

The semantics of scalar equatives in Mandarin Chinese

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The article presents a formal analysis of the *xiang.....yiyang* scalar equative construction in Mandarin Chinese (MSEs). In the standard degree-based approach, scalar equatives are widely assumed to express an asymmetrical linear ordering between two degree-denoting descriptions such that the degree to which the comparee possesses is at least as great as the degree to which the standard possesses. However, this standard analysis would fall short of MSEs, which display a cluster of properties that are unexpected on the standard account: (i) MSEs disallow differentials; (ii) MSEs cannot take measure phrases as the standard; (iii) MSEs in general do not license NPIs in the standard phrases, and (iv) MSEs disallow factor phrases that express multiplication of numerical values. We propose that unlike scalar equatives in English (ESEs), where the comparison of equality is based on asymmetrical linear ordering of the degrees as points, MSEs recur to degrees as kinds, and consequently, the comparison of equality in the latter is based on instantiation of the degree-kinds, namely, equality of properties. The commonalities and differences between MSEs and ESEs suggest that, despite the fact that degrees and properties are semantic objects of distinct types, the underlying connection between them runs deep and fundamental.

Keywords: scalar equatives, degree semantics, degree as points, degrees as kinds, cross-linguistic variation

1. Introduction

The cross-linguistic and cross-categorical variation in the expression of comparison in natural language has attracted much attention, esp. in degree-based semantics (Lechner 2001; Beck et al. 2004; Beck et al. 2009; Kennedy 2009; Bhatt & Takahashi 2011; Bochnak 2013; Hohaus & Bochnak 2020, among many others). There are two driving questions behind this line of research: (i) whether a case of

apparent surface variability in making comparison reflects variability in grammar, and (ii) which component of grammar (if any) can a case of variability in comparison be reduced to (cf. Luo & Xie 2018). Answers to the questions vary as different scholars entertain different proposals (see Beck (2012) and Hohaus & Bochnak (2020) for a detailed overview). However, most studies on this topic, if not all, concentrate on the cross-linguistic variation of differential comparatives (i.e., comparison constructions that express superiority or inferiority between a comparee and a standard, which may or may not overtly contain a differential phrase), and thus leave room for the discussion on whether other comparison constructions (e.g., superlatives, equatives, etc.) are also subject to cross-linguistic/cross-categorical variation or not, and, if so, what is the source for the variation? This study attempts to throw light on this topic by investigating the *xiang* 'lit. like'.....*yi yang* 'lit. equally' scalar equatives in Mandarin Chinese (MSE) with a view to providing some suggestions for the ontological conceptualizations of degrees and the potential point of variation in the expression of equality.

To begin with, in many languages such as English, a prototypical scalar equative construction takes a gradable predicate as its main predicate and expresses an equality relation in degrees between a comparee and a standard with respect to the gradable property denoted by the main predicate. There are five constitutive elements in a typical equative construction (following the terminology of Haspelmath & Buchholz (1998); Rett (2013); Haspelmath & the Leipzig Equative Constructions Team (2017); see also Treis (2018), among many others): (1) a COMPAREE: what is being compared against some standard of comparison; (2) a DEGREE MARKER, or alternatively, PARAMETER MARKER: marks the degree of presence/absence of a property in the comparee; (3) a PARAMETER of comparison: the property that is being compared, often contributed by a scalar, gradable predicate (adjectives, verbs, etc.); (4) a STANDARD MARKER: marker of the grammatical function of the standard; (5) a STANDARD of comparison: what the comparee is being compared against. This is exemplified in (1), using an English and a French example.

- | | | | | | |
|-----|----------------|------------------|----------------|---------------------------------------|---------------|
| (1) | 1 | 2 | 3 | 4 | 5 |
| | <i>Kim est</i> | [<i>aussi</i> | <i>grand</i>] | [<i>que</i> | <i>Jim</i>]. |
| | COMPAREE | DEGREE MARKER | PARAMETER | STANDARD MARKER | STANDARD |
| | <i>Kim is</i> | [<i>equally</i> | <i>tall</i>] | [<i>like</i> | <i>Jim</i>]. |
| | | | | (Haspelmath et al. 2017: Example (2)) | |

At first glance, the translational equivalent of (1) in Mandarin Chinese looks very similar. For instance, like the equative constructions illustrated in (1), a typical scalar equative in Mandarin Chinese (henceforth MSEs) comprises five constitutive elements: (1) a COMPAREE, which occupies the matrix subject position; (2) a

DEGREE MARKER *yiyang* (meaning ‘the same/equally’);¹ (3) a PARAMETER of comparison, normally contributed by a scalar, gradable adjective; (4) a STANDARD MARKER *xiang* (meaning ‘like’),² and (5) a STANDARD of comparison that is being compared to the comparee. Despite the difference in surface word order, scalar equatives in English (henceforth ESEs) and MSEs seem to express similar truth conditions. Like its English/French counterpart, (2) expresses that Kim is at least as tall as Jim is.

(2)	<i>Kim</i>	<i>xiang</i>	<i>Jim</i>	<i>yiyang</i>	<i>gao</i> .
	COMPAREE	STANDARD	MARKER	STANDARD	DEGREE MARKER
	Kim	like	Jim	equally	tall
	Lit.: ‘Kim is equally tall like Jim.’				

However, despite these superficial similarities, there are a variety of morphosyntactic variations between ESEs and MSEs, such as (to be detailed in §3): (i) measure phrases such as *three meters*, *two kilos* can function as the standard phrases in ESEs, but not in MSEs; (ii) factor phrases as differentials are allowed in ESEs, but not in MSEs; (iii) ESEs exhibit comparative sub-deletion, which is lacking in MSEs, and (iv) typical negative polarity items (NPIs) are licensed in the standard phrases of ESEs, but are not in MSEs.

The commonalities and differences between MSEs and ESEs raise a number of interesting questions, such as: (i) whether scalar equatives exemplified in (1) and (2) are subject to the same semantics, that is, can the standard degree-based semantics that presumably captures the semantics of ESEs be straightforwardly extended to MSEs? (ii) If not, what is the potential source of variation between them? (iii) In what sense and to what extent can we arrive at a principled account

1. Some equative constructions in Mandarin Chinese also employ *nayang/name* ‘lit. that manner’, a demonstrative-turned degree/parameter marker. Due to limitation of space, we concentrate on the *xiang.....yiyang* equative construction in this article and leave the other constructions for another occasion. Interested readers may refer to Chen (2010); Luo & Cao (2018); Luo (2019) and Sun (2019; 2021) and references therein for further discussion.

2. The same morpheme *xiang* ‘like’ is also used in similatives, namely, the constructions that express similarity in manner, e.g., *Mary sings like a nightingale*.

(i) *Mary xiang yeying yiyang gechang*.
 Mary like nightingale equally sing
 ‘Mary sings like a nightingale.’

This suggests that it is not implausible to provide a unified account for equatives and similatives in Mandarin Chinese (cf. Haspelmath & Buchholz (1998) for further discussion on the commonalities between equatives and similatives across languages). We shall leave this issue for another occasion.

for the commonalities and differences among different equative constructions cross-linguistically and cross-categorially?

