1) as containing an unpronounced instance of the adjective in the main clause.

(1)   Alice is taller than [$_{CP}$ Ben is ~~tall~~].

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[1] Acknowledgements and glosses.

This kind of syntax of generally paired with a semantic analysis that treats comparative morphemes like -er as quantificational expressions on par with *every*. Both compose with two property-type expressions, but where *every* composes with two sets of entities (2), -er instead composes with sets of degrees (3) (von Stechow 1984; Heim 2001; Beck 2011, among many others).

(2) $every \rightsquigarrow \lambda P_{\langle e,t \rangle} . \lambda Q_{\langle e,t \rangle} . \forall x . P(x) \rightarrow Q(x)$ $\langle \langle e,t \rangle, \langle \langle e,t \rangle, t \rangle \rangle$

(3) $-er \rightsquigarrow \lambda D_{\langle d,t \rangle} . \lambda D'_{\langle d,t \rangle} . \text{MAX}(D') > \text{MAX}(D)$ $\langle \langle d,t \rangle, \langle \langle d,t \rangle, t \rangle \rangle$

Applied to (1), the two sets of degrees (D, D') taken as argument by *more/-er* correspond respectively to the degrees to which Ben is tall, and the degrees to which Alice is tall.

In a sentence like (4), by contrast, the standard lacks any overt clausal material. While there is debate as to the analysis of such strings (see e.g. Lechner 2004; Bhatt & Takahashi 2011), one strategy is to treat the standard of comparison as denoting an entity rather than a set of degrees, and lacking in any hidden clausal structure (Hoeksema, 1983; Heim, 1985; Kennedy, 1997).

(4)   Alice is taller than [$_{DP}$ Ben].

More recent crosslinguistic investigation has argued that this 'phrasal' analysis alone is available for standards of comparison in Mandarin, Japanese, Turkish, Hindi-Urdu, and Luganda (Xiang, 2005; Kennedy, 2007; Pancheva, 2006; Hofstetter, 2009; Bhatt & Takahashi, 2011; Beck et al., 2012).

A phrasal syntax for the standard of comparison is most often paired with a semantic analysis which does not treat *more/-er* and its reflexes in other languages as a quantifier. Instead, it composes directly with two entities (x, y) and a gradable predicate (g) determined by the adjective in the main clause. While the sentence in (4) would have the same truth conditions as its clausal counterpart in (1), these truth conditions would be derived differently.

(5) $-er \rightsquigarrow \lambda y_e . \lambda g_{\langle d,et \rangle} . \lambda x_e . \text{MAX}(\lambda d . g(x, d)) > \text{MAX}(\lambda d . g(y, d))$ (Heim, 1985)

                                                          $\langle e, \langle \langle d, \langle e,t \rangle, \langle e,t \rangle \rangle \rangle$

This paper considers data from Navajo degree constructions like those in (6) which challenges this pairing of syntactic and semantic analyses. We argue that while Navajo seems to be a clear case of a language with syntactically phrasal standards of comparison, it is nevertheless a language for which a quantificational semantics for comparative morphemes (or, as in Navajo, standard markers) is nevertheless motivated.

(6)   a.   Alice Ben yi-lááh   'áníłnééz.
                     Alice Ben 3OBJ-beyond 3SUBJ.tall
                     'Alice is taller than Ben.'
     b.   Alice 'a-lááh   'áníłnééź.
                     Alice UNSPEC_OBJ-beyond 3SUBJ.tall
                     'Alice is tallest, Alice is taller than anyone.'

While a non-quantificational meaning for the comparative standard marker *-lááh* 'beyond'

would suffice in (6-a), the expression of superlative meaning in (6-b) motivates us to posit (only) a quantificational meaning for *-lááh*. Superlative meaning is expressed by combining the standard marker with the 'unspecified' object marker *'a-*. We demonstrate that unless *-lááh* is given a quantificational meaning, we predict *'a-* to have scope over the comparative relation, giving rise to an unattested interpretation in which Alice need only be taller than a particular individual.

This paper addresses the interaction of quantification and degree in three ways. First, it provides evidence from a structure with a quantificational standard of comparison (*'a-* in (6-b)) for a quantificational meaning for Navajo standard markers. Second, it considers how a phrasal syntax can be reconciled with a quantificational entry for comparative morphemes. We accomplish this by invoking application of a measurement operator to the standard. Third, it presents evidence that the Navajo lexicon includes expressions of quantificational determiner type $\langle\langle\tau, t\rangle, \langle\langle\tau, t\rangle, t\rangle\rangle$, in the domain of degrees. Navajo has generally been viewed as a language without meanings of this type (Faltz, 1995, 2000; Speas & Parsons-Yazzie, 1996). We suggest that Navajo allows this type of meaning in the domain of degrees because unlike entity arguments of verbs more generally, the degree arguments of gradable expressions are not saturated by morphology on the verb itself, thus leaving property-type expressions available to compose with quantifiers.

2   Background

Navajo expresses gradable properties using verbs. While somewhat less morphologically complex than event-denoting verbs in Navajo, adjectival verbs such as those below still bear key morphological components otherwise associated with verbs, including a stem and a subject prefix.[2]

(7)   a.   'áníłnééz   3SUBJ.tall
       b.   'anísnééz   1SUBJ.tall
       c.   nineez   3SUBJ.tall
       d.   deesdoi   3SUBJ.hot
       e.   nohzhóní   2PL_SUBJ.pretty

All Navajo verbs obligatorily bear prefixes to mark core nominal participants (subject, object). Adjectival verbs bear only a subject marker. As with all verbs, when the subject (or object, where relevant) is third person, a verb-external nominal expression can be optionally included.

(8)   (Alice) nineez.
       Alice   3SUBJ.tall
       'Alice (he, she, it) is tall.'

Bogal-Allbritten (2013a, 2016) discusses at length differences in degree constructions that correlate with the morphological marking borne by adjectival verbs, e.g. *'áníłnééz* vs. *nineez* in (7). We follow Bogal-Allbritten (2013a, 2016) in taking these differences to have

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[2]For much more detail on the topics discussed here, see Bogal-Allbritten (2013a, 2016).

syntactic, rather than semantic, sources. These differences will largely not be important for our purposes here and will only be mentioned when they are salient or useful to note.

Following Bogal-Allbritten (2013a, 2016), we treat all adjectival verbs in Navajo as denoting, at an abstract level, relations between entities and degrees, as is familiar from analyses of gradable predicates in English (Cresswell 1976; von Stechow 1984; Heim 1985, 2001; Kennedy & McNally 2005, and many others).[3]

(9) $tall \rightsquigarrow \lambda x_e . \lambda d_d . \mathsf{height}(x) \geq d$ $\qquad\qquad\qquad\qquad \equiv \lambda x . \lambda d . \mathsf{tall}(x, d)$

Navajo verbs cannot appear without prefixes for all nominal arguments in place, however. We suggest that the denotation in (9), then, does not actually correspond to a verb form that can be pronounced in the language.[4] The verb's entity argument is saturated by the third-person pronominal subject prefix, which we treat as a pronoun, indicated with subscript i, translated as a variable with the same index (v_1). An adjectival verb as a whole denotes an expression of type $\langle d, t \rangle$.[5]

(10) $'áníłnééz_i$ $\qquad \rightsquigarrow \lambda d . \mathsf{height}(v_i) \geq d$ $\qquad\qquad\qquad \equiv \lambda d . \mathsf{tall}(v_i, d)$
        $3\textsc{subj}_i.\text{tall}$

This view of Navajo verbs is consistent with analyses that take it to be a Pronominal Argument language, in which all nominal arguments of the verb are pronouns realized as morphologically dependent affixes on the verb (Jelinek, 1984; Baker, 1996; Willie & Jelinek, 2000; Hale, 2001). Verb-external nominal expressions do not themselves saturate the verb's argument positions but instead come to corefer with the pronominal prefixes through a binding process that we might think of as similar to clitic left dislocation in Romance (Baker, 1996). The details of this process will not be critical to us. What is important is the typical verbs like in (11) do not denote relations of type $\langle e, t \rangle$ or $\langle e, \langle e, t \rangle \rangle$ but are instead treated like complete clauses would be (type t).

(11)   Yiyííyą́ą́'.
        3\textsc{obj}.3\textsc{subj}.eat.\textsc{perf}
        'S/he/it ate it.'

We propose here that the key difference between ordinary verbs and adjectival verbs is that while the first express sentential meanings once fully inflected, adjectival verbs denote functions of type $\langle d, t \rangle$ since there does not exist an equivalent to subject and object prefixes in the domain of degrees.

