# Degrees and grammar

## An East Asian perspective

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In this article, we discuss some fundamental issues as well as several
unresolved questions of degree-based theories in contemporary linguistics
from the perspective of East Asian languages, with a view to pointing out
some directions for future research. We first focus on several controversies
surrounding the studies of comparative constructions in the literature, i.e.,
phrasal comparison vs. clausal comparison, individual comparison vs.
degree comparison, big DegP vs. small DegP, the points of cross-linguistic
variation, etc. We then expand the discussion to comparative constructions
and other degree-related constructions in Mandarin Chinese, Japanese, and
Korean, and demonstrate how an East Asian perspective offers a novel
insight into those controversies and uncovers considerable in-depth
commonality underlying a variety of degree-related constructions cross-
linguistically. We conclude by suggesting some directions for future within-
and cross-linguistic research.

**Keywords:** gradability, degree semantics, comparative construction, cross-
linguistic variation, Mandarin Chinese, East Asian languages

## 1. Introduction

The past few decades have witnessed a wealth of research under the rubric of
"degree semantics" that explores gradability and measurement in natural lan-
guage. With the introduction of degrees into semantic ontology, degree semantics
has deepened our understanding of a variety of phenomena including gradability,
comparatives, equatives, superlatives, and other degree-related constructions. In
the meantime, such research has also brought to the forefront of linguistic
research a number of theoretical questions that merit further exploration.

In this article, we discuss some unresolved issues in degree semantics from
the perspective of East Asian languages. After briefly introducing foundations

of degree semantics, we summarize several outstanding controversies in recent research such as the controversies between phrasal vs. clausal comparison, individual vs. degree comparison, explicit vs. implicit comparison, big DegP vs. small DegP, the source of cross-linguistic variations, etc. We then expand the discussion to comparative constructions and other degree-related constructions in Mandarin Chinese, Japanese, and Korean, three major languages spoken in East Asia. We note some outstanding challenges that East Asian languages have brought to degree semantics. From the discussion, we hope to (i) demonstrate how and to what extent degree semantics has furthered our understanding of certain phenomena in East Asian languages, and (ii) conversely, reveal how and to what extent data from major East Asian languages throw light on the controversial issues in degree semantics. Finally, we lay out some directions for future within- and cross-linguistic research.

## 2.     Foundations of degree semantics[1]

### 2.1     The semantics of gradable predicates

Degree semantics, as the name indicates, revolves around the notion of degree. Though discussion about degree (and relevant notions such as vagueness and gradability) can be traced back to Russell (1923), Jespersen (1933), and Sapir (1944),[2] it wasn't until the 1970s and '80s that degree was introduced as an ontological entity in semantic representations and began to attract the attention of linguists (cf. Bolinger 1972; Seuren 1973; Cresswell 1976; von Stechow 1984; Heim 1985; Bierwisch 1988, inter alios). In the past several decades, degree semantics has gained much momentum and taken a prominent place in contemporary linguistics, thanks to the contribution of various scholars (cf. Rullmann 1995; Kennedy 1999, 2001, 2002, 2007; Kennedy & McNally 2005; Schwarzschild 2008; Schwarzschild & Wilkinson 2002; Lin 2009; Morzycki 2009, 2016; Nouwen 2008, 2011; Rett 2015, inter alios). Degree semantics has been an essential tool in analyzing gradability phenomena in natural language, and its applicative domains range from such phenomena as gradable predicates, comparative constructions,

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**1.** To be precise, there is no single theory called "degree semantics". Degree semantics is more like a cluster of approaches centered on the notion of degree than a single semantic theory. In this article, "degree semantics" is used as a cover term for the approaches that make (heterogeneous) reference to such a notion.

**2.** The interested readers are referred to Kamp & Sassoon (2016) for a recent overview.

and degree questions to exclamatives, numerals, and event structures (see Morzycki (2016) and references therein for an extensive overview).

What exactly constitutes a degree varies from one theory to another. To take a safe start, we follow the traditional approach: degrees are "abstract representation of measurement" (Kennedy & McNally 2005), which can be modeled either as points (von Stechow 1984; Kennedy 1999) or intervals along a scale (Kennedy 2001; Schwarzschild & Wilkinson 2002) (but see § 4.2 for the controversy over the ontological representation of degrees). In this approach, gradable predicates can be treated as functions from degrees to properties of individuals, i.e., they denote binary relations between degrees and individuals.[3]

(1)   $[\![tall]\!] = \lambda d\lambda x.$ **height** $(x) \geq d$

Since gradable predicates are of type $<d, et>$, they cannot combine with properties or individuals directly. There are at least two ways to saturate the degree argument. In the first structure, a gradable predicate combines with a measure phrase (MP), as in (2). Syntactically, MPs like *6 feet* head a degree phrase, or DegP. Semantically, *6 feet* denotes a degree, which saturates the degree argument. The semantic derivation proceeds as in (3).[4]

(2)   John is [$_{DegP}$ [$_{Deg}$ 6 feet] [$_{AP}$ tall]].

(3)   a.   $[\![6\ feet]\!] = $ **6-feet**: d
      b.   $[\![tall]\!] = \lambda d\lambda x.$ **height** $(x) \geq d$: $<d, et>$
      c.   $[\![tall]\!]\ (\ [\![6\ feet]\!]\ ) = \lambda x.$ **height** $(x) \geq$ **6-feet**: $<e, t>$
      d.   $[\![John\ is\ 6\ feet\ tall]\!] = 1$ iff **height** $(j) \geq$ **6-feet**: t

In the other structure, as in (4a), a gradable predicate combines with a degree morpheme (e.g., "very"). Degree morphemes usually form a complementary distribution with MPs and compete for the same syntactic position as MPs, as demonstrated in (4b). That is, they are heads of DegPs. Semantically, degree morphemes take a gradable predicate *G* and an individual *x* as its input, and return a

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**3.**  An alternative way to characterize the semantics of gradable predicates is to take them to denote measure functions from individuals to degrees (cf. Kennedy 1999). Since in most cases, these two representations are truth-conditionally equivalent, we will not distinguish them in this article (see Grano & Kennedy (2012) for argument for the Kennedy-style representation of degrees).

**4.**  Note that the structures like (2) (where a gradable predicate directly combines with a MP) are rare both cross-lexically (e.g., *6 feet tall* vs. *\*170 pounds heavy*) and cross-linguistically. See Grano & Kennedy (2012) and references therein for more details. We use this example mainly for illustrative purpose.

true proposition if the *G*-ness of *x* exceeds some contextually provided standard of *G* (**Stnd**$_c$(G)), as in (5a). The truth-conditions of (4a) are shown in (5b).[5]

(4)  a.  John is [$_{DegP}$ [$_{Deg}$very] [$_{AP}$tall]]].
     b.  *John is very 6 feet tall.

(5)  a.  ⟦*very*⟧ = λG$_{<d,\ et>}$λx∃d[G(d)(x) ∧ d ≥ **Stnd**$_c$(G)]
     b.  ⟦*John is very tall*⟧ =1 iff ∃d[**tall** (d)(*j*) ∧ d ≥ **Stnd**$_c$(tall)]

## 2.2  The semantics of comparative constructions

Degree semantics provides an appealing and powerful way to capture the compositional semantics of a variety of degree constructions. In this subsection, we discuss the application of degree semantics to comparative constructions. Intuitively, comparisons are constructed out of two individuals being mapped onto a scale, and the relative positions of the individuals on the scale determine comparison outcomes (von Stechow 1984; Kennedy & McNally 2005; Beck 2012; Morzycki 2016; Scontras 2017).

Take the comparative sentence in (6) for example. Intuitively, the sentence means that the degree to which John (target of comparison) is tall exceeds the degree to which Mary (standard of comparison) is tall. More formally, the comparative morpheme *-er* is analyzed as a two-place predicate such that it takes both "John's height" and "Mary's height" as its input and imposes on an asymmetrical ordering between them, as in (7). For the present purposes, we simply assume that the underlying structure for (6) involves a (reduced) clausal comparison, as in (6b). (See § 3.3 for further detail.) The derivation of (6) proceeds as in (8).