In this paper, we put forward an analysis that would derive the empirical differences and commonalities between ESEs and MSEs. We propose that the morphosyntactic variations can be tied down to a variation in the strategy of making comparison of equality: one strategy makes direct reference to degrees, which are often modeled as abstract representation of measurement, corresponding to points (or intervals) along a scale, akin to real numbers (Seuren 1973; von Stechow 1984; Kennedy 1999; Kennedy & McNally 2005, among others), while the other type of strategy compares properties, making reference to Chierchia-style kinds which are constructed from properties (i.e., sets of individuals) (Cresswell 1976; Moltmann 2009; Anderson & Morzycki 2015; Scontras 2017; Mendia 2020). Equative constructions adopting the former rely on the asymmetrical linear ordering of points, while those adopting the latter recur to the comparison of equality of properties. This analysis correctly predicts the morphosyntactic differences between MSEs and ESEs and captures the cross-categorical variation (as different types of equative constructions) between them. Furthermore, the analysis also lends strong support for the well-felt intuition that the connection between degrees and properties runs deep and fundamental (cf. Cresswell 1976; Anderson & Morzycki 2015; Scontras 2017; Hohaus & Zimmermann 2021).

The rest of this paper proceeds as follows. §2 reviews the standard degree-based analysis of equative constructions and shows how it captures the behaviors of ESEs. §3 discusses the morphosyntactic properties of MSEs. After laying out a number of morphosyntactic differences between ESEs and MSEs, we conclude that the standard degree-based analysis that works for ESEs cannot be extended to MSEs, and an alternative analysis must be sought to explain them. In §4, we propose that the differences between ESEs and MSEs boil down to a variation in the strategy of making comparison of equality: while one type of equative constructions makes direct reference to degrees as points, the other type equates properties. In §5, we provide a detailed account of MSEs in the framework of degrees-as-kinds as proposed in Anderson & Morzycki (2015) and Scontras (2017) and demonstrate how this analysis captures the morphosyntactic and semantic properties of MSEs. In §6, we offer some speculative notes about the fundamental connection between degrees and properties and conclude.

2. Equative constructions: A standard degree-based account

This section presents a relatively uncontroversial semantics for scalar equatives as a starting point for further discussion. Haspelmath & Buchholz (1998) identify a class of sentences that equate different types of semantic objects such as degrees, individuals, manners, times, etc. (see also Rett 2013, 2015; Haspelmath et al. 2017; Treis 2018). Such constructions are exemplified in (3a–d) respectively:

- (3) a. Mr. Darcy is as rich as Mr. Bingley is. (equatives)
 b. John bought the same car as Peter did. (same/different construction)
 c. John danced as Mary did. (manner)
 d. John danced as Mary sang. (time)

Among these constructions, equatives, exemplified in (3a), are of particular interest to us.³ According to von Stechow (1984); Beck (2012); Rett (2013), equatives equate degrees, i.e., equatives express the degree to which the comparee possesses is no less than the degree to which the standard possesses with respect to some gradable property denoted by the parameter. Since this kind of sentences always take a gradable/scalar adjective as the parameter of comparison, we dub them as SCALAR EQUATIVES.

In the standard degree-based framework, degrees are modelled as points or intervals on an abstract scale, akin to real numbers (cf. Seuren 1973; von Stechow 1984; Kennedy 1999, 2002, 2009; Schwarzschild & Wilkinson 2002; Kennedy & McNally 2005; Beck 2012). On this view, ESEs have been treated as kinds of the differential comparatives that express superiority or inferiority (e.g., *Mr. Darcy is taller than Mr. Bingley*). They have the same LF as that of differential comparatives, and their semantics differs only minimally, viz., differential comparatives invoke a strict linear ordering (i.e., “**Adj-ness** (x) > **Adj-ness** (y)” (for superiority comparatives) or “**Adj-ness** (x) < **Adj-ness** (y)” (for inferiority comparatives)), while equatives invoke a weak linear ordering (i.e., “x is at least as Adj as y” (**Adj-ness** (x) ≥ **Adj-ness** (y))) (von Stechow 1984; Beck 2012; Rett 2013, among others). In a word, they have a common semantics based on linear ordering of degrees. We follow the standard approach to assume that the degree marker *as* imposes a weak linear ordering between degrees, as in (4a). In this approach, a maximalization operator MAX is tacitly assumed, which is defined in (4b).

3. It is an open question whether equative constructions can be uniformly treated. Rett (2013) proposes a non-uniform analysis, arguing that equatives differ from other equation constructions in that they contain a lexicalized degree argument while the other constructions equate a non-lexicalized argument. But see Hohaus & Zimmermann (2021) for a unified account of equatives and similatives in German.

- (4) a. $\llbracket as \rrbracket = \lambda D_2 \lambda D_1. \text{MAX}(D_1) \geq \text{MAX}(D_2)$
 b. $\text{MAX}(D) \Leftrightarrow \text{id}[D(d) \wedge \forall d'[(D(d') \rightarrow d' \leq d)]]$

Equatives establish a relation between two sets of degrees. As for the underlying structure of an equative sentence, we simply follow the standard approach to assume that the set of degrees that constitute the standard of comparison (e.g., Mr Bingley's richness degrees, see (3a)) is derived by a covert operator movement within the comparative clause (Bresnan 1973; Chomsky 1977), while the set of degrees that constitute the comparee of comparison is a result of Quantifier Raising (QR) headed by the degree marker. This is illustrated in (5a). The stepwise derivation for the truth-conditions of (3a) is provided in (6).

- (5) Logical Form for (3a):
 $\llbracket_{\text{DegP}} \text{as} \rrbracket = [\lambda d_1 [\text{Mr. Bingley is } d_1\text{-rich}]]_{\langle d, t \rangle} \llbracket \lambda d_2 [\text{Mr. Darcy is } d_2\text{-rich}]]_{\langle d, t \rangle}$
- (6) a. $\llbracket \lambda d_2 [\text{Mr. Darcy is } d_2\text{-rich}] \rrbracket = \lambda d_2 [\text{Mr. Darcy is } d_2\text{-rich}]$
 b. $\llbracket \lambda d_1 [\text{Mr. Bingley is } d_1\text{-rich}] \rrbracket = \lambda d_1 [\text{Mr. Bingley is } d_1\text{-rich}]$
 c. $\llbracket as \rrbracket (\lambda d_2 [\text{Mr. Darcy is } d_2\text{-rich}]) (\lambda d_1 [\text{Mr. Bingley is } d_1\text{-rich}])$
 d. $\llbracket \text{Mr. Darcy is as rich as Mr. Bingley} \rrbracket = 1$ iff
 $\text{MAX}(\lambda d_1. \text{Darcy is } d_2\text{-rich}) \geq \text{MAX}(\lambda d_2. \text{Bingley is } d_2\text{-rich})$
 $= \text{richness}(d) \geq \text{richness}(b)$

There are several pieces of empirical evidence supporting that equatives equate degrees. These facts will be relevant when we turn to scalar equatives in Mandarin Chinese in the next section.

Firstly, like differential comparatives, ESEs allow measure phrases (MPs) to be used as the standard phrases. See (7).