We will primarily be concerned with the semantics of elements found in Navajo degree constructions. In contrast with English, Navajo does not have both degree morphemes

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[3]We note that it's more typical to treat adjectives as denoting $\langle d, \langle e, t \rangle \rangle$ expressions. We reverse the entity and degree arguments since we assume here the entity argument is obligatorily saturated first by verb-internal morphology in Navajo.

[4]Bogal-Allbritten (2016) suggests this to be the entry for the adjectival verb stems, which is the right-most morpheme in the verb.

[5]We place the index for the third-person subject prefix at the right edge of the verb in (10) as we are not showing the full morphological breakdown for these verbs here. The actual prefix would come towards the middle of the verb word.

(e.g. *more/-er*, *less*, *as*) and standard markers (e.g. *than*, *as*). Instead, Navajo only uses standard markers to express comparative meaning. The standard markers are shown in bold below.[6]

(12)   Alice (Ben) yi-**lááh**   'áníłnééz.
        Alice Ben   3OBJ-**beyond** 3SUBJ.tall
        'Alice is taller than Ben/him/her/it.'   [Comparison of superiority]

(13)   Alice shi-**'oh**   'áníłnééz.
        Alice 1OBJ-**short.of** 3SUBJ.tall
        'Alice is less tall than me.'   [Comparison of inferiority]

(14)   Alice (Ben) y-**ee**-níłnééz.
        Alice Ben   3OBJ-**with**-3SUBJ.tall
        'Alice is as tall as Ben/him/her/it.'   [Equative, postpositional]

(15)   Alice Ben-**gi** 'áníłnééz.
        Alice Ben-**at** 3SUBJ.tall
        'Alice is as tall as Ben.'   [Equative, enclitic]

The Navajo standard markers shown above belong to two different morphosyntactic categories. Postpositions function as the comparative morphemes in comparisons of superiority (12), comparisons of inferiority (13), and the equative structure shown in (14). Postpositions in Navajo obligatorily bear object markers which indicate the person features of the object of the postposition, e.g. *yi-* (3OBJ) in (12) and (14), and *shi-* (1OBJ) in (13). The standard marker in the equative construction in (15) is an enclitic which attaches to the independent nominal expression serving as the standard of comparison. Regardless of the category of the standard marker, the standard of comparison can never be omitted:

(16)   a.   *Alice lááh   'áníłnééz.
            Alice beyond 3SUBJ.tall
            (*Intended:* Alice is taller, Alice is taller than that)
       b.   *Alice gi 'áníłnééz.
            Alice at 3SUBJ.tall
            (*Intended:* Alice is as tall, Alice is as tall as that)

While all postpositional standard markers necessarily bear pronominal object marking, an additional expression can be added to provide more information about third-person standards of comparison. This additional expression can be a proper name is in the examples above. It can also be a measure phrase:

(17)   a.   Alice hastą́ą́di 'adées'eez yi-lááh   'áníłtso.
            Alice six   feet   3OBJ-beyond 3SUBJ.big
            'Alice is taller than six feet.'
       b.   Díí   bikáá'adání hastą́ą́di 'adées'eez-gi 'áníłnééz.
            this table   six   feet-at   3SUBJ.long

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[6]There are other degree constructions in Navajo which will not concern us here. See Bogal-Allbritten (2013a, 2016) for discussion.

'This table is six feet long.'

In addition, Navajo has a subcomparative construction in which the standard of comparison contains clausal material. In structures like (18), the clausal material in the standard is obligatorily marked by *-ígíí*, also found in internally-headed relative clauses in the language (Platero, 1974; Willie, 1989; Grosu, 2012). We return to the analysis of subcomparatives in section 5.2.

(18)   Ch'é'étiin [bikáá'adání 'áníłnééz-ígíí]   yi-lááh   'áníłtéél.
       door   table   3SUBJ.long-NMLZ 3OBJ-BEYOND 3SUBJ.wide
       'The door is wider than the table is long.'

Finally, it should be noted that the glosses given to each standard marker reflect the fact that none is only found in degree constructions. Their glosses reflect their meaning elsewhere in the language. For instance, *-lááh* can describe motion or position beyond some point in space, named by the object of the postposition. In these 'literal' uses, postpositions are frequently accompanied by additional locative markers such as *-di* in (19-a), but this is not obligatory (19-b).

(19)   a.   Tooh ńlínígíí   bi-**láah**-di   shighan   si'á.
            water 3SUBJ.extend.NMLZ 3OBJ-beyond-LOC 1POSS.hogan 3SUBJ.sit
            'My place is over beyond the river.'   (Young & Morgan, 1987, 222)
       b.   Ko̧' yee naagháhí dził   bi-**láah**-go   sh-ił   dah
            balloon   mountain 3OBJ-beyond-SUB 1OBJ-with up
            diildo.
            3SUBJ.fly.PERF
            'My balloon went flying up with me beyond the mountains.'
                                                            (Young & Morgan, 1987, 342)

This paper will not discuss how one might reconcile the entries that we give for standard markers with the use of the same expressions to convey various other types of meaning. For discussion of connections between comparative and locative meaning in particular in general, we refer the reader to Hohaus 2012. For discussion of this issue with particular respect to Navajo, see Schwarzschild 2012, 2014.

3   Clausal and phrasal analyses of comparatives

3.1   Overview

There are two major approaches to a sentence with the shape in (20), both for English and for its counterparts in other languages. The key feature of (20) is that the standard appears to consist only of DP *Ben*.

(20)   Alice is taller than Ben.

One analysis of sentences like (20) is that the standard of comparison contains a clause which has been largely elided (Bresnan, 1973; von Stechow, 1984; Lechner, 2004; Bhatt &

Takahashi, 2011), as in (21).

(21)   Alice is taller than [$_{CP}$ Ben ~~is tall~~].

This is the same kind of syntax as is given to standards with overt clausal structure:

(22)   a.   This table is longer than [$_{CP}$ the door is wide].
         b.   Alice is taller than [$_{CP}$ Ben is ~~tall~~].

A clausal syntax for the standard is most commonly paired with a semantic analysis of comparative and other degree morphemes as quantifiers over degrees (type $\langle\langle d,t\rangle,\langle\langle d,t\rangle,t\rangle\rangle$). The entry in (23) for *more/-er* is based on proposals by Cresswell (1976). The two properties of degrees taken as argument are both maximalized by the comparative morpheme such that comparison is ultimately between the maximal degrees in each set. Motivation for addition of maximalization comes from von Stechow (1984) and Rullmann (1995).[7]

(23) $-er_{clausal} \rightsquigarrow \lambda D_{\langle d,t\rangle} . \lambda D'_{\langle d,t\rangle} . \text{MAX}(D') > \text{MAX}(D)$

         where $\text{MAX(D)} \rightsquigarrow \lambda D_{\langle d,t\rangle} . \iota d . D(d) \,\&\, \forall d' \, [D(d') \to d' \le d]$

The comparative morpheme takes as argument two sets of degrees: one contributed by the standard phrase and the other contributed by the main clause. The following LF is based on von Stechow (1984), as given by Beck et al. (2012).[8]

(24)   [[-er$_{clausal}$ [than [λd_1 [Ben is d_1 tall]]]] λd_2 [Alice is d_2 tall]]]

As an aside, the proposals above have been criticized for English because all semantic work is done by *more/-er* while *than* is vacuous. von Stechow (1984) and Rullmann (1995) suggest an alternative in which maximalization over the standard of comparison is accomplished by *than*, so that the comparative morpheme instead composes with a single degree followed by a property of degrees. Other approaches in this vein assign maximalization to a *wh*-operator and treat the standard as a free relative of degrees à la Partee (1987) and Jacobson (1995).

(25)   a. $-er_{clausal} \rightsquigarrow \lambda d_d . \lambda D_{\langle d,t\rangle} . \text{MAX}(D) > d$
         b. $than \rightsquigarrow \lambda D_{\langle d,t\rangle} . \text{MAX}(D)$

While this kind of account may be well-suited to a language like English, Navajo does not have separate comparative morphemes and standard markers. Thus, there is no overt element in Navajo to which we might wish to treat as a separate maximality operator.

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[7]Alternative entries that are also of quantifier type include the following:

(i)   a. $-er_{clausal} \rightsquigarrow \lambda D_{\langle d,t\rangle} . \lambda D'_{\langle d,t\rangle} . \exists d . D'(d) \wedge \neg D(d)$
        b. $-er_{clausal} \rightsquigarrow \lambda D_{\langle d,t\rangle} . \lambda D'_{\langle d,t\rangle} . D \subset D'$

Nothing about the claims made in the rest of this paper should change if either of these denotations is substituted for any instance of a comparative morpheme with the denotation in (23).