(6)  a.  [John]$_{Target}$ is taller than [Mary]$_{Standard}$ is.
     b.  [$_{DegP}$ *-er* [than ∅ λd$_1$ [Mary is d$_1$ tall]]] [λd$_2$ John is d$_2$ tall]

(7)  a.  ⟦*-er*⟧ = λD$_2$λD$_1$.MAX(D$_1$) > MAX (D$_2$)
     b.  MAX(D) ⇔ ιd[D(d) ∧ ∀d'[(D(d') → d' ≤ d)]]

(8)  a.  ⟦*D$_1$*⟧ = λd. John is d-tall
     b.  ⟦*D$_2$*⟧ = λd. Mary is d-tall
     c.  ⟦*John is taller than Mary is*⟧ =1 iff
         MAX (λd. John is d-tall) > MAX (λd. Mary is d-tall)

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**5.**  For the unmodified positive form like *John is tall*, a silent morpheme, POS, is postulated: [$_{DegP}$ [$_{Deg}$POS] [$_{AP}$tall]] (Cresswell 1976; Kennedy & McNally 2005). This treatment is not without controversy (see Rett (2015) and references therein). Interested readers are also referred to Grano (2012) for a case study of Mandarin Chinese degree morphemes.

Equatives receive almost the same treatment as comparatives, except that the ordering is "equal or greater than" rather than "exceed" (cf. Beck (2012), who attributes this idea to von Stechow (1984)), as in (9). (10) provides an illustration of the semantics of an equative sentence.[6]

(9)   $[\![as...as]\!] = \lambda D_2 \lambda D_1.MAX(D_1) \geq MAX\,(D_2)$

(10)  a.  John is as tall as Mary is.
      b.  $[\![John\ is\ as\ tall\ as\ Mary\ is]\!]$ =1 iff
          $MAX\,(\lambda d.\ John\ is\ d\text{-tall}) \geq MAX\,(\lambda d.\ Mary\ is\ d\text{-tall})$

Superlatives can be decomposed as comparatives (Heim 1985). Intuitively, (12a) means John is taller than the rest of all in the class. Capitalizing on this intuitive insight, the superlative morpheme *-est* can be represented as in (11), and (12) illustrates how the semantics of a superlative sentence proceeds (Heim 1995; Sharvit & Stateva 2002; Beck 2012).

(11)   $[\![\text{-}est]\!] = \lambda G_{<d,\ et>}\lambda x.MAX(\lambda d.G(d)(x)) > MAX\,(\lambda d.\exists y[y{\neq}x \wedge G(y)(d)])$

(12)  a.  John is the tallest in the class.
      b.  $[\![\text{-}est]\!]\,(\lambda d\lambda z.\ z\ is\ d\text{-tall})(j)$
      c.  $[\![John\ is\ the\ tallest]\!]$ =1 iff **height** $(j) > MAX\,(\lambda d.\ \exists y[y{\neq}j \wedge y\ is\ d\text{-tall}])$

The brief survey in this section only serves as an introduction for illustrative purpose and leaves out many complex linguistic facts and theoretical complications. In the next section, we shall mention several unresolved issues to show how the complication of linguistic facts poses no small challenge for linguistic theorizing.

## 3.   Unresolved issues

### 3.1   Clausal vs. phrasal comparatives

The issue of clausal vs. phrasal comparatives arises from the contrast between (13a–b). The standard of comparison in (13a) involves some underlying reduction or ellipsis, while the standard in (13b) is a DP (Bhatt & Takahashi 2011). For clausal comparatives, the comparative morpheme *-er* connects two degree-predicate-denoting clauses and imposes ordering between them. For phrasal comparatives, *-er* establishes an ordering between the target and the standard

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**6.**  Luo & Cao (2019) draw data from Mandarin Chinese and English to argue that scalar equatives are not alike across languages, and the cross-linguistic difference may be attributed to a variation in the ontological representation of degrees: degrees as points vs. degrees as kinds.

with respect to the gradable property denoted by the predicate (cf. Heim 1985; Lechner 2001; Bhatt & Takahashi 2011).[7]

(13)  a.  Clausal comparative: John is taller than [$_{TP}$Bill is ~~tall~~].
      b.  Phrasal comparative: John is taller than [$_{DP}$Bill].

(14)  a.  $[\![-er_{(13a)}]\!] = \lambda D_2 \lambda D_1.MAX(D_1) > MAX\,(D_2)$
      b.  $[\![-e_{r(13b)}]\!] = \lambda y \lambda G_{<d,\,et>} \lambda x.\ MAX\,(\lambda d_1.G(d_1)(x)) > MAX(\lambda d_2.G(d_2)(y))$

Despite the superficial difference, (13a–b) are truth-conditionally equivalent. This equivalence raises a number of questions. For example, why are two distinct structures mapped to the same truth-conditional meaning? Can they be reduced to one single underlying structure? To what extent do languages differ with respect to this variation?

   Answers to these questions vary. One answer to the clausal vs. phrasal controversy suggested by Bhatt & Takahashi (2011), is that languages vary from one another in morphosyntactic features of the comparative morpheme. In English, there is a single two-place meaning for the comparative morpheme, and the so-called phrasal comparative is the result of covert reduction operation. In other languages (e.g., Hindi-Urdu and Japanese), there are distinct lexical entries for the comparative morpheme. Merchant (2009) reports data from Greek to demonstrate that the clausal vs. phrasal distinction may be one potential source of cross-linguistic variation in expressing comparison. Beck et al. (2009) attempt to reduce the distinction to whether languages make use of degree abstraction at syntax or not. Despite the many studies on this topic, how and to what extent the distinction correlates with cross-linguistic variation remains open, and new data from understudied languages may have the promise to shed light on this controversy (cf. Hohaus & Bochnak 2020).

## 3.2   Explicit vs. implicit comparatives

The contrast between explicit and implicit comparison is exemplified in (15a) and (15b) (Kennedy 2009).

(15)  a.  Explicit comparison: John is taller than Lee.
      b.  Implicit comparison: Compared to Lee, John is tall.

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**7.** Another widely used pair of terminology is direct comparison vs. reduced comparison. The latter, but not the former, involves some deletion operation in the derivation. In the literature, "direct comparison" and "phrasal comparison" are used interchangeably, and likewise for "reduced comparison" and "clausal comparison".

Explicit comparison involves specialized morphology (e.g., *-er* in English) to express ordering relations, while implicit comparison takes advantage of the inherent context sensitivity of the positive, unmarked form (Kennedy 2009). Unlike explicit comparison, the standard in an implicit comparative sentence is often introduced by such expressions as "compared to" or "with respect to".

The distinction between explicit vs. implicit comparison bears semantic and syntactic consequences. First, explicit comparison is perfectly acceptable in crisp judgment contexts, i.e., the contexts that involve slight differences between the compared objects, while implicit comparison is generally disallowed or degraded in such contexts. This contrast is illustrated by the examples in (16) and (17), both reproduced from Kennedy (2009).

(16)  Context: A 600 word essay and a 200 word essay
    a.  This essay is longer than that one.
    b.  Compared to that essay, this one is long.

(17)  Context: a 600 word essay and a 597 word essay
    a.  This essay is longer than that one.
    b.  #Compared to that essay, this one is long.

Second, because implicit comparison relies on contextual manipulation of the standard, it is incompatible with gradable predicates that involve a minimum standard such as *open* and *bent*, for which any non-zero level of the associated property (openness and bend) makes the predicate true (cf. Kennedy & McNally 2005; Kennedy 2007). By contrast, explicit comparative constructions are perfectly acceptable with minimum standard predicates.

(18)  a.  This rod is more bent than that rod.
    b.  ??Compared to that rod, this rod is bent.