- (7) a. Bill is as tall as 6.7 feet.
 b. Peter is as heavy as 150 kilograms.

MPs are widely assumed to denote degrees. The examples in (7) are thus expected on this account.

Secondly, since degrees are akin to real numbers, equatives should permit differentials that express multiplication of numerical values. This prediction is borne out, as evidenced by the following examples in (8) that contain factor phrases that modify the parameter of comparison. This is expected if the constituent that comprises the parameter plus the standard denote degrees.

- (8) a. He could not help seeing that you were about five times as pretty as every other woman in the room. (*Pride and Prejudice* by Jane Austin)
 b. The curtain is twice as wide as the window. (Beck 2012: 1349)

Thirdly, scalar equatives exhibit comparative sub-deletion, just as differential comparatives do:

- (9) a. Michael Jordan has more scoring titles than Dennis Rodman has tattoos.
(Kennedy 2002: Example (2a))
b. I brought more apples than you brought bananas.
- (10) a. I brought as many apples as you brought bananas.
b. This table is as wide as it is high.

Comparative sub-deletion, as exemplified in (9), is widely analyzed as involving comparison of degrees (cf. von Stechow 1984; Kennedy 1999, 2002; Beck 2012). For instance, (9b) states that the amount/degree of apples exceeds that of bananas. In the same vein, the scalar equatives in (10) invoke comparison of degrees. (10a) expresses the amount/degree of apples that “I” brought is no less than the amount/degree of bananas that “you” brought. (10b) states that the degree to which the table is wide is no less than the degree to which the table is high.

Fourthly, as shown in (6b), the standard degree-based semantics of equatives involves an inbuilt maximality operator, which makes the standard of equatives a downward entailing (DE) context.⁴ This is illustrated in (11) to (13).

- (11) Proof: The standard phrases of equatives are DE contexts
- i. $D_2 \subseteq D_1$;
 - ii.
$$\frac{\text{MAX}(D_1) \geq \text{MAX}(D_2)}{\therefore \text{MAX}(D_1) \geq \text{MAX}(D_2)}$$

(11) predicts the entailment patterns in (12) and (13):

- (12) Context: John is 188 cm tall. Mary is 185 cm tall. Sue is 180 cm tall.
- a. $\llbracket \text{John is taller than Mary} \rrbracket$
= $\text{MAX}(\lambda d_1. \text{John is } d_1 \text{ tall}) > \text{MAX}(\lambda d_2. \text{Mary is } d_2 \text{ tall})$

4. One reviewer provides the following examples to show that the standard phrases may well be an upward entailing (UE) environment:

- (i) a. The tree is as tall as some giraffes are.
b. The tree is as tall as some animals are.

It is important to note that the DE environment that we talk about in the paper is the one based on gradable dimensions that are subject to the maximalization (MAX) operation. Suppose John is 185 cm, and Peter is 182 cm, the degree interval that includes John's height also includes Peter's height: $(0, 182] \subset (0, 185]$. Now if we say Mary is taller than John, the implication is that Mary is also taller than Peter.

We remain agnostic about the phenomenon pointed out by the reviewer. We reckon it to be general problem about DE, and leave it for future research.

- b. $\llbracket \text{Mary is taller than Sue} \rrbracket$
 $= \text{MAX}(\lambda d_1. \text{Mary is } d_1 \text{ tall}) > \text{MAX}(\lambda d_2. \text{Sue is } d_2 \text{ tall})$
- c. $\llbracket (12a) \rrbracket \Rightarrow \llbracket (12b) \rrbracket = \text{MAX}((0, 188]) > \text{MAX}((0, 185])$
 $\Rightarrow \text{MAX}((0, 185]) > \text{MAX}((0, 180])$
- (13) Context: John is 185 cm tall. Mary is 185 cm tall. Sue is 180 cm tall.
- a. $\llbracket \text{John is as tall as Mary} \rrbracket$
 $= \text{MAX}(\lambda d_1. \text{John is } d_1 \text{ tall}) \geq \text{MAX}(\lambda d_2. \text{Mary is } d_2 \text{ tall})$
- b. $\llbracket \text{Mary is as tall as Sue} \rrbracket$
 $= \text{MAX}(\lambda d_1. \text{Mary is } d_1 \text{ tall}) \geq \text{MAX}(\lambda d_2. \text{Sue is } d_2 \text{ tall})$
- c. $\llbracket (13a) \rrbracket \Rightarrow \llbracket (13b) \rrbracket = \text{MAX}((0, 185]) \geq \text{MAX}((0, 185])$
 $\Rightarrow \text{MAX}((0, 185]) \geq \text{MAX}((0, 180])$

According to Ladusaw (1980), NPIs are licensed in downward-entailing contexts. Given Ladusaw's observation, we predict that NPIs will be licensed in the standard phrases of equatives in English. The prediction is borne out, as evidenced by the examples in (14).

- (14) a. Jim is as competent as anyone here could possibly be. (Alrenga 2010)
 b. Paris is as quiet as ever. (Penka 2017)
 c. Two glasses was as much as I cared to drink. (Penka 2017)

To sum up, ESEs display some strikingly similar behaviors as differential comparatives. These similarities include: (i) they allow MPs to be used as standard phrases; (ii) they permit differentials that express multiplication (i.e., factor phrases); (iii) they exhibit comparative sub-deletion, and (iv) they can license NPIs in their standard phrases. All these facts lead to the conclusion that ESEs involve a semantics based on linear ordering of degrees.

In the next section, we examine whether scalar equatives in Mandarin share the same morphosyntactic properties as their English counterparts. If scalar equatives in Mandarin Chinese share the morphosyntactic properties as their English counterparts, the standard analysis that works for English can be straightforwardly extended to Mandarin Chinese. However, if scalar equatives in Mandarin Chinese and English exhibit systematic morphosyntactic differences, it is necessary to seek an alternative analysis for Mandarin Chinese.

3. The properties of scalar equatives in Mandarin Chinese

As we have stated before, like the ESE, a prototypical MSE comprises five components: (a) a COMPAREE of comparison; (b) a STANDARD of comparison; (c) a DEGREE MARKER *yiyang* (lit. the same/equally) that introduces a parameter; (d) a

PARAMETER, which is typically contributed by a scalar predicate (adjectives, verbs, etc.), and (e) a STANDARD MARKER *xiang* (lit. ‘like’). This is illustrated in (15) below:⁵

- (15) *Zhangsan xiang Lisi yiyang gao.*
 COMPAREE STANDARD-MARKER STANDARD DEGREE-MARKER PARAMETER
 Zhangsan like Lisi equally tall
 ‘Zhangsan is as tall as Lisi.’

- (16) Kim is as tall as Jim.

The example in (15) expresses the same truth conditions as its English counterpart in (16), namely, they are translational equivalents (Francez & Koontz-Garboden 2017): both (15) and (16) mean the degree to which the comparee is tall is no less than the degree to which the standard is tall. Does the fact that ESEs and MSEs express the same truth conditions mean they are compositionally and morpho-syntactically the same? In this section, we scrutinize the properties of MSEs and point out that, despite the superficial similarity and being “translational equivalents”, ESEs and MSEs manifest different strategies in making comparison of equality, as evidenced by a variety of morphosyntactic differences between them.