[8]Abstraction over degree arguments in each clause is necessitated by the assumption that gradable predicates in English are expressions of type $\langle d,\langle e,t\rangle\rangle$. The LF will be simpler in Navajo since we take inflected adjectival verbs to already denote expressions of type $\langle d,t\rangle$.

Thus, when we consider the analysis of Navajo, we will focus on entries like (26) in which all meaning is contributed by a single morpheme, and where two sets of degrees are taken as argument.

(26) $\text{-}l\acute{a}\acute{a}h_{clausal} \rightsquigarrow \lambda D_{\langle d,t \rangle} . \lambda D'_{\langle d,t \rangle} . \text{MAX}(D') > \text{MAX}(D)$

Precedent for an entry like (26) for a standard marker comes from Alrenga et al. (2012), who observe that it is very common to find languages using only a standard marker to express comparative meanings.

The second major approach to the string in (20) treats the standard not as a reduced clause but instead as just a DP.

(27)   Alice is taller than $[_{DP}$ Ben].

While this syntactic analysis has been debated for English (Heim, 1985; Kennedy, 1997; Lechner, 2004; Bhatt & Takahashi, 2011), there is greater consensus in favor of it for several other languages; see Xiang 2005 for Mandarin, Pancheva 2006 for Slavic, Hofstetter 2009 for Turkish, Bhatt & Takahashi 2011 for Hindi-Urdu, and Bochnak 2013 for Luganda.

The syntax in (27) is compatible with the following denotation for -er. This entry is taken from Heim (1985); see Beck et al. (2012) for comparison of it with an alternative from Kennedy (1997).

(28) $\text{-}er_{phrasal} \rightsquigarrow \lambda y_e . \lambda g_{\langle d,et \rangle} . \lambda x_e . \text{MAX}(\lambda d . g(x,d)) > \text{MAX}(\lambda d . g(y,d))$

It has been suggested that there also exists a variant of (28) whose first argument is a degree (Pinkal, 1989; Beck et al., 2004; Bochnak, 2013).

(29) $\text{-}er_{phrasal} \rightsquigarrow \lambda d_d . \lambda g_{\langle d,et \rangle} . \lambda x_e . \text{MAX}(\lambda d . g(x,d)) > d$

Under this account, the comparative morpheme does not take as argument two sets of degrees, but instead composes with two entities (or one entity and one degree) and a gradable predicate (type $\langle e, \langle \langle d, \langle e,t \rangle \rangle, \langle e,t \rangle \rangle \rangle$). As formulated here, the comparative relation still holds between the maximal degrees in two sets of degrees, but the sets of degrees are derived directly by *more/-er*.

As before, an account of Navajo in this style would assign the meaning of *more/-er$_{phrasal}$* to the standard marker *-lááh*. An entry of this kind is attributed to standard markers by Bhatt & Takahashi (2011) in their analysis of Hindi-Urdu.

(30) $\text{-}l\acute{a}\acute{a}h_{phrasal} \rightsquigarrow \lambda y_e . \lambda g_{\langle d,et \rangle} . \lambda x_e . \text{MAX}(\lambda d . g(x,d)) > \text{MAX}(\lambda d . g(y,d))$

In the next section, we discuss whether a clausal or a phrasal analysis is more appropriate for Navajo. We will argue that syntactically, a phrasal analysis is more appropriate, but semantically, a clausal-style analysis should be adopted.

3.2   Diagnostics

There exist a number of structures that have been taken to support a phrasal analysis (syntax and semantics) over a clausal one, and vice versa. While some of these diagnostics

were originally discussed for English (Hankamer, 1973; Heim, 1985; Kennedy, 1997), we will illustrate them as applied to Hindi-Urdu by Bhatt & Takahashi (2011), who argue that only a phrasal analysis is appropriate for Hindi-Urdu. Hindi-Urdu comparatives are at least superficially similar to Navajo comparatives, making their comparison potentially instructive.[9]

Like Navajo, Hindi-Urdu forms comparatives by marking a nominal standard of comparison with a postposition. The postposition *-se* is also found outside of comparative constructions to express temporal and locative notions of 'from' (Bhatt & Takahashi, 2011, 591).[10]

(31)   John [$_{DP}$ Bill]-se   (zyaadaa) lambaa   hai.
       John   Bill-than more   tall.MASC.SG be.PRES.SG
       'John is taller than Bill.'

The first diagnostic concerns the acceptability of multiple phrases within the standard of comparison. Hindi-Urdu does not permit the standard to contain any expression in addition to the DP. In the following example, a time adverb is permitted in the main clause but rejected in the standard:

(32)   *Tina-ne aaj   Pim kal-se   zyaadaa kitaabẽ   paRh-ĩ:
       Tina-ERG today Pim yesterday-than more   books.FEM read-PERF.FEM.PL
       (*Intended:* 'Tina read more books today than Pim yesterday.')

The English translation shows that English, by contrast, permits multiple phrases in the standard of comparison. We expect the English sentence to be acceptable if the English standard contains elided clausal structure, which Bhatt & Takahashi (2011) argue that it does. The absence of clausal structure from Hindi-Urdu standards means that we correctly predict adverbs to be ungrammatical.

The second diagnostic concerns the availability of reflexive standards of comparison. Hankamer (1973) observes for English that a reflexive bound by the subject cannot function as the standard in clear cases of clausal comparison (33-a). Reflexives become grammatical if the standard is apparently phrasal, however (33-b).

(33)   a.   *No girl is taller than herself is.
       b.   No girl is taller than herself.

Examples like these led Hankamer to suggest that English can have true phrasal standards which are not derived from clausal reduction. If the standard is a clause as in (33-a), *herself* will not be locally bound and thus is correctly predicted to be ungrammatical. In (33-b), on the other hand, A phrasal syntactic analysis of (33-b), on the other hand, would

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[9]A class of diagnostics that we do not consider here looks at the case of nominal expressions in the standard. Certain cases can be indicate reduced clausal structure (Heim, 1985; Pancheva, 2006). Since Navajo does not have nominal case, however, these diagnostics will not be instructive.

[10]Unlike Navajo, Hindi-Urdu sentences like (31) can optionally contain the morpheme *zyaadaa* glossed here as a comparative marker 'more'. This morpheme becomes obligatory in certain comparative constructions, including comparisons of quantity. See discussion of its possible semantic function by Schwarzschild (2013).

place *herself* in the same clause as the coreferential subject, making the reflexive not only licensed but obligatory on usual binding-theoretic assumptions (Chomsky, 1981).

In Hindi-Urdu, the standard in a *se*-phrase can, and indeed must, be a reflexive form when it is coindexed with the subject of the gradable predicate. This configuration suggests that Hindi-Urdu standards are not derived from reduction of a full clausal structure.[11]

(34)　koi-bhii$_i$ apne　　　[$_{DP}$ aap]-se$_i$　/ [$_{DP}$ us]-se$_{j/*i}$ lambaa nahĩ: ho
　　　 anyone REFL.POSS　REFL-than　　him-than tall　NEG be
　　　 sak-taa
　　　 can-HABITUAL.MASC.SG
　　　 'No one$_i$ can be taller than himself$_i$/him$_{j/*i}$.'

The final diagnostic we highlight concerns quantifier scope in standards. Bhatt & Takahashi (2011) show that in an English sentence like (35), the universal quantifier is permitted to take scope within the standard of comparison.[12]

(35)　More students read every syntax paper than (read) every semantics paper.
　　　 ≈ The number of students who read every syntax paper exceeds the number of students who read every semantics paper.

This reading would arise from the following LF, as given in Beck et al. (2012):

(36)　[[-er$_{clausal}$ [than [$\lambda d \,.\, d$-many people read every semantics paper]]]
　　　　 [$\lambda d \,.\, d$-many people read every syntax paper]]

Bhatt & Takahashi (2011) give the following translation into Hindi-Urdu for sentence (35).

(37)　[har　syntax paper] [har　semantics paper]-se　zyaadaa logõ-ne　　paRh-aa.
　　　 every syntax paper　every semantics paper-than　more　people-ERG read-PERF
　　　 ≈ For every pair $\langle x, y \rangle$ of a syntax paper x and a semantics paper y, more people read x than y. (The least-read syntax paper was read by more people than any semantics paper) (paraphrase from Beck et al. 2012)

In contrast with the English sentence, however, (37) only has a reading in which the universal quantifier is interpreted with scope above the comparative relation. This meaning can be paraphrased in terms of 'pairwise comparison' as shown above. This reading corresponds to the following LF (Beck et al., 2012):

(38)　[every syntax paper λx [every semantics paper
　　　　 λy [x [[-er$_{phrasal}$ than y] [$\lambda d \,.\, \lambda z \,.\, d$–many people read z]]]]]

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[11]We note that these data may be consistent with a treatment of phrasal standards either as simple DPs or as reduced small clauses as Pancheva (2006, 2010) proposes for Slavic (see sec. 5.1) if sentences of the form *I consider myself lucky* are analyzed as with small clause structure. See Pesetsky (1995) and Bruening (2010) for arguments that true small clauses are opaque domains for anaphora.