Third, implicit comparison is impossible with MPs. Because the composition of an MP with a gradable predicate generates a predicate that is no longer context dependent, it leaves no room for contextual manipulation.

(19)  a.  ??Compared to Lee, Kim is 10 cm tall.
    b.  Kim is 10 cm taller than Lee.

According to Kennedy (2009), the explicit vs. implicit comparison distinction might be a potential source of variability for comparative constructions within and across languages. How and to what extent languages may differ with respect to this distinction remains understudied.

### 3.3 The big vs. small DegP controversy

Another controversial topic concerns the distinction between "small DegP" vs. "big DegP" (adopting Morzycki's (2016) terminology). There are two competing approaches to the internal structure and composition of the extended adjectival projection. Though both recognize the phrasal projection DegP, they differ in what it is and where it is located. In the "classic" approach (cf. Bresnan 1973; Heim 2000; Bhatt & Pancheva 2004), DegP occupies the specifier position of AP. Under this view, English degree morphemes (e.g., *-er* and *more*) take comparative clauses introduced by *than* as their complements. Assuming degree morphemes to denote functions from sets of degrees to functions from sets of degrees to truth values (<*dt, <dt, t>*>), as in (20), their composition with comparative clauses yields an expression of type <dt, t>, the same type as generalized quantifiers. As generalized quantifiers, they are extraposed to the left edge of the clause at LF. (21) illustrates how the "small DegP" analysis works for comparatives.

(20)   $\llbracket\text{-}er\rrbracket = \lambda D_{1<d,\,t>}\lambda D_{2<d,\,t>}[\text{MAX}(D_2) > \text{MAX}(D_1)]$

(21)   a.   John is taller than Mary is.
       b.   i.   John is $[_{AP}\,[_{DegP}\,\text{-}er\,[\text{than}\,\emptyset\,\lambda d_1\,[\text{Mary is }d_1\text{ tall}]]]$ tall]
            ii.  $[_{DegP}\,\text{-}er\,[\text{than}\,\emptyset\,\lambda d_1\,[\text{Mary is d1 tall}]]]\,[\lambda d_2\text{ John is }d_2\text{ tall}]$
            iii. $\llbracket\textit{John is taller than Mary is}\rrbracket =1$ iff
                 $\text{MAX }(\lambda d_2[\text{John is }d_2\text{ tall}]) > \text{MAX}(\lambda d_1[\text{Mary is }d_1\text{ tall}])$

In the alternative "big DegP" approach, AP is assumed to be the complement of the Deg head, and comparative clauses are adjuncts within the DegP (Corver 1990, 1993; Kennedy 1999). Under this view, the comparative morpheme takes a gradable predicate and a set of degrees (contributed by the comparative clause) and returns a function from individuals to truth values (22). No QR-like movement is needed in this analysis. Semantic composition proceeds as surface word order goes.

(22)   $\llbracket\text{-}er\rrbracket = \lambda G_{<d,\,et>}\lambda D_{<d,\,t>}\lambda x.\ \text{MAX}(\lambda d_1.G(d_1)(x)) > \text{MAX}(D)$

(23)   a.   John is $[_{DegP}\,[_{Deg'}\,[_{Deg}\,\text{-}er\,[_{AP}\text{tall}]]\,]\,[\text{than }\lambda d\text{ Mary is }\sout{d\text{ tall}}]]$
       b.   $\llbracket\textit{John is taller than Mary is}\rrbracket =1$ iff
            **height** $(j) > \text{MAX}(\lambda d_1[\text{Mary is }d_1\text{ tall}])$

Although the two approaches generate truth-conditionally equivalent result in the above examples, they make different predictions regarding scope ambiguity. The QR-based "small DegP" approach predicts a scope ambiguity, while the "big DegP" analysis does not. This boils down to the question: do degree morphemes actually give rise to scope ambiguity?

Heim (2000) suggests a positive answer to this question. According to her, modalized comparatives in English are ambiguous. (24) is open to both a minimum required length reading and a maximum permitted length reading, as indicated by the continuations (24a) and (24b) respectively. Such ambiguity is an important argument for the analysis of the comparative morpheme as a degree operator that QRs at LF.

(24)   The paper is required to be less long than 10 pages.
    a.   … so you don't need to lengthen it.
    b.   … so you have to shorten it.

However, unlike English, modalized comparatives in many others languages, say, Mandarin Chinese, are not ambiguous. The Mandarin Chinese counterpart of (24) can only be continued with the sentence in (25a), but not the one in (25b) (cf. Krasikova 2008; Erlewine 2018). But see Gong and Coppock (2021) for a different take on this issue.

(25)   *Zhe-pian wenzhang bixu  shao-yu     shi ye.*
    DEM-CL  paper       must short-than 10 page
    a.   *suoyi bixu  suoduan yidian.*
        So     must shorten  a-bit
    b.   ?*suoyi bu   yong kuochong le.*
        so    not need expand   ASP

This raises the issue as to whether the distinction between the "small DegP" vs. the "big DegP" is a potential source for cross-linguistic variation.

In the following, we consider data from Mandarin Chinese, Japanese, and Korean to demonstrate how degree-related constructions can vary and what novel insights East Asian languages have to offer on these controversial issues.

## 4.   Degree constructions in Mandarin Chinese

### 4.1   The clausal vs. phrasal controversy

There exist several different comparative constructions in Mandarin Chinese (Xiang 2005; Lin 2009; Liu 2010b, among many others). Among them, the *bi* comparative construction, exemplified in (26), has received the most attention.

(26)   *Zhangsan bi  Lisi gao.*
    Zhangsan BI Lisi tall
    'Zhangsan is taller than Lisi.'

In the phrasal analysis, the standard of comparison introduced by *bi* is an individual-denoting DP, and the silent degree operator *-er*$_{phrasal}$ is a 3-place predicate that takes the target of comparison, the standard of comparison, and the predicate of comparison as arguments (Xiang 2005; Erlewine 2007; Lin 2009). The comparative operator applies the predicate of comparison to the target of comparison and to the standard of comparison and asserts an ordering between them (Heim 1985; Kennedy 2009). The underlying structure and the lexical entry of the comparative operator *-er*$_{phrasal}$ are given in (27) and (28) respectively (a la Heim 1985). The semantic derivation proceeds as in (29). The standard marker *bi* is semantically vacuous in this analysis.

(27)  [$_{TP}$ Zhangsan [$_{biP}$ bi Lisi] [$_{DegP}$ [$_{Deg}$ *-er* [λdλx [x is d-gao]]]]

(28)  $[\![$*-er*$_{phrasal}]\!] = \lambda G_{<d,\,et>}\lambda y\lambda x.\ \mathrm{MAX}(\lambda d_1.\ G(d_1)(x)) > \mathrm{MAX}(\lambda d_2.\ G(d_2)(y))$

(29)  a.  $[\![$*gao*$]\!] = \lambda d\lambda x.\ \textbf{height}\ (x) \geq d$
  b.  $[\![$*-er*$_{phrasal}]\!]\ (\lambda x\lambda d.\ \textbf{height}\ (x) \geq d)(zs)(ls) = 1$ iff
    $\mathrm{MAX}(\lambda d_1.\ [[$*gao*$]]\ (d_1)(zs)) > \mathrm{MAX}(\lambda d_2.\ [[$*gao*$]]\ (d_2)(ls))$
  c.  $[\![$*Zhangsan bi Lisi gao*$]\!] = 1$ iff $\textbf{height}\ (zs) > \textbf{height}\ (ls)$

In the clausal approach, the underlying structure of a *bi* comparative is given as in (30). Unlike the phrasal analysis, *bi* is semantically contentful: it is a two-place operator, equivalent in denotation to the clausal *-er* that we provided in (14a). The derivation in a clausal analysis proceeds as in (32) (cf. Erlewine 2018).