Firstly, unlike ESEs, MPs cannot be used as the standard of comparison in MSEs, as evidenced by the oddness of the examples in (17).

- (17) a. **Zhangsan xiang liang mi yiyang gao.*
 Zhangsan like two meter equally tall
 Intended: ‘Zhangsan is as tall as 2 meters.’
 b. **Zhujiang xiang 2214 gongli yiyang chang.*
 Pearl River like 2214 kilometer equally long
 Intended: ‘The Pearl River is as long as 2214 kilometers.’

Secondly, factor phrases that express multiplication of numerical values are in general prohibited from being used as differentials in MSEs.

- (18) **Zhangsan xiang Lisi liang bei yiyang gao.*
 Zhangsan like Lisi two times equally tall
 Intended: ‘Zhangsan is two times as tall as Lisi.’

5. MSEs also allow the demonstrative (degree) particles such as *zheme/zhelyang* ‘this manner’ to be used the degree/parameter markers. Limitation of space prevents us from providing a comprehensive account of all kinds of MSEs in this paper.

Thirdly, unlike ESEs, argumental NPIs like *renheren* ‘anybody’ are not licensed in the standard phrases of MSEs.⁶

- (19) **Zhangsan xiang renheren yiyang gao.*
 Zhangsan like anybody equally tall
 Intended: ‘Zhangsan is as tall as anybody else.’

Fourthly, the comparative sub-deletion that applies to ESEs doesn’t apply to MSEs. Consider (20) below.

- (20) **Zhe zhang zhuozi xiang na zhang zhuozi gao yiyang kuan.*
 DEM CL table like DEM CL table tall equally wide
 Intended: ‘This table is as wide as that table is tall.’

Note that Mandarin is not alone in exhibiting these properties. German equatives, for instance, do not license NPIs in the standard phrases either (Penka 2017). This is illustrated in (21a) and (21b), where the NPI *jemals* ‘ever’ is not licensed in the standard phrases of equatives.

- (21) a. **Luise war so glücklich [wie jemals zwor].*
 Luise was so happy how ever before
 ‘Louise was as happy as ever.’
 b. **Der Jemen ist so schön, [wie ich jemals gedacht habe].*
 DEM Yemen is so beautiful how I ever thought have
 ‘The Yemen is as beautiful as I thought.’

(Hohaus & Zimmermann 2021: Example (48a–b))

The cross-linguistic and cross-categorical morphosyntactic variations between ESEs and MSEs are summarized in the following table.

Table 1. The cross-linguistic variation between ESEs and MSEs

	MPs as standard	Factor phrases as differentials	NPI licensing	Sub-deletion
English	+	+	+	+
Mandarin	–	–	–	–

6. One reviewer questioned that whether NPIs are absolutely not licensed in the standard phrases of MSEs. The reviewer provides the following example:

- (i) *Zhangsan de fa-qiu-ju xiang renheren de yiyang hao.*
 Zhangsan PAR serving-game like anybody PAR equally good
 ‘Zhangsan’s serving games are as good as anybody.’

Our informants replied that (i) is rather degraded. And furthermore, unlike (19), the NPI in (i) is embedded and used as the modifier in an NP. This is reminiscent of the infamous “subtrigging” effect in the NPI literature. We remain agnostic about this effect in Chinese.

As indicated in Table 1, the variations between ESEs and MSEs are systematic. Given these systematic differences, a natural corollary is that the standard semantic analysis based on linear ordering of degrees that works for ESEs cannot be straightforwardly extended to MSEs. Because, if such is the case, we would miss some important contrast between these two constructions. We thus tentatively conclude that ESEs and MSEs, though both express equality between two individuals/entities with respect to a gradable property, seem to involve different mechanisms and comparison strategies. The comparison between MSEs and ESEs constitutes a very interesting research question insofar as it would unveil some commonalities and differences in the semantics of equative constructions. There are two questions remaining to be resolved: (i) how to properly account for the behaviors of MSEs, and (ii) to which component of grammar should we attribute the variations between ESEs and MSEs? In the following section, we argue that the differences between ESEs and MSEs boil down to a variation in the strategy of making comparison of equality: while one strategy makes reference to degrees as points (ESEs), the other makes reference to properties (MSEs).

4. The proposal

4.1 Two strategies of making comparison of equality

As discussed in the previous section, the standard degree-based analysis makes correct predictions for the behaviors of ESEs. However, the behaviors of MSEs are unexpected on the standard analysis. To account for the empirical properties of MSEs, we must seek an alternative analysis.

Apparently, the differences between ESEs and MSEs can be reduced to the lexical semantics of the standard markers in these two languages. According to the standard analysis, the standard marker *as* in English equatives patterns with degree operators in taking sets of degrees as its argument (Rett 2013). However, unlike *as* in English, the standard marker *xiang* in Mandarin equatives can only take kind-denoting terms or definite NPs as its arguments at surface syntax. Other types of DPs, e.g., indefinites, quantified phrases, etc., are generally disallowed.⁷ To illustrate, consider (22) (cf. Zhu 1982).

- (22) a. *haozi xiang mao yiyang da.*
 mice like cat equally big
 ‘The mouse is as big as the cat.’

7. We take DP as a cover term for the (maximal) projection of nominal expressions. Such said, our DPs contain both the definite NPs (*the book*) and indefinite NPs (*three books, some books*).

- b. *Zhangsan xiang Lisi yiyang gao.*
 Zhangsan like Lisi equally tall
 ‘Zhangsan is as tall as Lisi.’
- c. *Zhe ben shu xiang na ben shu yiyang hou.*
 DEM CL book like DEM CL book equally thick
 ‘This book is as thick as that one.’
- d. **Zhe ben shu xiang san ben shu yiyang hou.*
 DEM CL book like three CL book equally thick
 Intended: ‘This book is as thick as three ones’

In (22a), the bare noun *mao* ‘cat’ denotes the CAT kind; in (22b), the standard following *xiang* is a proper name, and in (22c), it is the singular definite NP *na ben shu* ‘that book’ serving as the standard phrase. (22d) contains an indefinite NP (i.e., *san ben shu* ‘three books’) as the standard and the sentence is odd. The observation illustrated by the examples in (22) is important insofar as it leads to the conclusion that Mandarin adopts a different comparison strategy in making equality, resulting into different syntactic derivation and semantic composition. As is well-known, there is an inherent affinity between singular definite descriptions and proper names, both being restricted to well-defined kinds (Abbott 2010: 171). Taking kind terms as their standard phrases, MSEs express identity in properties, rather than identity in degrees.

Recently, much attention has been paid to the ontological representation of degrees. Approaches roughly fall within two camps. The “standard” (more established) approach takes degrees as primitives, akin to real numbers, or more specifically, as points or intervals on an abstract scale (cf. Seuren 1973; von Stechow 1984; Kennedy 1999, 2002, 2009; Schwarzschild & Wilkinson 2002; Kennedy & McNally 2005; Beck 2012). The other approach, pioneered by Cresswell (1976), treats degrees as equivalence classes, or sets of individuals that are equivalent with respect to some measure. This is followed and further developed by Grosu & Landman (1998); Moltmann (2009), among many others. Most recently, Anderson & Morzycki (2015); Scontras (2017), and Mendia (2017), all present case studies that motivate conception of degrees as entities comparable to kinds (cf. Carlson 1977; Chierchia 1998). These two conceptualizations of degrees are summarized in (23).