[12]Much has been written about quantifiers in English that appear to obligatorily scope outside of comparatives. See (Gajewski, 2008; Larson, 1988; Schwarzschild & Wilkinson, 2002; Heim, 2006; Alrenga & Kennedy, 2014; Fleisher, 2016).

This difference between English and Hindi-Urdu is expected if English permits clausal standards while Hindi-Urdu does not. In English, the quantificational phrase *every semantics paper* ($\langle\langle e,t\rangle,\rangle$) will undergo Quantifier Raising in order to compose with the unpronounced adjective in the standard of comparison, which seeks a type e argument. The quantificational phrase can undergo QR within the clausal standard of comparison and thus take low scope with respect to the comparative operator. In Hindi-Urdu, by contrast, quantificational phrases cannot take scope within the standard of comparison. This makes sense if Hindi-Urdu has phrasal standards of comparison and the standard marker *-se* seeks a type e argument: *Every semantics paper* must QR out of the standard of comparison in order to resolve the type mismatch.[13]

4 Applying the tests to Navajo

4.1 First impressions

A phrasal analysis of Navajo standards immediately suggests itself when we consider simple degree constructions like those below. The standard marker *-lááh* obligatorily bears pronominal marking corresponding to the standard of comparison. On verbs we treated prefixes for objects and subjects as saturating argument positions of their host: Why not say that *shi-* in (39) saturates the first argument of *-lááh$_{phrasal}$*?

(39) Alice shi-lááh   ’áníłnééz.
      Alice 1OBJ-beyond 3SUBJ.tall
      ‘Alice is taller than me.’

But despite the initial appeal of a phrasal syntactic analysis, subcomparative-like structures like (40) have been previously used to motivate a clausal analysis for Navajo standards of comparison. Bogal-Allbritten (2013a, 2016) treats all Navajo standards as underlyingly clausal, extrapolating from complex structures like (40) to simple cases like (39).

(40) Ch’é’étiin [bikáá’adání ’áníłnééz]-ígíí   yi-lááh   ’áníłtéél.
      door   table   3SUBJ.long-NMLZ 3OBJ-BEYOND 3SUBJ.wide
      ‘The door is wider than the table is long.’

As we will see next, however, despite the apparent existence of subcomparatives other diagnostics point away from a clausal analysis of the standard.

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[13]Hindi combines a universal quantifier *sab* with standard marker *-se* to translate superlatives prompts, as well. As expected given, *sab* can only take high scope.

(i)   Atif sab-se lambaa hai.
       Atif all-ABL tall   be.PRES.SG
       ‘Atif is the tallest.’ (*Lit:* Atif is taller than everyone)

4.2 Evidence for a syntactically phrasal standards

With respect to the majority of diagnostics applied by Bhatt & Takahashi (2011) to Hindi-Urdu, Navajo seems to pattern like a clear example of a language with phrasal standards of comparison. First, like Hindi-Urdu — and unlike English — Navajo disallows multiple phrases in the standard of comparison.

(41) *'Ahbínídą́ą́' Alice 'ałní'ní'ą́ą́dóo Ben yi-láah-go   bááh łikaní
      morning   Alice afternoon   Ben 3OBJ-beyond-SUB cookie
      yiyííyą́ą́'.
      3OBJ.3SUBJ.eat.PERF
      Context: Alice ate 4 cookies this morning. Ben ate 2 cookies this afternoon. I tell you: Alice ate more cookies this morning than Ben ate this afternoon.

(41) is not ungrammatical because it compares quantities. Quantities can be compared as in (42), which differs from (41) only in the lack of adverbs.

(42) Alice Ben yi-láah-go   bááh łikaní yiyííyą́ą́'.
      Alice Ben 3OBJ-beyond-SUB cookie   3OBJ.3SUBJ.eat.PERF
      'Alice ate more cookies than Ben did.

We can further conclude that (41) must be ungrammatical because of the temporal adverb *'ałní'ní'ą́ą́dóo* 'afternoon' in the standard of comparison. The sentence again becomes grammatical if this adverb is removed:

(43) 'Ahbínídą́ą́' Alice Ben yi-láah-go   bááh łikaní yiyííyą́ą́'.
      morning   Alice Ben 3OBJ-beyond-SUB cookie   3OBJ.3SUBJ.eat.PERF
      'Alice ate more cookies this morning than Ben did.'

Second, Navajo postpositional standard markers can bear the the reciprocal object marker *'ahi-*. We illustrate with the comparative standard marker *-láah* as well as the equative standard marker *-ee*.[14][15]

(44) Alice dóó Mary doo 'ahi-láah   'áníilnééz   da.
      Alice and Mary NEG RECIP_OBJ-beyond 1PL_SUBJ.tall NEG
      'Alice are Mary are not taller than each other.' (I.e. they are exactly the same height)

---

[14]Equative structures with the enclitic standard marker *-gi* comparable to seem to be ruled out for independent reasons, namely that Navajo lacks a non-affixal reciprocal pronoun (Willie, 1991), which would be what *-gi* would need to attach to.

[15]It is also possible to find the reflexive object marker *'ádi-* with standard markers. However, the meanings here were a bit odd, e.g. (i) (Young & Morgan, 1987, 61). Further work is needed to determine how the meaning of (i) arises from its components.

(i) Díí tsin 'ał-'oh   neel'ą́.
     this stick REFL_OBJ-short.of 3SUBJ.extend
     'These sticks aren't the same length.'   *Lit:* These sticks extend short of each other.

(45) 'ah-ee-níilnééz
     RECIP_OBJ-with-1PL_SUBJ.tall
     'We are equally tall.'   *Lit.* We are as tall as each other.
                                        (Young & Morgan, 1987, 54)

Reflexive and reciprocal object markers are obligatorily locally bound by an appropriate (i.e. non-singular) subject in Navajo (Willie, 1991). The reciprocal marker in the following sentence cannot be replaced with a third-person marker without changing the meaning (i.e. 'We are painting some third person(s).').

(46) 'Ahiidleesh.
     RECIP_OBJ.1DL_SUBJ.paint.IPFV
     'We are painting each other.'   (Willie, 1991, 34)

Thus, the grammaticality of reciprocal markers as standards of comparison suggests strongly that the standard of comparison should not be analyzed as a full clause, of which the standard is the subject.

4.3 Evidence for quantificational meaning from superlatives

A phrasal treatment of Navajo standards is challenged, however, by comparatives with indefinite standards, used to express superlative meaning. Navajo lacks a single superlative marker comparable to English *-est* but instead translates superlative prompts by combining the comparative standard marker *-lááh* seen above with an object prefix of the shape *'a*. Superlative meaning arises regardless of the morphological form of the adjectival verb (e.g. *'ániłnééz* vs. *nineez*).[16] Crucially, this sentence only has one meaning: Alice is taller than anyone else is. It cannot mean that there is someone whom Alice is taller than.

(47)   a. Alice 'a-lááh   ánílnééź.
           Alice UNSPEC_OBJ-beyond 3SUBJ.tall
           'Alice is tallest, Alice is taller than anyone.'
       b. Alice 'a-lááh-go   nineez.
           Alice UNSPEC_OBJ-beyond-SUB 3SUBJ.tall
           'Alice is tallest, Alice is taller than anyone.'

The *'a-* object marker can also be borne by the postpositional standard marker used in comparisons of inferiority, *-'oh*. The meaning here is identical to (47) except that the meaning is that Alice is shorter (less tall) than anyone else in the context.

(48)   Alice 'a-'oh   'ánílnééź.
     Alice UNSPEC_OBJ-short.of 3SUBJ.tall
     'Alice is shortest.'   *Lit:* Alice is tall short of anyone.

---

[16]This sentence has a true superlative interpretation in the sense that it means that the subject bears the property in question to a unique degree among all relevant competitors. That is, (47) does not merely express that Alice is tall to a high degree, but rather that she is taller than anyone else under comparison. This sentence was rejected in a context in which Alice and Ben were both exceptionally tall individuals but the same height as each other.