(30)  [$_{TP}$ [$_{DegP}$ [$_{Deg}$ *-er/bi*] λd$_1$[Lisi is d$_1$-gao]][λd$_2$ [Zhangsan is d$_2$-gao]]]

(31)  $[\![$*bi*$]\!] = [\![$*-er*$_{clausal}]\!] = \lambda D_{1<d,\,t>}\lambda D_{2<d,\,t>}[\mathrm{MAX}(D_2) > \mathrm{MAX}(D_1)]$

(32)  a.  $[\![$*gao*$]\!] = \lambda d\lambda x.\ \textbf{height}\ (x) \geq d$
  b.  $[\![$*Zhangsan is d-tall*$]\!] = \lambda d.\ \textbf{height}\ (zs) \geq d$
  c.  $[\![$*Lisi is d-tall*$]\!] = \lambda d.\ \textbf{height}\ (ls) \geq d$
  d.  $[\![$*-er*$_{clausal}]\!]\ ([\![$*Zhangsan is DegP tall*$]\!])([\![$*Lisi is DegP tall*$]\!]) =$
    $\mathrm{MAX}(\lambda d.\ \textbf{height}\ (zs) \geq d) > \mathrm{MAX}(\lambda d.\ \textbf{height}\ (ls) \geq d)$
  e.  $[\![$*Zhangsan bi Lisi gao*$]\!] = 1$ iff $\textbf{height}\ (zs) > \textbf{height}\ (ls)$

At first glance, empirical facts seem to be in favor of the phrasal approach. First, the *bi* comparative disallows comparative subdeletion, a hallmark property of the clausal comparison, shown in (33a) (Kennedy 2002). No matter how to manipulate the position of the gradable predicates *kuai* and *gao*, the sentence in (33b) cannot express what the intended English translation expresses (Xiang 2005; Lin 2009; Xie 2014). To express the intended meaning, Mandarin Chinese needs to resort to nominal scale terms, as in (33c).

(33)  a.  This table is taller than that window is wide.
      b.  *Zhe-zhang zhuosi bi  na-shan chuanghu kuan gao.*
          DEM-CL    table  BI DEM-CL window  wide tall
          Intended: 'This table is taller than that window is wide.'
      c.  *Zhe-zhang zhuozi de   gaodu chaoguo na-shan chuanghu de   kuandu.*
          DEM-CL    table  GEN height exceed  DEM-CL window  GEN width
          'The height of this table exceeds the width of that window.'

Second, Mandarin Chinese lacks attributive comparatives, where the comparative serves as a modifier within a DP. As shown in (34), such comparatives are easily amenable to a clausal analysis. Again, see Gong and Coppock (2021) for a different take on this issue.

(34)  a.  John wrote a longer paper than Peter did.
      b.  MAX (λd. *j* wrote a d-long paper) > MAX (λd. *p* wrote a d-long paper)

(35)  *Zhangsan bi  Lisi xie-le      yi-pian chang lunwen.*
       Zhangsan BI Lisi write-ASP one-CL long   paper
       Intended: 'Zhangsan wrote a longer paper than Lisi did.'

Third, as already indicated in (25), modalized *bi* comparative sentences are not ambiguous. According to Xiang (2005), Krasikova (2008) and Lin (2009), the unavailability of (i) comparative subdeletion, (ii) attributive comparatives, and (iii) ambiguity of modalized *bi*-comparatives provides important evidence for a phrasal analysis of the *bi* comparative in Mandarin Chinese.

Recently, researchers have pointed out conceptual and empirical difficulties with analyzing the *bi* comparative as a phrasal comparative and instead espoused a clausal alternative. Hsieh (2015) approaches the question by investigating the bare reflexive *ziji* in embedded *bi* sentences, and Erlewine (2018) arrives at a similar conclusion by looking at other facts in *bi* comparative sentences.

Hsieh's main evidence for a clausal analysis of the *bi* comparative includes: (i) a comparative sentence with the bare reflexive *ziji* in the gradable predicate gives rise to a sloppy reading (36); (ii) an embedded comparative with *ziji* in the gradable predicate is liable to a long-distance reading (LDR) reading (37); and (iii) the LDR reading is blocked when changing the person feature of the standard of comparison (38).

(36)  *Zhangsan bi  Lisi dui ziji hao.*
       Zhangsan BI Lisi to   self good
       Sloppy reading: 'Zhangsan$_i$ is better to himself$_i$ than Lisi$_j$ is to himself$_j$.'

(37)   *Wangwu renwei Zhangsan bi Lisi dui ziji hao.*
Wangwu think   Zhangsan BI Lisi to   self good

    a.   LDR reading: 'Wangwu$_i$ thinks that Zhangsan is better to him$_i$ than Lisi is to him$_i$.'

    b.   Non-LDR reading: 'Wangwu thinks that Zhangsan$_i$ is better to himself$_i$ than Lisi$_j$ is to himself$_j$.'

(38)   *Wangwu renwei Zhangsan bi wo dui ziji hao.*
Wangwu think   Zhangsan BI I   to   self good

    a.   *LDR reading: 'Wangwu$_i$ thinks that Zhangsan is better to him$_i$ than I am to him$_i$.'

    b.   Non-LDR reading: 'Wangwu thinks that Zhangsan$_i$ is better to himself$_i$ than I$_j$ am to myself$_j$.'

These behaviors of *ziji* can be captured straightforwardly under the clausal analysis, which involves some deletion operation in the derivation. Details aside, the LFs for the above examples are provided in (39), (40) and (41) respectively.

(39)   LF for (36): ... [$_{vP}$ [bi Lisi$_j$ dui ziji$_j$ hao] [$_{vP}$ Zhangsani dui ziji$_i$ hao]]

(40)   a.   LF1: [Wangwu$_i$ ... [$_{CP}$ [$_{TP}$ ... [$_{vP}$ [bi Lisi [$_{AP}$ dui ziji$_i$ hao]] [Zhangsan [$_{AP}$ dui ziji$_i$ hao]]]]]]]

    b.   LF2: [Wangwu ... [$_{CP}$ [$_{TP}$ ... [$_{vP}$ [bi Lisi$_i$ [$_{AP}$ dui ziji$_i$ hao]] [Zhangsan$_j$ [$_{AP}$ dui ziji$_j$ hao]]]]]]]

(41)   a.   *LF1: [Wangwu$_i$ ... [$_{CP}$ [$_{TP}$ ... [$_{vP}$ [bi wo [$_{AP}$ dui ziji$_i$ hao]] [Zhangsan [$_{AP}$ dui ziji$_i$ hao]]]]]]]

    b.   LF2: [Wangwu ... [$_{CP}$ [$_{TP}$ ... [$_{vP}$ [bi wo$_i$ [$_{AP}$ dui ziji$_i$ hao]] [Zhangsan$_j$ [$_{AP}$ dui ziji$_j$ hao]]]]]]]

According to Hsieh, while the phrasal analysis of the *bi* comparative construction – with some "stretches" – is able to account for the sloppy/non-LDR readings of (36) and (38), the blocking effect, as illustrated by the availability contrast of LDR reading between (37) and (38), cannot be captured by the phrasal analysis. Any phrasal analysis that is able to explain the absence of the LDR reading for (38), which arises from the change of the person feature of the standard of comparison introduced by *bi*, would wrongly exclude the LDR of *ziji* in the structurally similar (42).

(42)   *Wangwu$_i$ renwei Zhangsan$_j$ dui Lisi/wo$_k$ zhanshi ziji$_{i/j/*k}$ de   zuopin.*
Wangwu think   Zhangsan to   Lisi/I   exhibit self   GEN work
'Wangwu$_i$ thinks that Zhangsan$_j$ showed Lisi/me$_k$ the work of self$_{i/j/*k}$.'

Erlewine (2018) claims that the *bi* comparative construction is clausal but without degree abstraction. He posits a Degree Last parameter for gradable predicates (43), a parameter that gives rise to two different ways to define the semantics of gradable predicates, as in (44).