- (23) Two approaches to the ontology of degrees:
- i. The *degrees-as-points* approach: Degrees are semantic primitives, formalized as points on an abstract scale, akin to real numbers (cf. Seuren 1973; von Stechow 1984; Heim 1985; Kennedy 1999; Schwarzschild & Wilkinson 2002; Kennedy & McNally 2005; Kennedy 2007; Beck 2012);
 - ii. The *degrees-as-kinds* approach: Degrees are not semantic primitives, but rather ontologically complex entities. Research within this approach treats degrees as equivalence classes (Cresswell 1976), as tropes (Moltmann 2009), or as kinds (Anderson & Morzycki 2015; Scontras 2017).

Grosu & Landman (1998); Anderson & Morzycki (2015); Scontras (2017); Mendia (2020), among many others, have observed much parallelism between kinds and degrees. Anderson & Morzycki (2015), for instance, observe that in both Polish and German, a single morpheme serves as a proform for kinds, manners and degrees. This is illustrated in (24) for Polish and (25) for German, respectively.

(24) Polish

- a. KIND
tak-i pies
such-MASC dog
'such a dog'
- b. MANNER
tak się zachowywać
such REL behave
'behave that way'
- c. DEGREE
tak wysoki
such tall
'that tall'

(Anderson & Morzycki 2015: Example (1))

(25) German

- a. KIND
so einen Hund
such a dog
'a dog of the same kind'
- b. MANNER
so getanzt
such danced
'danced like that'

- c. DEGREE
Ich bin so groß
 I am such tall
 'I am this tall.' (Anderson & Morzycki 2015: Example (5))

They also observe that in Polish (and many other Slavic languages) and German, a single WH-word is used across the domains of kinds, manners and degrees. This is illustrated by the examples in (26) (from Polish) and (27) (from German) respectively.

- (26) Polish
- a. KIND
jak-i pies
 WH-MASC dog
 'what kind of dog'
- b. MANNER
Jak się zachowywał
 WH REL behaved-MASC
 'How did he behave?'
- c. DEGREE
Jak wysoki jest Clyde?
 WH tall is Clyde
 'How tall is Clyde?' (Anderson & Morzycki 2015: Example (2))

- (27) German
- a. KIND
so ein Hund wie dieser
 such a dog WH this
 'a dog such as this'
- b. MANNER
Jan hat so wie Maria getanzt.
 Jan has such WH Mary danced
 'John danced the way Mary danced.'
- c. DEGREE
Ich bin so groß wie Peter
 I am such tall WH Peter
 'I am as tall as Peter.' (Anderson & Morzycki 2015: Example (6))

A corollary of the parallel facts is that degrees can be treated as kinds (cf. Anderson & Morzycki 2015; Scontras 2017). Space limitation prevents us from elaborating on this topic. For ease of exposition, we simply follow Anderson & Morzycki (2015) to take the new kind of degree as Chierchia-style kinds (for a slightly different implementation, see Scontras (2017)).

Chierchia (1998) posits that all first order properties have counterparts in the entity domain such that for any natural property (e.g., the property of being a dog), it corresponds to a kind (e.g., the DOG kind). Conversely, natural kinds have corresponding property counterparts, i.e., the property that instantiates that kind. Chierchia defines two semantic operations that “transform” between kinds and properties (Chierchia 1998: 38–39). The “down” operator \downarrow , a process of nominalization, derives kinds from properties. The “up” operator \uparrow , a process of predicativization, retrieves properties from kinds. The semantics for these two operators are repeated as below (Chierchia 1998: 349).

(28) a. **Nominalization**

For any property P and world/situation s , $\downarrow P = \lambda s. \iota P_s$ if P_s is in K ; else undefined (where P_s is the extension of P in s and K is the set of kinds).

b. **Predicativization**

Let k be a kind. Then for any world/situation s , $\uparrow k = \lambda x. x \leq k_s$, if k is defined, false otherwise (where k_s is the plural individual that comprises all the atomic members of this kind).

Because degrees can be reconstructed from equivalence class of individuals, i.e., properties of individuals, and because of the natural conversion between properties and kinds, the same theoretical machinery that handles kinds can be extended to handle degrees. This has paved way for a more principled account of the properties of MSEs, and a novel approach to the potential source of variation among different types of equative constructions. For current purposes, we entertain the following Degree Mapping Parameter to derive the empirical differences between ESEs and MSEs:

(29) Degree Mapping Parameter

- i. Type A: $d \in \mathbb{N}$, where degrees are points on an abstract scale, akin to real numbers;
- ii. Type B: $d \in K$, where degrees are Chierchia-style kinds.

The empirical differences between ESEs and MSEs are tied down to different conceptualizations of degrees: one type of degree refers to abstract representation of measurement, corresponding to points, while the other type of degree refers to Chierchia-style kinds. Equatives adopting the former rely on the (asymmetrical) linear ordering of points, while the comparatives that adopt the latter recur to comparison of equality of properties. We argue that MSEs should be analyzed as generalized modification structures, a form of relativization that adopts intersective semantics in semantic composition. We turn to the syntax and semantics of MSEs in the next section.

4.2 The syntax and semantics of scalar equatives in Mandarin

There is ample evidence indicating that in MSEs, the [*xiang*+standard] forms a constituent and functions as an adjunct to the main clause (i.e., the [target+predicate (of parameter)]). Some supporting pieces of evidence will be discussed below (for more details, see Song (1984)).

Firstly, the [*xiang*+standard] sequences can be freely dislocated from the matrix clause, as demonstrated in (30).

- (30) *Xiang Lisi yiyang, Zhangsan (hen) gao.*
 like Lisi equally Zhangsan very tall
 ‘Like Lisi, Zhangsan is (very) tall.’

Secondly, the [*xiang*+standard] constituents can be used as answers to degree questions, as illustrated in (31). (30a) is a degree question which asks about the degree of Zhangsan’s tallness. As (33b) indicates, the [*xiang*+standard] alone can be used to answer this degree question.

- (31) a. *Zhangsan duo gao?*
 Zhangsan how tall
 ‘How tall is Zhangsan?’
 b. *Xiang Lisi yiyang.*
 Like Lisi equally
 ‘As tall as Lisi.’

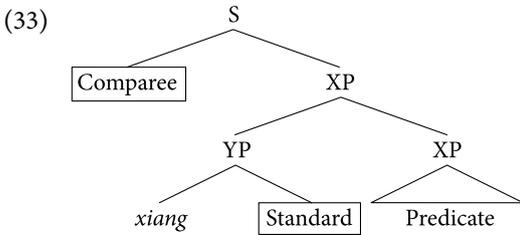
Thirdly, the linker *de* can be inserted between the standard phrase and the predicate of parameter (cf. Zhu 1982). This property is illustrated by (32) below.