Young & Morgan (1987) refer to the 'a- prefix as the 'unspecified' or 'indefinite' object marker. Reflexes of 'a- with the same characteristics are found in other Athabaskan and Dene languages. In Navajo, 'a- occupies the same position in the morphological template otherwise associated with the kind of object markers we have already seen (Young & Morgan, 1987). As such, it is not possible for a verb to bear both 'a and a 'normal' object marker.

The 'a- prefix is by no means restricted to superlative constructions. Minimal pairs of verbs with unspecified objects ((a)-sentences) and third-person objects ((b)-sentences) are given below.[17]

(49)   a.   Na'niłkaad.
                UNSPEC_OBJ.3SUBJ.herd.IPFV
                'S/he is herding (something).'
        b.   Neiniłkaad.
                3OBJ.3SUBJ.herd.IPFV
                'S/he is herding it/them.'

(50)   a.   'Asts'ééh.
                UNSPEC_OBJ.1SUBJ.eat_mush.IPFV
                'I am eating (something).'
        b.   Yists'ééh.
                3OBJ.1SUBJ.eat_mush.IPFV
                'I am eating it.'

The 'a- object marker is also found on postpositions outside of those used in superlative constructions.[18]

(51)   a.   Shizhéé   '-ee   nástaaz.
                1POSS.father UNSPEC_OBJ-with 3SUBJ.wrap.up.PERF
                'My father was wrapped up (in something).'
        b.   Shichee   y-ee   nástaaz.
                1POSS.grandfather 3OBJ-with 3SUBJ.wrap.up.PERF
                'My grandfather was wrapped up in it.'

<div align="right">(Young & Morgan, 1987, 569)</div>

Replacing a regular object marker with 'a- has two concrete effects. First, the use of 'a- blocks the use of verb-external nominal expressions, which are unremarkable with regular object markers.

(52)   a.   'Ashkii (*dibé) na'niłkaad.
                boy   sheep   UNSPEC_OBJ.3SUBJ.herd.IPFV
                'The boy is herding.'

---

[17]As the translations suggest, the verb stem may impose particular kinds of physical attributes on both regular and unspecified objects to have particular physical attributes. For example, the verb stem *tsééh* requires that the patient of the verb be mushy matter; thus, the unspecified object in (50-a) must be mushy even though it does not refer to any particular mushy matter in particular as the object marker in (50-b) does. See Fernald & Willie (2001) for discussion.

[18]The 'a- prefix phonologically reduces into a glottal stop here.

b. 'Ashkii dibé   neinilkaad.
   boy   sheep 3OBJ.3SUBJ.herd.IPFV
   'The boy is herding sheep.'

Second, if a verb bears the *'a-* object prefix, a subsequent verb bearing a regular object prefix cannot refer back to the object involved in the event described by the first verb (Fernald et al., 2000).

(53) 'Ashkii léi'   na'nilkaad.   #'Éí   táididoogish.
      boy   INDEF UNSPEC_OBJ.3SUBJ.herd.IPFV   that.one 3OBJ.3SUBJ.shear.FUT
      'A boy is herding. He will shear it/them.'

On the basis of these two behaviors, Fernald et al. (2000) propose to treat *'a-* as a detransitivizing affix as opposed to a referential pronoun of the kind denoted by other object prefixes in the language. We give *'a-* the following general meaning (compare Dowty's (1978) rule for Unspecified Object Deletion).[19]

(54)   Given a predicate $P \rightsquigarrow \lambda x . \lambda y \ldots \lambda z . P(x, y, \ldots z)$, then
        $'a\text{-}P \rightsquigarrow \lambda y \ldots \lambda z . \exists x . P(x, y, \ldots, z)$

To illustrate, *na'nilkaad* in (53) arises through composition between the unspecified object marker *'a* and verb (or verb stem) followed by composition with the third-person pronominal subject.

(55) $na'nilkaad_i$ $\rightsquigarrow \exists x . \mathsf{herd}(x, v_i)$
       UNSPEC_OBJ.3SUBJ$_i$.herd.IPFV

With this in hand, we return to the superlative construction. We stated above that (47) cannot be used in a context in which there is a particular individual who Alice is taller than. However, this is precisely the truth conditions that are generated if we assign *-lááh* the denotation associated above with phrasal standards.[20]

(56)   a. $-lááh_{phrasal} \rightsquigarrow \lambda y . \lambda g_{\langle d, et \rangle} . \lambda x . \mathrm{MAX}(\lambda d . g(x, d)) > \mathrm{MAX}(\lambda d . g(y, d))$
       b. $'a\text{-}lááh \rightsquigarrow \lambda g_{\langle d, et \rangle} . \lambda x . \exists y . \mathrm{MAX}(\lambda d . g(x, d)) > \mathrm{MAX}(\lambda d . g(y, d))$
       c.   *Alice 'a-lááh 'ánílnééz* $\rightsquigarrow$
            $\exists y . \mathrm{MAX}(\lambda d . \mathsf{tall}(\mathsf{Alice}, d)) > \mathrm{MAX}(\lambda d . \mathsf{tall}(y, d))$
            True iff there exists some y, such that Alice's maximal degree of height exceeds the maximal degree of height of y

If we instead permit Navajo to have clausal standards of comparison, we generate the right meaning. In the following derivation, *'a-* composes with the unpronounced copy of the gradable predicate in the standard of comparison and so has low scope.

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[19]For simplicity, we assume that both subject and object arguments are part of verb's basic meaning, rather than introduce the subject via a functional head (Hale, 2000; Rice, 2000). We also suppress situation arguments. Nothing hinges on this.

[20]The translation in (56-c) is a simplification. Since we assume that pronominal prefixes saturate the argument positions of verbs, *'ánílnééz* would actually be translated as $\mathsf{tall}(v_i)(d)$. The index i is associated with Alice via a binding process (Baker, 1996).

(57)   a.   *-lááh$_{clausal}$* $\rightsquigarrow \lambda D_{\langle d,t \rangle} . \lambda D'_{\langle d,t \rangle} . \text{MAX}(D') > \text{MAX}(D)$

       b.   *Alice 'a-lááh 'áníłnééz* $\rightsquigarrow$

$$\text{MAX}(\lambda d . \text{tall}(\text{Alice}, d)) > \text{MAX}(\lambda d . \exists y . \text{tall}(y, d))$$

               True iff Alice's maximal degree of height exceeds the maximal degree d such that for any y, y is tall to d

These results strongly suggest not only that Navajo can have a quantificational semantics for standard markers such as *-lááh*, but furthermore that they must. Admitting a phrasal semantics for *-lááh* would predict a high scope indefinite reading to be available for sentences in which *'a-* functions as the standard of comparison. Although *'a-* might seem like a prime candidate for a phrasal semantics for the standard marker — as *'a* consists of a nominal affix and nothing more — we never find *'a-* being interpreted with scope over the comparative relation.

However, this conclusion about the semantics of *-lááh* and, by extension, other standard markers is in conflict with earlier evidence that strongly supported a phrasal syntax for the standard. The goal of the analysis in the next section is to resolve this conflict.

5   Quantificational standard markers, but phrasal standards

5.1   Proposal

We have seen evidence that suggests that Navajo standards are phrasal and part of the same clause as the rest of the degree construction, rather than deriving from reduced clausal structure. Nevertheless, we have also seen two kinds of evidence that challenge this view. First, subcomparatives; we will return to their analysis in sec. 5.2, where we argue that they in fact do not challenge a phrasal analysis. The second piece of evidence is the obligatory low scope of quantificational prefix *'a-* in Navajo superlative constructions. This latter challenge is central to our main claim in this paper: Navajo standard markers must have quantificational entries. We represent the class of standard markers with *-lááh*, but the proposals made here should be able to be generalized to all postpositions and enclitics used in degree constructions.

(58)   *-lááh* $\rightsquigarrow \lambda D_{\langle d,t \rangle} \lambda D'_{\langle d,t \rangle} . \text{MAX}(D') > \text{MAX}(D)$

Nevertheless, we will maintain that Navajo standards are syntactically phrasal.

In order to reconcile a quantificational semantics with a phrasal treatment of standards, we will need to associate the entities denoted by standard phrases with properties of degrees without adding actual clausal structure in the process. We propose that composition between an entity-denoting standard and a quantificational standard marker is mediated by MEAS, a null functional head. We adopt the entry assigned to MEAS by Solt (2009).

(59)   MEAS $\rightsquigarrow \lambda x_e . \lambda d_d . \mu_{\text{DIM}}(x) \geq d$ (Solt, 2009, 105)

The measure function μ_{DIM} associates an entity x with a set of degrees ($\langle d, t \rangle$) on a scale along some dimension. For Solt (2009), the choice of dimension is determined by the nominal expression taken as argument, the degree construction that the type $\langle d, t \rangle$ expression

occurs in, and context.