(43)   Degree Last                                              (Erlewine 2018: 457)
       Gradable predicates can take their degree argument as their last argument.

(44)   Two lexical entries of gradable predicates
       a.   $[\![tall]\!] = \lambda d \lambda x.$ height $(x) \geq d$: $<d, <e, t>>$
       b.   $[\![tall]\!] = \lambda x \lambda d.$ height $(x) \geq d$: $<e, <d, t>>$

The Degree Last-based lexical entry of gradable predicates, when coupled with the clausal analysis, correctly derives the truth conditions of the *bi* comparative. As shown in (45b) for (45a), *bi* is a coordinator that imposes an asymmetric ordering relation between the maxima of the degree descriptions $TP_1$ and $TP_2$. The local predicate *gao* 'tall' in $TP_1$ gets elided under identity with the predicate in $TP_2$. The ultimate outcome states that Zhangsan's height exceeds Lisi's height, and this is achieved without degree abstraction.

(45)   a.   *Zhangsan bi Lisi gao.*
            Zhangsan BI Lisi tall
            'Zhangsan is taller than Lisi.'
       b.   *bi* (-er) $[_{TP1} [_{DP} zs] [_{AP} \lambda x \lambda d$ [x is d-tall]]] $[_{TP2} [_{DP} ls] [_{AP} \lambda x \lambda d$ [x is d-tall]]]

Erlewine (2018) considers a number of constructions in favor of the clausal analysis. For illustrative purposes, consider the comparatives with object preposing (Erlewine attributes the observation to Tsao (1989)):

(46)   *Wo$_i$ daishu bi pro$_i$ jihe      xihuan__.*
       I    algebra BI pro geometry like
       'I like algebra more than I like geometry.'

In (46), the two objects "algebra" and "geometry" are fronted from their postverbal base positions via object preposing. Obviously, for both objects to have originated in the complement position of "like", there must be two "like" predicates in the underlying structure. This constitutes a direct support to the clausal analysis.

How would facts like (46) be treated in a phrasal analysis? In a phrasal analysis, because the target *wo daishu* 'I algebra' and the standard *wo jihe* 'I geometry' do not form a constituent, separate mechanisms must be posited to base-generate objects directly in the target and/or the standard positions. Lin (2009) exemplifies an important analysis of this kind. As Erlewine points out, Lin's analysis predicts that comparatives with contrasting objects are free of the restrictions on object preposing, contrary to fact, and over-generates many ungrammatical compara-

tives (Erlewine 2018: 465). Thus, consideration of parsimony favors the clausal analysis over the phrasal one. Erlewine also examines *bi* comparatives in *bei* long passives, verb copying constructions, etc. and demonstrates how these facts challenge the phrasal analysis and receive a better treatment in the clausal analysis.

It bears noting that if the *bi* comparative is indeed clausal and lacks degree abstraction, there are still many unsolved questions. One such a question, as Erlewine himself admits, is how far this lack of degree abstraction can take us to tackle other degree constructions in Mandarin Chinese and other languages. In more recent research, Gong and Coppock (2021) take issue with some observations and arguments in Erlewine (2018) and argue for degree abstraction in the *bi* comparative. Due to space and timing consideration, we leave our readers to refer to their paper for more details.

## 4.2 Differential verbal comparatives in Mandarin Chinese and the ontology of degree

Recently, the so-called "differential verbal comparatives" (DVCs) in Mandarin Chinese, as exemplified in (47), have received considerable attention in the literature (Krasikova 2008; Li 2009, 2015a; Lin 2014; Luo & Xie 2018).

(47)   a.   $DP_1$ *bi* $DP_2$ *duo/shao* V *(differential phrase)
       b.   *Zhangsan bi Lisi duo/shao kan-le    liang ben xiaoshuo.*
            Zhangsan BI Lisi more/less read-ASP two   CL   novel
            'Zhangsan's reading exceeds Lisi's reading by two novels.'

Two interesting observations about the DVC: (i) the differential is obligatory in the DVC, and (ii) the differential phrase in the DVC can take the form of a DP (e.g., *liang ben xiaoshuo* in (47b)). Under standard degree semantics, differential phrases denote degree difference between the target and the standard. If we take the DP *liang ben xiaoshuo* to denote a degree, how is it derived? If it does not denote a degree, how can it serve as a differential phrase?

Taking differential DPs in DVCs as "regular" individual-denoting DPs, Li (2009; 2015a) holds that a degree-based semantic analysis would fall short of the DVC, and that the construction is amenable to a degreeless, mapping-based semantics that compares the entities in two sets. She posits the semantics in (48a) for *duo*, which involves a bijective mapping between two sets of entities to which the target of comparison $DP_1$ and the standard of comparison $DP_2$ relate by the predicate V. It identifies the difference between the sets with the denotation of the differential phrase. For (47b), Li assumes (48b) as its LF structure, where *bi* projects a PP and is semantically vacuous. $DP_2$ is taken to be a simple PP complement, with no clausal syntactic structure. The semantics of (47b) is given in (48c),

which says that for each novel Lisi read, Zhangsan read a matching copy, and there are two novels that Zhangsan read but for which Lisi did not read matching copies.

(48)   a.   $[\![duo_f]\!]^g = \lambda P_{<e,<et>>}\lambda x_e\lambda y_e\lambda k_e.\,\forall z_e[P(z)(y) \to$
$\exists t_e[t=g(f)(z) \wedge proper(g(f)) \wedge P(t)(x) \wedge P(k)(o) \wedge \neg t\bigcirc k]]$

   b.   $[_S\ [_{DP}$ liang ben xiaoshuo$]_i\ [_S\ \lambda i\ [_{VP}\ [_{DP1}$ Zhangsan$]\ [_{VP}\ [_{PP}\ [[_P$ bi$][_{DP2}$ Lisi$]]]][_{VP}$ [duo kan-le $t_i]]...$

   c.   $[\![\ (48b)\ ]\!] =1$ iff $\exists x_e[\mathbf{novel}(x) \wedge \#x{\geq}2 \wedge \forall z_e[\mathbf{read}(z)(ls) \to$
$\exists t_e[t=g(f)(z) \wedge PROPER(g(f)) \wedge \mathbf{read}(t)(zs) \wedge \mathbf{read}(x)(zs) \wedge \neg t\bigcirc x]]]$

Li's mapping-based analysis of the DVC is largely motivated by the observation that when the differential phrase in the DVC is not a measure phrase (MP), it shares properties with DP objects that purport to denote individuals. Luo & Xie (2018) take issue with this treatment, and show there are empirical observations that set non-MP differential phrases in DVC sentences apart from genuine DPs. For instance, when the differential phrase in a DVC sentence is a numeral + classifier phrase, it can be preceded by the degree-modifying "na(me)", a modifier that cannot precede a genuine DP (49).

(49)   *Jisuanji    zhuanye bi women duo    shang na'me san-men ke.*
computer major    BI we    more study so    three-CL course
'Computer science majors (merely) take three more courses than we do.'

Luo & Xie conclude that DVCs in Mandarin Chinese also make use of comparison of degrees, albeit in a different ontological representation. They follow Cresswell (1976), Anderson & Morzycki (2015), and Scontras (2017) to assume that degrees are more ontologically complex than is typically construed, i.e., they are nominalizations of quantity-uniform properties. As such, they reference both abstract representation of measurement and the objects in the world that instantiate that measurement. An enriched definition of degree (as Chierchia-style kinds) is provided in (50) ("$^\cap$" and "$^\cup$", respectively, are the operators that turn properties to kinds and vice versa, cf. Chierchia 1998).

(50)   Degrees as kinds:
DEGREE := $^\cap\lambda x.\exists k\exists n[\mu_f(x)=n \wedge\,^\cup k(x)]$ (where $\mu_f$ is a contextually-specified measure)

Based on this new definition of degree, Luo & Xie propose a new lexical entry for *duo* (51a), which involves a difference function **m**, defined in (51b) (cf. Kennedy & Levin 2008).