- (32) *Zhangsan xiang Lisi yiyang de gao.*
 Zhangsan like Lisi equally DE tall
 Lit.: ‘Zhangsan’s height is as tall as Lisi’s.’

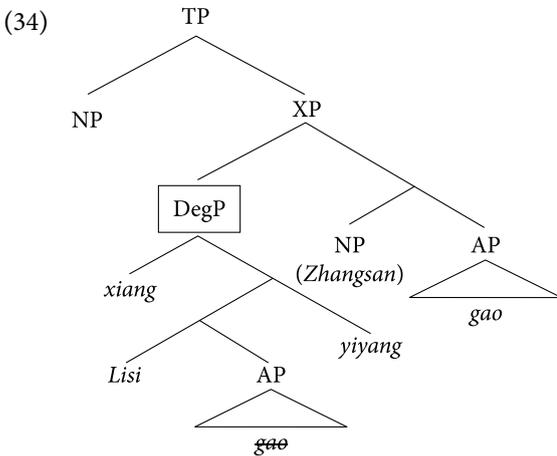
In Mandarin Chinese, the linker *de* is often used in modification structures and links/connects two property-denoting descriptions. For example, in the nominal modification structures, *de* connects two properties of individuals and the result is an intersection of the two properties: *Zhangsan tuijian de shu* Zhangsan recommend DE book ‘the book that Zhangsan recommends’ means x is a book and x is recommended by Zhangsan ($\lambda x[\text{book}(x) \wedge \text{Zhangsan-recommend}(x)]$). If the [*xiang*+standard] phrase denotes a property and some (generalized) modification structure is also involved in scalar equatives, the presence of *de* is expected.⁸

8. One reviewer raises whether the *de* in (32) is a relativizer or an adverbial modification marker. These two uses are not mutually exclusive to each other, since relativization can be

In view of the above empirical properties, we propose that Mandarin equatives are correlatives in disguise. Specifically, the [target+predicate] forms the matrix clause, and the [*xiang*+standard] is a reduced clause, which adjoins to the matrix clause. Following Liu (1996); Hsieh (2015); Wellwood (2015); Erlewine (2018), and many others, we assume scalar equatives are an instance of clausal comparison, as demonstrated in (33).



We adopt an adjunction analysis for equatives, in which the [*xiang*+standard] (as a reduced clause) is an adjunct to the main clause. Assuming a Predicate-internal Subject Hypothesis, the underlying structure of MSEs is shown in (34) below. The predicate of parameter in the standard phrase is deleted under identity with the predicate of parameter in the matrix clause (for a similar treatment of the *bi* comparatives, see Erlewine (2018)).⁹



treated as an instance of modification in semantic sense (cf. Heim & Kratzer 1998). Not to invite further controversy, we adopt the relatively uncontroversial terminology LINKER here.

9. The structure of (34) is simplified somewhat. The projection AP could contain a covert positive morpheme POS. In this case, *yiyang* connects two clauses: [Comparee [POS AP]] and [Standard [POS AP]]. It is an open issue whether MSEs allow positive readings or not. We set this issue aside in this paper.

Following Anderson & Morzycki (2015); Wellwood (2015), and many others, we introduce two semantic types into the model: state argument s , and kind argument k . In this approach, gradable adjectives are associated with a state variable s . This is illustrated in (35).

$$(35) \llbracket \textit{gao} \rrbracket = \lambda x \lambda s [\textit{tall} (s, x)] \text{ (} s \text{ instantiates a tallness state of } x \text{)}$$

The standard marker *xiang* ‘like’ in our analysis is no longer semantically vacuous. Rather, it takes a kind argument as its input and the result is a property that instantiate the kind. This is illustrated in (36), where the “up” operator \cup is the familiar Chierchia-style predicativization operator that applies to a kind and returns the property from which it was built on.

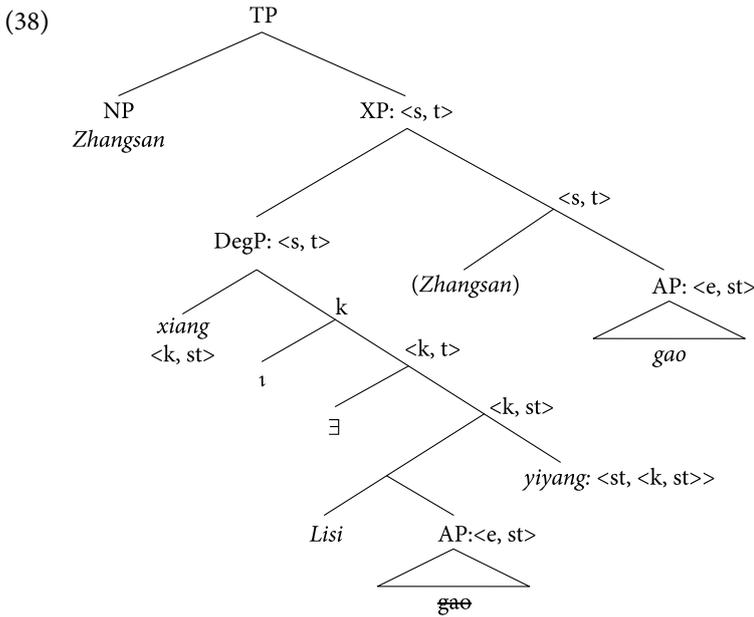
$$(36) \llbracket \textit{xiang} \rrbracket = \lambda k \lambda s [\cup k(s)]$$

Rett (2013); Anderson & Morzycki (2015), among others, take the semantic composition of equative constructions to be an instance of predicate modification (i. e., intersective semantics). We basically follow this line of reasoning. The lexical entry of the degree/parameter marker *iyang* ‘equally’ is provided in (37). In this analysis, *iyang* connects a property of states with another property of states (retrieved from some kind-denoting term via the predicativization operator) and affirms that some state s instantiates both properties. This semantics is, essentially, an intersective one.¹⁰

$$(37) \llbracket \textit{iyang} \rrbracket = \lambda P_{\langle s, t \rangle} \lambda k \lambda s [P(s) \wedge \cup k(s)]$$

With the above semantic machinery at hand, we are now in a position to tackle the compositionality issue of equative constructions. Specifically, the [*xiang*+standard] composes with the [target+predicate] via intersection, or Predicate Modification in the sense of Heim & Kratzer (1998). To satisfy interpretability, we assume that there is a covert iota-shift operation that turns a predicate of kinds into a unique one. (38) and (39) below illustrate the underlying structure and stepwise derivation of scalar equative constructions respectively (cf. Anderson & Morzycki 2015).