There is significant precedent in the literature for measurement operators in a variety of constructions, although proposals vary as to whether the meaning of this operator is built into nominal meaning or expressed by a separate head as we assume here (Cresswell 1976; Krifka 1989; Kayne 2005; Schwarzschild 2006; Svenonius & Kennedy 2006; Nakanishi 2007; Solt 2009; Rett 2014; Wellwood 2015, among others). Measurement operators are perhaps best known for being the semantic 'glue' which enables composition between nouns and measure phrases or numerals (e.g. *six cats*, *5cm paperclips*), as well as between nouns and quantity adjectives (e.g. *many*) on analyses that treat them as relations between degrees and intervals (Solt, 2009, 2015; Rett, 2008, 2014). In our proposal, the role of MEAS is also to mediate between an entity and a degree expression, in this case a standard marker like *-lááh*.

We illustrate the application of MEAS in Navajo degree constructions with the following simple sentence:

(60)   Alice yi-lááh   'áníłnééz.
       Alice 3OBJ-beyond 3SUBJ.tall
       'Alice is taller than him/her/it.'

The standard of comparison is the third-person pronominal prefix *yi-*. Composition of *yi-* with the measurement operator MEAS produces a set of degrees along some scale which are associated with the referent of this pronoun.

(61)   MEAS $yi_i \rightsquigarrow \lambda d \,.\, \mu_{\text{DIM}}(v_i) \geq d$

The set of degrees that is produced then composes with the standard marker *-lááh*.

(62)   *-lááh* [MEAS yi_i] $\rightsquigarrow \lambda D'_{\langle d,t \rangle} \,.\, \text{MAX}(D') > \text{MAX}(\lambda d \,.\, \mu_{\text{DIM}}(v_i) \geq d)$

The second set of degrees taken by *-lááh* is contributed by material from the main clause. The gradable predicate *'áníłnééz* bears a subject prefix which we have taken to saturate the entity argument position of the verb. We use the same simplification introduced earlier and show direct composition between the verb and *Alice*, the verb-external nominal expression which will ultimately come to value the subject pronominal prefix. The set of degrees to which Alice is tall is taken as argument by yi_1-*lááh* as it was defined in (62).

(63)   *Alice yi_i-lááh 'áníłnééz* $\rightsquigarrow$
       $\text{MAX}(\lambda d \,.\, \text{height}(\text{Alice}) \geq d) > \text{MAX}(\lambda d \,.\, \mu_{\text{DIM}}(v_i) \geq d)$
       True iff the maximal degree to which Alice is tall exceeds the maximal degree associated with the referent of yi_i

The dimension associated with MEAS is still unspecified in our truth conditions above, but it seems reasonable to assume that in a sentence like (60), the most accessible meaning is one in which μ is equated with the measure function from the main clause gradable predicate, namely height.

We now turn to the analysis of Navajo superlatives, as repeated in (64):

(64)   Alice 'a-lááh   áníłnééź.
           Alice UNSPEC_OBJ-beyond 3SUBJ.tall
           'Alice is tallest, Alice is taller than anyone.'

The unspecified object prefix *'a-* composes first with MEAS. Composition returns the set of degrees d such that for any y, d is a degree associated with y on some scale to be determined.

(65)   *'a* MEAS $\rightsquigarrow \lambda d \,.\, \exists y \,.\, \mu_{\mathrm{DIM}}(y) \geq d$

This set of degrees is then taken as argument by the standard marker *-lááh*, just as before. The second set of degrees taken as argument by *-lááh* is determined by application of the main clause gradable predicate to the subject. Keeping the same notational simplifications from above in place, the final truth conditions are as follows. We once again assume that the measure function μ in MEAS is identified with the measure function, height, from the gradable predicate in the main clause.[21]

(66)   *Alice 'a-lááh áníłnééź* $\rightsquigarrow$
       MAX$(\lambda d \,.\, \mathsf{height}(\mathsf{Alice}) \geq d) > $ MAX$(\lambda d \,.\, \exists y \,.\, \mu_{\mathrm{DIM}}(y) \geq d)$

       True iff the maximal degree to which Alice is tall exceeds the maximal degree to which any y is tall

We recognize there to be a slight mismatch in morphological and semantic bracketing here. Although the prefixes *yi-* and *'a-* are taken as argument by MEAS, they are nevertheless morphologically realized as prefixes to the standard marker *-lááh*. A preference for matching the Logical Form with morphological bracketing might suggest that these two elements compose directly, as would be the case if *-lááh* had a non-quantificational meaning. But while regular object markers like *yi-* could in principle compose directly with *-lááh* so defined and still yield the right truth conditions, we have seen that the the same is not true for *'a*. If *'a-* composes directly with *-lááh*, only the unattested high scope

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[21]Our analysis of Navajo superlatives suggests another reason to avoid an alternative analysis on which *-lááh* is not of quantificational determiner type but is instead type $\langle d, \langle \langle d, t \rangle, t \rangle \rangle$, where its first argument is obtained by prior application of an independent MAX operator to the standard of comparison (von Stechow, 1984; Rullmann, 1995; Heim, 2001). Earlier, we suggested that while such an approach may make sense for languages in which we find a standard marker (and/or *wh*-operator) in addition to a comparative morpheme, it is not parsimonious for Navajo, where we seem to only have a comparative operator at our disposal: Why not put all meaning related to comparison in the entry of a quantificational *-lááh*, then, as we have done?

However, there is another kind of analysis that would be consistent with a type $\langle d, \langle \langle d, t \rangle, t \rangle \rangle$ meaning for *-lááh*. What if we instead define MEAS as a measure function $(\langle e, d \rangle)$ as Wellwood (2015) does? This measure function would apply to entity-denoting standards and return the (maximal) degree associated with that entity along some scale. Thus, there would be no need to posit an extra MAX operator, which we found unappealing above. However, this alternative treatment of MEAS cannot be integrated with our analysis of superlatives in Navajo. As we have defined *'a-* as an existential closure operation, it must compose with a set-type expression (i.e. the type ends in $\ldots t)$). We see no coherent way to define *'a-* such that it can compose with a measure function-type MEAS. This is, then, another strike against a type $\langle d, \langle \langle d, t \rangle, t \rangle \rangle$ treatment of Navajo standard markers.

reading for *’a-* is expected.[22] We assume that *yi-* and *’a-* are realized as prefixes on *-lááh* despite composing first with MEAS because MEAS is not overt and therefore not an eligible host for prefixes.

Finally, we note that our account of Navajo is similar in spirit to the small clause account of Slavic phrasal comparatives developed by Pancheva (2006, 2010). She proposes to maintain familiar quantificational denotations for comparative morphemes by treating apparently phrasal standards of comparison as reduced small clauses that contain an anaphoric gradable predicate. However, our analysis differs from Pancheva's in that MEAS crucially does not introduce (even small) clausal structure of the sort that might, for instance, license adverbs in the standard of comparison. Furthermore, it is not easy to see how a small clause account could be applied directly to Navajo, since there is no clear evidence for small clauses elsewhere in the language.

5.2 Accounting for subcomparatives

Subcomparatives like (67) and (68) originally motivated Bogal-Allbritten (2013a, 2016) to assume that Navajo must permit clausal standards.

(67) Ch'é'étiin [bikáá'adání ’áníłnééz]-ígíí   yi-lááh   ’áníłtéél.
      door   table   3SUBJ.long-NMLZ 3OBJ-BEYOND 3SUBJ.wide
      'The door is wider than the table is long.'

(68) Ch'é'étiin [bikáá'adání ’áníłnééz]-í-gi   ’áníłtéél.
      door   table   3SUBJ.long-NMLZ-at 3SUBJ.wide
      'The door is as wide as the table is long.'

While Bogal-Allbritten (2013a, 2016) did not assign any particular semantic function to *-ígíí*, it clearly plays some kind of key role in these sentences. If we remove *-ígíí* (or its morphological variant *-í* seen in (68)), the structure becomes ungrammatical, e.g.:

(69) *Ch'é'étiin [bikáá'adání ’áníłnééz] yi-lááh   ’áníłtéél.
       door   table   3SUBJ.long 3OBJ-BEYOND 3SUBJ.wide

The marker *-ígíí* is also found on structures previously analyzed as internally-headed relative clauses (Platero, 1974; Willie, 1989).