(51)   a.   $\lambda E_{1<v,\,t>}\lambda d\lambda E_{2<v,\,t>}\lambda e_v\exists e'[E_1(e) \wedge E_2(e') \wedge \mathbf{m}^{\uparrow}_{m(e')}(e) =d]$

b.    **m**: $D_v \longmapsto D_d$ is a measure function mapping events to degrees.

Luo & Xie assume that the underlying structure of comparative sentences is *bi*-clausal (52). The truth-conditions of DVC sentences can be illustrated as in (53), which amounts to a statement consisting of three sub-components: (i) there is a reading event *e* for which Zhangsan is the agent; (ii) there is a reading event *e'* for which Lisi is the agent; (iii) the difference between Zhangsan's reading and Lisi's reading along a certain measurable dimension and at some sortal level is a degree kind *d* which is instantiated by a plural individual composing of two novels. Because degree kinds are nominalized quantity-uniform properties, the real-world objects that instantiate the kind NOVEL do not matter. This difference function-based semantics, when appropriately constrained by the contextual and pragmatic factors, delivers the desirable truth conditions.

(52)    $[DP_1 [bi [DP_2 [t2 P]] [[duo/shao [t_1 V]] [Diff]]]$

(53)    $\exists e \exists e'[\mathbf{read}(e) \wedge \mathbf{Agent}(e) = ZS \wedge \mathbf{read}(e') \wedge \mathbf{Agent}(e') = LS \wedge$
$\mathbf{m}_{m(e')}^{\uparrow}(e) = {}^{\cap}\lambda z[\mu_{ben}(z) = 2 \wedge {}^{\cup}NOVEL(z)]]$

In short, Luo & Xie's (2018) approach to the problem raised by DVCs under an enriched definition of degrees: degrees as kinds.

DVCs in Mandarin Chinese are particularly interesting because they pertain to the question of ontological conceptualizations of degrees. Approaches roughly fall within two camps, which lead to distinct (though not completely incompatible) consequences for the semantics of comparatives. The "standard" approach, as we have presented in the previous sections, takes degrees as primitives, viz., as points or intervals on an abstract scale, akin to real numbers (Seuren 1973; von Stechow 1984; Heim 1985; Kennedy 1999, 2002, 2009; Schwarzschild & Wilkinson 2002; Kennedy & McNally 2005; Nouwen 2011; Beck 2012). For ease of reference, we label treatment of degrees in this approach as the *simplex* approach. Under this approach, to compare two individuals with respect to a gradable property, they each map onto corresponding positions on the relevant scale, and their relative positions determine comparison outcome. The other approach, pioneered by Cresswell (1976), treats degrees as something ontologically more complex. Cresswell takes degrees to be equivalence classes, or groups of individuals that are equivalent with respect to some measure. This conception of degrees has been further developed by such scholars as Grosu & Landman (1998); Bale (2008); Castroviejo & Schwager (2008), and Moltmann (2009).[8]

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**8.**   It should be noted that although these scholars largely share the view that the degrees should be ontologically richer than mere points, their specific enrichments are by no means the same. For example, Grosu & Landman (1998) take degrees as tuples of three coordinates: the car-

Most recently, Anderson & Morzycki (2015), Scontras (2014; 2017), and Mendia (2017; 2018), from different starting points, present case studies that motivate conceiving of degrees as entities comparable to kinds (cf. Carlson 1977a, 1977b; Chierchia 1998). For ease of reference, we label treatment of degrees in this approach as the *complex* approach.

There seems to be a division of labor between the two approaches: while some phenomena are (more) amenable to the *simplex* approach (e.g., adjectival comparatives, degree questions, exclamatives), some other phenomena can be better treated in the complex approach, e.g., English amount constructions (Scontras 2017), manner modifications (Anderson & Morzycki 2015), degree-denoting DPs (Mendia 2018), scalar equatives in Mandarin Chinese (Luo & Cao 2019). There are some open issues here. First, are the two conceptualizations of degrees reducible to one single ontological representation or not? Second, if we keep the two representations as a plausible dichotomy, what factors determine which representation is at work for a particular degree construction? The third question has to do with semantic composition of degree constructions, especially that of differential comparatives. While a lot of research has been done in the *simplex* camp (cf. von Stechow 1984; Heim 1985; Kennedy 1999, 2002; Schwarzschild 2008; Bhatt & Takahashi 2011; Beck et al. 2009; Beck 2012), similar research in the complex camp is a burgeoning yet challenging enterprise. More research is needed to deepen our understanding of these questions.

## 5.     Degree constructions in Japanese

Turning to Japanese, one of the lively debated issues in Japanese degree constructions is the syntax and semantics of *yori*-comparatives (Beck et al. 2004; Oda 2008; Kennedy 2009; Hayashishita 2009; Bhatt & Takahashi 2011; Shimoyama 2012; Pearson 2013; Sudo 2015, among others). Various proposals have been made: some consider *yori*-comparatives as underlyingly phrasal (Beck et al. 2004; Oda 2008; Kennedy 2009; Sudo 2015); others consider them as clausal (Hayashishita 2009; Bhatt & Takahashi 2011; Shimoyama 2012).[9] Semantically,

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dinality of a plural individual, a sortal predicate that constrains the measure domain, and the plural individual itself. Moltmann (2009) represents degrees as "tropes", or particular instantiations of properties.

**9.**   Two other relevant parameters are Degree Abstraction Parameter (Beck et al. 2004) and Comparison Type parameter (individual vs. degree comparison) (Kennedy 2009 and Bhatt &Takahashi 2011). It is generally assumed that (underlyingly) clausal comparatives involve binding of degree variables in syntax, while (underlyingly) phrasal comparatives do not. This

some scholars postulate that *yori*-comparatives, in contrast to English *than*-comparatives, instantiate implicit comparison (Beck et al. 2004; Oda 2008; Pearson 2013), while others contend that they are comparatives of explicit comparison (Kennedy 2009; Sawada 2009). In this section, we briefly review these various proposals.

## 5.1    The controversy of clausal vs. phrasal comparison in Japanese

The debate on the syntax of *yori*-comparatives can be traced to Beck et al. (2004)'s seminal work where they pointed out that *yori*-comparatives differ from English *than*-comparatives in that. The acceptability of *yori*-comparatives seems to vary with respect to the choice of the adjective used (i.e., *takusan* 'many' in (54) vs. *nagai* 'long' in (55)) (Ishii 1991).

(54)    a.    *Taroo-wa [Hanako-ga    katta    yori  (mo)] takusan (-no)*
             Taroo-TOP [Hanako-NOM bought YORI (mo)] many    (-GEN)
             *kasa-o          katta.*
             umbrella-ACC bought
        b.    Taroo bought more umbrellas than Hanako did.

(55)    a.<sup>?</sup>**Taroo-wa [Hanako-ga    katta    yori  (mo)] nagai kasa-o          katta.*
             Taroo-TOP [Hanako-NOM bought YORI (mo)] long   umbrella-ACC bought
        b.    Taroo bought a longer umbrella than Hanako did.

Unlike English *than*-comparatives but similar to Mandarin Chinese *bi*-comparatives (as illustrated in (33–35) above), Japanese *yori*-comparatives lack comparative subdeletion (Snyder et al. 1994) (56) and English-like negative island effects (57).

(56)    a.    **Kono tana-wa [ano doa-ga    hiroi yori  (mo)] (motto) takai.*
             this   shelf-TOP [that door-NOM wide YORI (mo)] (more)  tall
        b.    This shelf is taller than that door is wide.

(57)    a.    *John-wa [dare-mo kawa-naka-tta no yori] takai      hon-o      katta.*
             John-TOP anyone   buy-NEG-PAST      YORI expensive book-ACC bought
        b.    *John bought a more expensive book than nobody did.