10. For a slightly different treatment of *iyang* and *nayang* ‘that manner’, see Sun (2019).



- (39)
- $\llbracket Lisi\ gao \rrbracket = \lambda s[\mathbf{tall}(s, LS)]$
 - $\llbracket yiyang \rrbracket (\llbracket Lisi\ gao \rrbracket) = \lambda k\lambda s[\mathbf{tall}(s, LS) \wedge {}^u k(s)]$
 - \exists -Closure $\llbracket [Lisi\ \cancel{gao}] yiyang \rrbracket = \lambda k[\exists s[\mathbf{tall}(s, LS) \wedge {}^u k(s)]]$
 - Iota-Shift $(\lambda k[\exists s[\mathbf{tall}(s, LS) \wedge {}^u k(s)]]) = \iota k[\exists s[\mathbf{tall}(s, LS) \wedge {}^u k(s)]]$
 - $\llbracket xiang [Lisi\ \cancel{gao}] yiyang \rrbracket = \lambda k\lambda s[{}^u k(s) (\iota k[\exists s[\mathbf{tall}(s, LS) \wedge {}^u k(s)]])](s)$
 $= \lambda s[{}^u (\iota k[\exists s[\mathbf{tall}(s, LS) \wedge {}^u k(s)]])](s)$
 - $\llbracket Zhangsan\ gao \rrbracket = \lambda s[\mathbf{tall}(s, ZS)]$
 - $\llbracket Zhangsan\ xiang\ Lisi\ yiyang\ gao \rrbracket$
 $= \lambda s[{}^u (\iota k[\exists s[\mathbf{tall}(s, LS) \wedge {}^u k(s)]])](s') \wedge \mathbf{tall}(s', ZS)]$
 - $\llbracket Zhangsan\ xiang\ Lisi\ yiyang\ gao \rrbracket = 1$ iff
 $\exists s[{}^u (\iota k[\exists s[\mathbf{tall}(s, LS) \wedge {}^u k(s)]])](s') \wedge \mathbf{tall}(s', ZS)]$

What end formula of (39) states is essentially intersective: The first conjunct says s' is a realization of the state that LS's tallness instantiates, and the second conjunct says that this s' also instantiates ZS's tallness. Together they mean there is a state that instantiates both ZS and LS's tallness. The formula states that the state to which *Zhangsan's* tallness instantiates also instantiates *Lisi's* tallness. The truth-conditions of the sentence *Zhangsan xiang Lisi yiyang gao* ('Zhangsan is as tall as Lisi') is intuitively and desirably captured in this analysis.

In the following section, we demonstrate how the empirical properties of MSEs follow from the present account.

5. Explaining the facts

The present analysis provides a natural explanation of the properties of MSEs and correctly predicts the empirical differences between MSEs and ESEs.

First, on the present account, the standard phrase is a kind-denoting definite description. It is well-known that definite descriptions do not create a downward-entailing environment (Jacobson 1995). As expected, NPIs are not licensed, as shown in (40). Despite the superficial differences, the oddness of (40) and (41) is due to the same reason, viz., no proper DE environment to license the NPI.

(40) *I can read whatever Bill ever read.

(41) **Zhangsan xiang renheren yiyang gao.*
 Zhangsan like anybody equally tall
 Intended: 'Zhangsan is as tall as anybody else.'

Second, in the present analysis, the comparison of equality is not based on linear ordering of degrees, rather, it is based on equality of properties. This correctly predicts that the MP differentials that directly denote degrees (e.g., *yibaibashi limi* '180 cm', *sanshi gongjin* '30 KGs', etc.) and the factor phrases that express multiplication of numerical values are prevented from being used as the standard of comparison. To repeat some of the previous examples:

(42) a. **Zhangsan xiang liang mi yiyang gao.*
 Zhangsan like two meter equally tall
 Intended: 'Zhangsan is as tall as 2 meters.'
 b. **Zhujiang xiang 2214 gongli yiyang chang.*
 The Pearl River like 2214 KM equally long
 Intended: 'The Pearl River is as long as 2214 kilometers.'

(43) **Zhangsan xiang Lisi liang bei yiyang gao.*
 Zhangsan like Lisi two times equally tall
 Intended: 'Zhangsan is two times as tall as Lisi.'

The oddness of (42) and (43) can be straightforwardly explained in terms of type mismatch (equality of degree points vs. equality of properties).

Third, supposing comparative sub-deletion involves comparison of degree points (Kennedy 2002), the puzzle that ESEs allow sub-deletion (cf. (44)) but MSEs do not (cf. (45)) is explained. Examples like (45) thus receive a natural explanation on the present account.

(44) This table is as wide as it is high.

- (45) **Zhe zhang zhuosi xiang na zhang zhuozi gao yiyang kuan.*
 dem CL table like DEM CL table tall equally wide
 Intended: 'This table is as wide as that table is tall.'

To recap, despite that ESEs and MSEs are translational equivalents, they are by no means the same. We propose that the cluster of morphosyntactic differences between ESEs and MSEs are tied to a variation in the ontological conceptualizations of degrees: degrees as points for ESEs and degrees as kinds for MSEs. This analysis makes correct predictions for the behaviors of ESEs and MSEs. It provides a natural explanation for a range of distributional and interpretative contrasts between scalar equatives in English and Mandarin Chinese, as summarized in (46).

- (46) a. **Measure Phrase (MPs) as standard phrases or not:** The equatives that are based on degrees as points allow MPs as standard phrases, the equatives that are based on degrees as kinds do not;
- b. **Factor phrases:** Factor phrases express multiplication of numerical values, and they are allowed in the equatives that are based on degrees as points, prohibited in the equatives that are based on degrees as kinds;
- c. **NPIs licensing:** Because degrees as points are subject to the maximalization operation, which in turn creates a downward-entailing environment, NPIs are licensed in the standard phrases of the equatives that are based on degrees as points, but not in the standard phrases of the equatives that are based on degrees as kinds;
- d. **Comparative sub-deletion:** The equatives that are based on degrees as points allow comparative sub-deletion, which is not possible for the equatives that are based on degrees as kinds.

The variation in the ontological representation of degrees leads to two distinct strategies for making comparison of equality. In one type of strategy, comparison is based on (asymmetrical) linear ordering, while in the other type of strategy, comparison is based on equality of properties. The latter strategy involves an intersective semantics, viz. if x has the same degree as y with respect to some comparable property, there is some degree d that instantiates some property of x also instantiates some property of y . The standard phrases of the latter, not of the former, are akin to relative clauses that adjoin to the matrix clause.

6. Concluding remarks

The cross-linguistic and cross-categorical variation in the expression of comparison has taken a prominent position in degree-based frameworks. As we stated

in the beginning of this paper, there are two core questions behind this phenomenon: (i) whether a case of apparent surface variability in making comparison reflects variability in grammar, and (ii) which component of grammar (if any) can a case of variability in comparison be reduced to (cf. Kennedy 2009; Luo & Xie 2018). Various proposals have been put forth, e.g., the degree abstraction parameter (Beck et al. 2004; Beck et al. 2009), individual comparison vs. degree comparison (Heim 1985; Kennedy 2009); explicit comparison vs. implicit comparison (Krasikova 2008); clausal comparison vs. phrasal comparison (or, reduced comparison vs. direct comparison) (cf. Lechner 2001; Lin 2009; Bhatt & Takahashi 2011), to name just a few. This study has injected some new content into this growing body of research by investigating scalar equatives in Mandarin Chinese. We have shown that there may exist different strategies in making comparison of equality. In one type of strategy, comparison is based on (asymmetrical) linear ordering, while in the other type of strategy, comparison is based on equality of properties. This variation can be couched in the broader distinction between degrees as points vs. degrees as kinds. Though space limitation prevents us from examining the other comparative constructions in detail, we have shown that, at least as far as scalar equatives are concerned, the variation between degrees as points vs. degrees as kinds might be a plausible source of variation among different equative constructions.