(70) [K'ad ’ashkii ’ałháá']-ígíí   yádoołtih.
       now boy   3SUBJ.snore.IPFV-NMLZ 3SUBJ.speak.FUT
      'The boy who is snoring right now will speak.'   (adapt. Platero 1974)

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[22]Crucially, the truth conditions are incorrect for *’a-lááh* if we assume direct composition regardless of which entry we assign to *-lááh*. We have already seen that this is true for the phrasal analysis in (56-c); (i) demonstrates that the truth conditions are still wrong if *-lááh* is instead given a quantificational meaning but nevertheless composes with *’a-* directly:

(i)   a. *-lááh* $\rightsquigarrow \lambda D_{\langle d,t \rangle}.\lambda D'_{\langle d,t \rangle}.\text{MAX}(D') > \text{MAX}(D)$
      b. *’a-lááh* $\rightsquigarrow \lambda D'_{\langle d,t \rangle}.\exists D_{\langle d,t \rangle}.\text{MAX}(D') > \text{MAX}(D)$
      c. *Alice ’a-lááh ’áníłnééz* $\rightsquigarrow \exists D_{\langle d,t \rangle}.\text{MAX}(\lambda d.\text{tall}(Alice, d)) > \text{MAX}(D)$
          'There exists a set of degrees D. Alice is taller than the maximal degree in this set.'

While the bracketed material above is clearly clausal, the addition of *-ígíí* allows it to function in positions that can otherwise be occupied by e.g. proper names, *viz.* *Alice yádoołtih* 'Alice will speak'.

On our analysis of standards developed above, MEAS composed with an entity and returned a property of degrees. In sentences like (70), the *ígíí*-marked clause appears to function in an argument position, where we would expect to find type e expressions. Why not, then, claim that the *ígíí*-marked clauses in subcomparatives also denote a simple type d expression? Under this view, we could treat *-ígíí* as either a choice function or iota operator, which would apply to a set of degrees (as would be denoted by a gradable predicate inflected for subject) and return a single degree. We illustrate with an iota operator.[23]

(71)   [Bikáa'adání 'áníłnééz]-ígíí
        table   3SUBJ.long-NMLZ
            $\leadsto \iota d \,.\, \mathsf{length}(\mathsf{table}) \geq d$ $\equiv \iota d \,.\, \mathsf{long}(\mathsf{table}, d)$

As we have defined *-lááh*, it is not able to compose directly with a type d expression. However, we can obtain a property of degrees if we allow MEAS to take a degree as argument.[24]

(72)   MEAS $\leadsto \lambda d \,.\, \lambda d' \,.\, \mu_{\mathrm{DIM}}(d) \geq d'$

Application of MEAS to the length d of the table would return a set of degrees along some dimension. This property of degrees would then go on to combine with *-lááh* and the rest of the clause in the familiar way. As before, we assume that the dimension associated with μ is determined by the main clause gradable predicate. We illustrate below with the subcomparative structure from (67).

(73)   *Ch'é'étiin bikáa'adání 'áníłnééz-ígíí yi-lááh 'áníłtéél* $\leadsto$
        $\mathrm{MAX}(\lambda d \,.\, \mathsf{width}(\mathsf{door}) \geq d) > \mathrm{MAX}(\lambda d \,.\, \mu_{\mathrm{DIM}}(\iota d \,.\, \mathsf{long}(\mathsf{table})(d)) \geq d)$
        True iff the maximal degree to which the doorway is wide exceeds the maximal degree to which the table's length is wide.

Intuitively, it is a bit odd to think about the width of a table's length, but this oddness seems to be a result of the paraphrase rather than the meaning itself. Since degrees of length and width both involve the same kind of dimensional parameter — a notion of "linear extent" (Kennedy, 1997, 21) — there is no reason why a degree of length should

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[23]Reason to prefer a choice function treatment of *ígíí*-marked clauses comes from cases in which these expressions do not appear to have the semantic attributes of definite noun phrases, such as in (i) from Grosu (2012), attributed to Ellavina Perkins. We will, however, leave this issue open for the time being.

(i)   [Bilasáana hazhó'ó tánágis]-ígíí   nisin.
       apple   carefully 3SUBJ.be.washed-NMLZ 3OBJ.1SUBJ.want/think
       'I want an apple that is well-washed.'

[24]This meaning may have broader currency in natural language, e.g. as the denotation for quantity words Coppock et al. (submitted).

not be able to be placed along the width scale.[25]

   This same entry for MEAS could also be used in measure phrase comparatives like (74), if we take measure phrases to denote degrees.[26]

(74)   Alice hastą́ą́di 'adées'eez yi-lááh   'áníłtso.
       Alice six   feet   3OBJ-beyond 3SUBJ.big
       'Alice is taller than six feet.'

The idea is that MEAS would apply to the measure phrase to return a set of degrees along some dimension. This set of degrees would then go on to compose with *-lááh* and the rest of the clause. This would be reminiscent of Hackl's (2000) analysis of measure phrase comparatives in English, which invokes an unpronounced quantity predicate in the standard of comparison. However, as was the case for Pancheva (2006, 2010), our account differs from Hackl's (2000) in that we do not invoke true clausal structure in Navajo standards of comparison.

5.3   Further use for MEAS

To this point, we have only seen MEAS used in standards of comparison. However, the following structure may be an example of MEAS in a main clause functioning as the sole gradable predicate. Ellavina Perkins volunteered the following sentence when asked her about structures like (41), where the standard should contain a temporal adverb. She volunteered the following sentence instead:

(75)   'Ahbínídą́ą́' Alice bááh łikaní yiyííyą́ą́'-ígíí   Ben 'ałní'ní'ą́ą́dóo
       morning   Alice cookie   3OBJ.3SUBJ.eat.PERF-NMLZ Ben afternoon
       yiyííyą́ą́'-ígíí   t'áa bi-lááh.
       3OBJ.3SUBJ.eat.PERF-NMLZ just 3OBJ-beyond
       Lit. The cookies that Alice ate this morning are more than the cookies that Ben ate this afternoon.
       Prompt: Alice ate 4 cookies this morning. Ben ate 2 cookies this afternoon. I tell you: Alice ate more cookies this morning than Ben ate this afternoon.

   Here, two *ígíí*-clauses seem to be compared directly by *-lááh*. However, we previously

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[25]The challenge will be to extend this view of *-ígíí* to its use in internally-headed relative clauses as in (70). When *-ígíí* is used in subcomparatives, it takes a property of degrees as argument. In the case of (70), however, it seems like *-ígíí* is combining with a complete clause rather than the type $\langle e, t \rangle$ expression that it seems we would need in order for the entire *ígíí*-marked expression to denote an entity. One possible direction is to take our analysis of *ígíí* as it occurs in subcomparatives as basic and reconsider Bogal-Allbritten & Moulton's (2017) analysis of Navajo internally-headed relative clauses as parallel to superficially similar structures in Japanese (Hoshi, 1995; Shimoyama, 1999). Instead, we might consider an account in which abstraction over one of the pronominal prefixes borne by the verb within the *ígíí*-marked clause. This process of abstraction would serve two functions: First, it would identify the head of the relative clause, and second it would create a property-type expression of the kind which *ígíí* can compose with. Precedent for this view of Navajo comes from Grosu (2012). However, we will leave resolution of this to future work.

[26]If measure phrases instead denote intervals ($\langle d, t \rangle$) as in Schwarzschild & Wilkinson (2002) and others, they could compose directly with *-lááh.*

suggested that *ígíí*-marked clauses denote either expressions of type d or type e. Here, a type e view would work if we assume that each *ígíí*-marked clauses composes with MEAS to yield a set of degrees.

(76) a. MEAS($\iota x.x$ is cookies that Alice ate this morning) $\leadsto$
$\qquad\lambda d . \mu_{\mathrm{DIM}}(\mathsf{Alice\text{-}cookies}) \geq d$
  b. MEAS($\iota x.x$ is cookies that Ben ate this afternoon) $\leadsto$
$\qquad\lambda d . \mu_{\mathrm{DIM}}(\mathsf{Ben\text{-}cookies}) \geq d$
  c. *-lááh*$(\lambda d . \mu_{\mathrm{DIM}}(\mathsf{Ben\text{-}cookies}) \geq d)(\lambda d . \mu_{\mathrm{DIM}}(\mathsf{Alice\text{-}cookies}) \geq d) \leadsto$
$\qquad$MAX$(\lambda d . \mu_{\mathrm{DIM}}(\mathsf{Alice\text{-}cookies})(d)) >$ MAX$(\lambda d . \mu_{\mathrm{DIM}}(\mathsf{Ben\text{-}cookies})(d))$

In the context given, it was clear that we were comparing quantities of cookies. It makes sense, then, if μ_{DIM} projects entities onto the quantity scale. In future work, we should investigate the extent to which μ_{DIM} is flexible: Could (75) be used in a context where we were comparing the relative size of the cookies eaten by Alice and Ben? Or their taste? Our account predicts that such interpretations should be available, but we leave confirmation of this to future work.