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parameter, to a great extent, overlaps with the syntactic parameter of phrasal vs. clausal comparatives. The same holds for the distinction between individual vs. degree comparison: phrasal comparatives in general express an ordering of two individuals (except for when the standard is a name of degree, ex. *John is taller than 6 feet*), while clausal comparatives express an ordering of two degrees.

In light of the above observations, Beck et al. argue that *yori*-comparatives are syntactically and semantically distinct from the *than*-comparative in English. They pattern with implicit comparison in English (e.g., *Compared to Mary, John is tall*), and *yori* draws similarity to the *compared to* phrase that only selects for a nominal complement. The seemingly clausal constituent of *yori* is a free relative clause that denote an individual (i.e., what Hanako bought). In the same vein, Sudo (2015) argues for a different version of the phrasal account. According to him, *yori* introduces a relative clause with an elided head. For instance, the *yori* comparative in (58a) is derived from the underlying structure in (58b), where the complement of *yori* is a relative clause headed by a degree noun, *kasikosa* 'smartness', subject to deletion.

(58) a. *John-wa [Mary-ga    kitaisita]-yori    kasikoi.*
       John-TOP [Mary-NOM expected]-YORI smart
       'John is smarter than Mary expected'
   b. *John-wa [Mary-ga    kitaisita kasikosa]-yori    kasikoi.*
       John-TOP [Mary-NOM expected smartness]-YORI smart
       'John is smarter than the smartness Mary expected'

On the other hand, some scholars contend that genuine clausal *yori* comparatives do exist in Japanese (Hayashishita 2009; Bhatt & Takahashi 2011; Shimoyama 2012). One intriguing piece of evidence in support of the clausal account comes from the scope interaction between the degree operator and intensional verbs in a *yori*-clause. Shimoyama (2012) notes that there is a semantic contrast between a clausal *yori*-comparative (59a) and its phrasal counterpart (59b): while the former has a *de dicto* reading (i.e., Hanako wanted (to buy) three rice balls, but not any specific ones, and Taro bought five rice balls), the latter only allows a *de re* reading (i.e., Hanako wanted (to buy) three specific rice balls). This contrast is unexpected if (59a) and (59b) are syntactically alike.

(59) a. *Taro-wa [Hanako-ga    hosigatteita]-yori takusan-no onigiri-o    katta.*
       Taro-TOP Hanako-NOM wanted-YORI    many-GEN  rice.ball-ACC bought.
       'Taro bought more rice balls than Hanako wanted.'
   b. *Taro-wa [[Hanako-ga    hosigatteita] -no] -yori  takusan-no onigiri-o*
       Taro-TOP Hanako-NOM wanted]        YORI many-GEN  rice.ball-ACC
       *katta.*
       bought
       'Taro bought more rice balls than {what/the ones} Hanako wanted.'

## 5.2    Explicit vs. implicit comparison in Japanese

Another important claim in Beck et al (2004) is that the semantics of the *yori*-comparative is not compositionally derived in the same manner as the *than*-comparative in English. Unlike the *than*-clause, the *yori* constituent functions as a context setter, whose semantic role is to relate the standard degree *c* to a degree associated with the individual introduced by *yori*. This is illustrated by the formula in (60).

(60)    MAX{λd: John is d-smart} > c, where c = the *number* made salient by the utterance context = the degree of smartness that Mary expected

Kennedy (2009) argues against this semantic analysis based on the contrast between explicit and implicit comparison (cf. § 3.2). He argues that *yori*-comparatives pattern with *than*-comparatives in English and both fall into the category of explicit comparison. Sawada (2009) strengthens this claim by showing that examples like (61), in contrast to *yori*-comparatives, are comparatives of implicit comparison.

(61)    *Tom-ni    kurabe-tara Jim-wa  se-ga      takai.*
        Tom-DAT compare-to Jim-TOP height-NOM tall
        'Compared to Tom, Jim is tall.'

Pearson (2013) takes one step further and makes a finer distinction between two types of implicit comparison – strong implicit comparison (ex, *Compared to John, Mary is tall*) and weak implicit comparison (ex. *Compared to John, Mary is taller*). Weak implicit comparison is an intermediate mode of comparison between explicit and strong implicit comparison: it contains a *compared to* phrase that modifies the domain of discourse and a comparative marker that introduces a comparative relation. Pearson argues that Japanese *yori*-comparatives instantiate weak implicit comparison.

　　To summarize, in this section, we briefly reviewed two controversies centered on Japanese *yori*-comparatives. Due to the limited space, we are unable to discuss them in detail; nor are we able to touch other degree constructions in Japanese, which received no less attention in the literature. The interested readers are referred to Aihiara (2009) on the Japanese superlative construction, Sawada & Granno (2011) on the interpretation of measure phrases in Japanese, Matsui & Kubota (2012) on Japanese *hoo* comparatives, Nakanishi (2007a; 2007b) and Li (2015b) on the excessive construction in Japanese.

## 6.    Degree constructions in Korean

The semantics of degree constructions in Korean has probably received less scholarly attention than Chinese and Japanese. Existing research of Korean comparative constructions primarily focuses on the syntactic representation (partly the phrasal vs. clausal distinction or lack thereof) of *pota*-comparatives and to a lesser extent, the interaction of information structure and interpretation.

Korean *pota*-comparatives generally are classified into two forms (Jhang 2001; Park 2009; Kim & Sells 2009, 2010). In the first form, the standard marker *pota* 'than', which is presumably a postposition when used as a standard marker and which also can be used alone as an independent adverb meaning 'more', is attached to a noun phrase, a postposition phrase, or even an adverb (62). The position of the *pota*-phrase is flexible as long as it appears to the left of the gradable predicate and conforms to certain information structure requirements irrelevant for our current purpose (Kim & Sells 2009; Yeom 2016). In the second form of *pota*-comparative sentences, the standard of comparison consists of a clause that is immediately followed by the bound noun *kes*. The clause may or may not contain a syntactic gap. For instance, in (64) the clause immediately before *kes* contains a gapped element that serves as the object for *ilk* 'read.' The nominal element *kes* can be replaced by a canonical noun like *chayk* 'book'. In (65), the clause marked by *kes* does not contain any syntactic gap.

(62)  a.  *[Pihayngki-pota] yelcha-ka (te)  phyenliha-ta.*                    (NP)
          airplane-than    train-NOM more convenient-DECL
          'The train is more convenient than the airplane.'

      b.  *Inho-nun ikos-eyse-pota kohyang-eyse (te)   hayngpokha-ta.*        (PP)
          Inho-TOP here-at-than   hometown-at more happy-DECL
          'Inho is happier at hometown than here.'

      c.  *Inho-nun ppali-pota mwusahi cip-ey    ka-ko.sip-ess-ta.*           (AdvP)
          Inho-TOP fast-than  safely    home-to go-want-PAST-DECL
          'Inho more wanted to go home safely than fast.'

(63)  a.  *Inho-ka    cha-lul Cinho-pota (te)  cal* mo-n-ta.
          Inho-NOM car-ACC Cinho-than more well drive-IMPF-DECL
          'Inho drives a car better than Cinho.'

      b.  *Inho-ka Cinho-pota cha-lul (te) cal mo-n-ta.*

      c.  *Cinho-pota Inho-ka cha-lul (te) cal mo-n-ta.*

(64)   *Tongsayng-i*          *[[hyeng-iilk-un]*        *kes-pota] (te)*    *manhi*
       younger.brother-NOM older.brother-NOM-read kes-than (more) many
       *ilk-ess-ta.*
       read-PAST-DECL
       'The younger brother read more than his older brother did.'

(65)   *[Wuli-ka ka-nun  kes]-i*     *[haksayng-tul-i  o-nun kes-pota] (te)*
       we-NOM go-mod kes-NOM student-PL-NOM come  kes-than (more)
       *phyenha-ta.*
       convenient-DECL
       'For us to go is more convenient than for students to come.'

Recent literature on Korean *pota*-comparatives primarily focuses on whether the
two forms of comparative in Korean respectively represent phrasal and clausal
comparison. In his empirical study of *pota*-comparatives, Jhang (2001) concen-
trates on the empirical differences between the two forms and points toward a
positive answer to this question without going into analytical details. Park (2009)
offers a more theoretically oriented analysis that *pota*-comparatives – to the exclu-
sion of cases in which the complement of *pota* is a measure phrase – involve
clausal comparison. By contrast, Kim & Sells (2010) hold that pota-comparatives
are subject to a unified phasal analysis.

    To start with, Jhang (2001) presents three syntactic and semantic differences
between the two forms of *pota*-comparatives: (i) multiple comparatives, where
more than one NP is compared simultaneously in one sentence, are not possible
in the first form of *pota*-comparatives, but are permitted in the second form of
*pota*-comparatives; (ii) S-Case (nominative and accusative) is allowed in the sec-
ond form of *pota*-comparatives, but not in the first form; on the other hand,
I-Case (dative, locative, instrumental, etc) is obligatory in the second form of
*pota*-comparative clausal, but optional in the first form; and (iii) the first form
of *pota*-comparatives may be ambiguous depending on the word order when the
target of comparison is not Case-marked, while the second form is not ambigu-
ous regardless of word order possibilities. Due to space limitation, we merely cite
Jhang's examples in (66) and (67) to illustrate the second difference between the
two forms.

(66)   a.   *John-i*      *[pro sakwa-(lul) mek-un kes]-pota kamca-lul  (te)*    *manhi*
            John-NOM      apple-ACC   eat-and kes-than potato-ACC (more) many
            *mek-ess-ta.*
            eat-PAST-IND
            'John ate more potatoes than he ate apples.'

b. *Wuli-nun [pro tapang-*(eyse)    manna-n kes]-pota swulcip-eyse (te)*
   we-TOP       coffee shop-LOC meet      kes-than  bar-LOC      more
   *cacwu manna-ss-ta.*
   often   meet-PAST-IND
   'We met in the bar more often than we met in the coffee shop.'

(67) a. *John-i  sakwa-(*lul)-pota kamca-lul  (te)   manhi mek-ess-ta.*
        J.-NOM apple-ACC-than    potato-ACC more many  eat-PAST-IND
        'John ate more potatoes than apples.'

   b. *Wuli-nun tapang-(eyse)-pota     wulcip-eyse (te)  cacwu manna-ss-ta.*
      we-TOP  coffee.shop-LOC-than bar-LOC      more often  meet-PAST-IND
      'We met in the bar more than in the coffee shop.'

Park (2009), like Jhang (2001), treats *-kes* in the second form of *pota*-comparatives as a complementizer that heads a clause either with or without a gap. For *pota*-comparatives of the first form where the standard of comparison is Case marked, Park posits that there is a covert *-kes* complementizer and hence they have the same structure as *pota*-comparatives with an overt *-kes*. The evidence primarily comes from LF *wh*-movement and island effects. For *pota*-comparatives of the first form where the standard of comparison is not Case marked, Park holds that they involve a degree small clausal structure. The evidence includes semantic ambiguity, Binding Theory Principle C, and the availability of sloppy reading for such comparatives (cf. Hsieh's (2015) discussion of *bi*-comparatives in Mandarin Chinese).

(68) a. *Na-nun [Mary-ka [e] ssun kes]-pota    te    kin nonmwun-ul ssessta.*
        I-TOP   Mary-NOM     wrote comp-than more long.paper-ACC wrote
        'I wrote a longer paper than Mary did.'

   b. [$_{vp}$ [$_{DegP}$ [Mary-ka [e] ssun kes]-pota ~~te~~] te kin nonmwun-ul ssessta

Kim & Sells (2010), on the other hand, argue that no strong evidence in Korean motivates derivation of phrasal comparatives from clausal comparatives. Supporting observations they cite for the claim include: (i) the ordering restriction of *pota*-phrases with respect to other elements, which Bhatt & Takahashi (2011) take to provide support for the direct, or phrasal, analysis, (ii) the adjacency requirement that when multiple *pota*-phrases appear in a sentence they must be adjacent, (iii) the lack of possible clausal sources for certain *pota*-comparatives for the first form, and (iv) different readings of *pota*-comparatives of the first form from their putative clausal sources. They further argue that *pota*-comparatives of the second form are not truly clausal, but are free relative NPs headed by the bound noun *kes*. As evidence, they draw on the nominal property of *kes*: (i) *kes*-led chunks can serve as the object of verbs requiring NP arguments, but not the comple-

ment of the complementizer *ko*, and (ii) *kes* can be replaced by a common noun and amount degree nominals such as *cengto* 'degree'. Kim and Sells suggest that Korean has phrasal comparatives only.

In sum, it has been a controversial issue whether Korean *pota*-comparatives are clausal or phrasal. We note that the several representative works we discussed above do not cover the same range of empirical patterns of *pota*-comparatives. Therefore, we deem it fair to say the dispute most likely remains unsettled, making it a potential topic for more in-depth research in the future.

## 7.    Looking ahead

In § 4 through § 6, we provided critical summaries of degree constructions in three major East Asian languages, namely, Mandarin Chinese, Japanese, and Korean. Existing research has identified unsolved issues that are common to these three languages. Clearly, the clausal vs. phrasal comparative controversy is one such issue. A comparative investigation of clausal and phrasal comparative constructions in these languages may shed new light on this important issue.

We also discussed language-specific issues surrounding some comparative constructions of Mandarin Chinese, Japanese, and Korean. For instance, the degree vs. degreeless comparison debate is unique to the degree semantics literature on Mandarin Chinese, and the explicit vs. implicit controversy is largely confined to scholarship on Japanese comparative constructions.

Due to space constraints, we put aside many other comparative constructions in the three languages, such as the transitive comparative in Mandarin Chinese (Grano & Kennedy 2012), the *geng* comparative in Mandarin Chinese (Liu 2010b), metalinguistic comparison (Giannakidou & Yoon 2011), and expressive comparison (Sawada 2014). While our attention was focused on comparative constructions, we should note that there are other degree-related phenomena in East Asian languages that merit further discussion. These phenomena include (i) the infamous *hen* puzzle in Mandarin Chinese, which refers to the observation that a gradable adjective in Mandarin Chinese often needs to occur together with the overt degree morpheme *hen* for a "default" positive interpretation which in many languages like English and French is obtained through the morphologically unmarked form of the adjective (Liu 2010a; Grano 2012); and (ii) the many forms of superlative and equative constructions in Mandarin Chinese and other East Asian languages (see Xie 2014; Luo et al. 2017; Luo & Cao 2019, among others, for further discussion).

Comparative study of degree semantics in the three East Asian languages, i.e., Mandarin Chinese, Japanese, and Korean remains just next to zero. Even between

the genetically closely related Japanese and Korean, research based on one language does not necessarily carry over to the other (Kim & Sells 2010). There are many other East Asian languages – including important ones such as Tibetan and Mongolian – whose behaviors in degree semantics are barely reported or investigated. Therefore, there yet remains a lot of work to be done so far as degree semantics in East Asian languages is concerned. Such work has the promise to unearth variability in the expression of degree and gradability not only across languages, but (even) within a certain language family. We believe the careful study of the semantics of degree constructions in East Asian languages can shed light on these important questions.

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## Abbreviations

| | |
|---|---|
| ACC | accusative |
| ASP | aspect marker |
| BI | the standard marker *bi* in Mandarin Chinese |
| CL | classifier |
| DAT | dative |
| DECL | declension |
| DEM | demonstrative |
| DVC | differential verbal comparatives |
| IMPF | imperfective |
| IND | indicative |
| GEN | genitive |
| LDR | long-distance reading |
| LOC | locative |
| MP | measure phrase |
| NEG | negative |

NOM    nominative
PAST    past tense
PL     plural
TOP    topic marker
YORI   the standard marker *yori* in Japanese

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