5.4 Scope of standard phrases

On our proposal, standard phrases in Navajo denote generalized quantifiers over degrees (type $\langle\langle d,t\rangle, t\rangle$).

(77) yi_i-*lááh* $\leadsto \lambda D'_{\langle d,t\rangle} .$ MAX$(D') >$ MAX$(\lambda d . \mu_{\mathrm{DIM}}(v_i) \geq d)$

As Heim (2001) discusses, Kennedy (1997) questions quantificational analyses of comparative structure given the absence of readings that we might expect if degree quantifiers can take scope with respect to other operators in the way that quantifiers over entities can. However, Heim argues that the apparent lack of scope-taking behavior by comparative structures does not necessarily rule against a quantificational analysis. Instead, she argues that many of the missing expected ambiguities can be attributed to certain systematic equivalence in truth conditions of sentences which might mask different heights of interpretation for degree quantifiers. As she writes, these cases are consistent with a theory in which degree quantifiers can take high scope, as well as a theory in which they never move past the first position where they can be interpreted.

Heim suggests that the clearest cases where true scope ambiguities can be detected are *exactly*-differentials, of the shape in (78):

(78) John is 4' tall. Every girl is exactly 1" taller than that.
  a. $\forall x . (girl)(x) \rightarrow$ MAX$\{d : \mathsf{tall}(x, d)\} = 4' + 1"$
$\qquad\approx$ For every girl x, the maximum degree to which x is tall is 49". Every
$\qquad$girl is precisely 49" tall.
  b. MAX$\{d : \forall x . \mathsf{girl}(x) \rightarrow \mathsf{tall}(x, d)\} = 4' + 1"$
$\qquad\approx$ The maximal degree d to which every girl is (at least) d-tall is 49".
$\qquad$The shortest girl is exactly 49" tall.

Such examples get complex to construct very quickly in Navajo since differential measure phrases are expressed using additional postpositional phrases, and have not yet been tested systematically.

Meanwhile, however, we can offer a few thoughts on what we might say if we do, ultimately, find that Navajo standard phrases are interpreted with lowest possible scope. Following Heim (2001), we suggest that this would not rule against a quantificational account of standard markers but would instead suggest that other factors in Navajo grammar are limiting scope possibilities. One such factor comes immediately to mind. As Bogal-Allbritten (2013a, 2016) discusses at length, adjectival verbs of a certain morphological form — the form used in most examples in this paper — impose tight locality restrictions on the position of the standard phrase. While the negation frame *doo...da* typically occurs directly adjacent to the verb (Faltz, 2000), we see in (79) that the equative standard phrase cannot be separated from the adjectival verb even by negation.

(79)   a.   *Alice Ben-gi doo 'áníłnééz.
             Alice Ben-at NEG 3SUBJ.tall NEG
             (*Intended:* 'Alice is not as tall as Ben.')
   b.   Alice doo Ben-gi 'áníłnééz.
             Alice NEG Ben-at 3SUBJ.tall NEG
             'Alice is not as tall as Ben.'

This contrasts with the normal flexibility in word order found for most verb-external expressions, in particular locative phrases used with non-adjectival verbs:

(80)   Baa' (Kinłání-di   biyáázh   (Kinłání-di)   naalnish.
      Bah   Flagstaff-LOC 3POSS.son Flagstaff-LOC 3SUBJ.work.IPFV
      'Bah's son works in Flagstaff.'   (Faltz, 2000, 38-39)

Navajo seems to exhibit rigid surface scope with respect to other elements that might be treated as scope-bearing, such as the indefinite expression *ła'* and negation as shown below (Bogal-Allbritten & Moulton, 2017).

(81)   a.   Ła'   t'áadoo yíyą́ą́'   da.
             INDEF NEG   3OBJ.3SUBJ.eat.PERF NEG
             'There was something I didn't eat.'
   b.   T'áadoo ła'   yíyą́ą́'   da.
             NEG   INDEF 3OBJ.3SUBJ.eatPERF NEG
             'I didn't eat anything.'

Putting these pieces together, we may not find the kinds of ambiguities one might expect given quantificational meanings for standard phrases since Navajo both has rigid surface scope and imposes certain restrictions on the position of standard phrases. With respect to the search for scope ambiguities, the kinds of cases to focus on in the future will be those adjectival verbs that Bogal-Allbritten (2013b, 2016) identifies as more permissive with respect to the position of standard phrases.

6   Conclusions and looking ahead: Quantification beyond degrees?

Our primary claim is that despite having a phrasal standards without reduced clausal structure, quantificational entries for Navajo standard markers are nonetheless appropriate given the scope of the existential prefix *'a-* in superlatives. We can wed a phrasal syntax to quantificational entries like (82) if we allow a measurement operator MEAS to apply to type e (or d) standards and return a property of degrees.

(82) $-lá**áh**_{clausal} \rightsquiggle \lambda D_{\langle d,t\rangle} . \lambda D'_{\langle d,t\rangle} . \text{MAX}(D') > \text{MAX}(D)$

Our analysis of Navajo suggests a novel strategy that might be employed in natural language to reconcile quantificational meanings for comparative morphemes (or standard markers) even when there is evidence that standards of comparison lack clausal structure.

Our proposal that Navajo has degree quantifiers of type $\langle\langle d,t\rangle, \langle\langle d,t\rangle, t\rangle\rangle$ is notable in light of prior claims that Navajo lacks true quantificational determiners. That is, it has been claimed that Navajo lacks expressions that form syntactic constituents with phrases that determine a property-type meaning that can serve as the restrictor to the quantifier (Faltz, 1995, 2000; Speas & Parsons-Yazzie, 1996). Faltz; Faltz observes, for instance, that the Navajo expression *t'áálá'í nítínígo* is sometimes translated to English as 'each'. In contrast with its English translation, however, this Navajo expression does not seem to form a constituent with the noun *'awéé* 'baby' in the following sentences: The two expressions can be separated from each other by extraneous material, such as a temporal adverb.

(83)   a.   'Awéé' 'adą́ą́dą́ą́' t'áálá'í nítínígo deíłzhozh.
             baby   yesterday each   PL.3OBJ.1SUBJ.tickle.PERF
             'I tickled each baby yesterday.'
         b.   T'áálá'í nítínígo 'adą́ą́dą́ą́' 'awéé' deíłzhozh.
             each   yesterday baby   PL.3OBJ.1SUBJ.tickle.PERF
             'I tickled each baby yesterday.'   (Faltz, 1995, 294)

Speas & Parsons-Yazzie (1996) also observe that *'ałtso*, often translated into English as 'every', can occur on its own without a nominal expression, in which case it is translated as an adverbial expression.

(84)   ('Ałk'ésdisií) 'ałtso yíyą́ą́'
         candy   all   1SG.SUBJ-ate
         'I ate it (the candy) all up.'   (adapt. Speas & Parsons-Yazzie 1996, 44)

Examples like (84) were among the original cases that led Jelinek (1995) and authors in the seminal Bach et al. 1995 volume on quantification to propose that some languages imply lack quantificational determiners (D-quantification), contra Barwise & Cooper's (1981) proposal that the kinds of structures and meanings involved in expressions like *every* or *every cat* are universally available.

One hypothesis for why Navajo lacks quantificational determiners could be that the

Navajo language simply lacks the kinds of logical resources necessary to express meanings of the right kind. For instance, we might hypothesize Navajo to be a language with access only to first-order logic. In such a language, we would not expect to find quantificational determiners, which denote relations between sets of individuals and would therefore require access to second-order logic.

However, Faltz (1995, 2000) suggests that perhaps Navajo lacks quantificational determiners because of independent facts about its grammar. If we take seriously the idea that the argument positions of Navajo verbs are saturated by prefixes, a Navajo verb will never denote a type $\langle e, t \rangle$ expressions at the point at which it becomes 'syntactically visible', as Faltz puts it. Thus we do not find quantificational determiners because the kind of property-type expressions they need to compose with in the syntax are simply not present.

Our findings suggest that Faltz (1995, 2000) was exactly right in his reason for why Navajo lacks quantificational determiners over entities. We have argued that Navajo does, in fact, have quantificational expressions of that denote relations between two sets. However, this type may be limited to the domain of degrees. This is expected given the grammar of Navajo: There are no pronominal prefixes that saturate the degree arguments of gradable predicates, so the right kind of property-type meanings — and the quantificational meanings that depend on them — will be available in the domain of degrees.

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