Despite the success in capturing the empirical properties of MSEs and accounting for the differences between MSEs and ESEs, the present analysis has some loose ends. As we have stated in the beginning of this article, MSEs and ESEs are “translational equivalent”, to borrow the terminology from Francez & Koontz-Garboden (2017). That is, they comprise similar components and express similar truth-conditions. For example, both MSEs and ESEs contain the same core elements in making comparison of equality: both contain a comparee, a degree/parameter maker, a parameter, a standard marker, and a standard. To repeat from previous examples:

(47) 1 2 3 4 5
 COMPAREE DEGREE MARKER PARAMETER STANDARD MARKER STANDARD
Kim is [*equally* *tall*] [*like* *Jim*]
 (Haspelmath et al. 2017: Example (2))

(48) *Kim* *xiang* *Jim* *yiyang* *gao*.
 COMPAREE STANDARD MARKER STANDARD DEGREE MARKER PARAMETER
 Kim like Jim equally tall
 ‘Kim is equally tall like Jim.’

Furthermore, (47) and (48) express similar truth-conditions: Both mean Kim is no less tall to the extent that Jim is tall. Similar “translational equivalents” are

widely reported in the literature: within and across languages, there are many equative constructions comprising similar components and expressing similar truth-conditions (Haspelmath & Buchholz 1998; Rett 2013; Haspelmath & the Leipzig Equative Constructions team 2017; Hohaus & Zimmermann 2021, among many others).

How to account for the commonalities and differences among equative constructions in natural language? Due to space limitation, we can only add some speculative notes here. One possibility is that degrees and properties might not be distinct semantic objects as is widely assumed. That is, degrees are not primitives, rather, they are derived concepts. Despite being semantic objects of distinct types, degrees and properties are conceptually related. This idea, of course, is nothing new. Cresswell (1976) proposes to reconstruct degrees from equivalence classes of individuals. Grosu & Landman (1998) provides a way to connect degrees with properties. Most recently, Anderson & Morzycki (2015) propose that there is some fundamental connection between degrees, manners, and kinds. Scontras (2017) also connects degrees with properties via nominalized properties. The fact that equative constructions within and across languages employ the same morpho-syntactic means and express similar truth conditions indicates that the connection between degrees and properties runs deep and fundamental (see Hohaus & Zimmerman (2021) for more discussion about the parallels between degrees and properties).

Supposing that there is some fundamental connection between degrees and properties, and degrees are derived concepts from properties (of individuals, events, states, etc.), the differences between MSEs and ESEs might turn out not to be about some absolute parameter, rather, the differences might be attributed to the degree of grammaticalization of the *degree* notion. Put it simply, in the constructions with less grammaticalized notion of *degree*, comparison may be based on properties, while in the constructions with more grammaticalized notion of *degree*, comparison may be based degrees (as points). This idea accords with Beck et al.'s (2009) Degree Semantics Parameter, which has been widely adopted to deal with cross-linguistic variation in gradable adjectives, comparison constructions and various gradability-related constructions (see Hohaus & Bochnak 2020 for a recent overview). We leave this topic to the interested readers.

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Abbreviations

CL	classifier	NPI	negative polarity item
DE	downward entailing	PAR	particle
DEM	demonstrative	QR	Quantifier Raising
ESE	English scalar equative	REL	relativizer
MASC	masculine	UE	downward entailing
MP	measure phrase	WH	WH word
MSE	Mandarin scalar equative		

References

- Abbott, Barbara. 2010. *Reference*. Oxford: Oxford University Press.
- Alrenga, Peter. 2010. Comparisons of similarity and difference. In Hofherr, Patricia Cabredo & Matushansky, Ora (eds.), *Adjectives: Formal analyses in syntax and semantics*, 155–186. Amsterdam: John Benjamins. <https://doi.org/10.1075/la.153.05alr>
- Anderson, Curt & Morzycki, Marcin. 2015. Degrees as kinds. *Natural Language and Linguistic Theory* 33(3). 791–828. <https://doi.org/10.1007/s11049-015-9290-z>
- Beck, Sigrid. 2012. Comparison constructions. In Maienborn, Claudia & von Stechow, Klaus & Portner, Paul (eds.), *Semantics: An international handbook of natural language meaning*, vol. 2, 1341–1389. Berlin: Mouton de Gruyter.
- Beck, Sigrid & Oda, Toshiko & Sugisaki, Koji. 2004. Parametric variation in the semantics of comparison: Japanese vs. English. *Journal of East Asian Linguistics* 13(4). 289–344. <https://doi.org/10.1007/s10831-004-1289-0>
- Beck, Sigrid & Krasikova, Sveta & Fleischer, Daniel & Gergel, Remus & Hofstetter, Stefan & Savelsberg, Christiane & Vanderelst, John & Villalta, Elisabeth. 2009. Crosslinguistic variation in comparison constructions. In van Craenenbroeck, Jeroen (ed.), *Linguistic variation yearbook 2009*, 1–66. <https://doi.org/10.1075/livy.9.01bec>
- Bhatt, Rajesh. & Takahashi, Shoichi. 2011. Reduced and unreduced phrasal comparatives. *Natural Language & Linguistic Theory* 29(3). 581–620. <https://doi.org/10.1007/s11049-011-9137-1>
- Bochnak, Michael Ryan. 2013. *Cross-linguistic variation in the semantics of comparatives*. Chicago: The University of Chicago. (Doctoral dissertation.)
- Bresnan, Joan. 1973. Syntax of the comparative clause construction in English. *Linguistic Inquiry* 4(3). 275–343.
- Carlson, Gregory. 1977. *Reference to kinds in English*. Amherst: UMass Amherst. (Doctoral dissertation.)

- Chen, Yi-Hsun. 2010. *The syntax and semantics of Chinese equatives*. Hsinchu: National Chiao Tung University. (Master's thesis.)
- Chierchia, Gennaro. 1998. Reference to kinds across languages. *Natural Language Semantics* 6(4). 339–405. <https://doi.org/10.1023/A:1008324218506>
- Chomsky, Noam. 1977. On wh-movement. In Culicover, Peter & Wasow, Thomas & Akmajian, Adrian (eds.), *Formal syntax*, 71–132. New York: Academic Press.
- Cresswell, Maxwell John. 1976. The semantics of degree. In Partee, Barbara H. (ed.), *Montague grammar*, 261–292. New York: Academic Press. <https://doi.org/10.1016/B978-0-12-545850-4.50015-7>
- Erlewine, Michael Yoshitaka. 2018. Clausal comparison without degree abstraction in Mandarin Chinese. *Natural Language and Linguistic Theory* 36(2). 445–482. <https://doi.org/10.1007/s11049-017-9383-y>
- Francez, Itamar & Koontz-Garboden, Andrew. 2017. *Semantics and morphosyntactic variation: Qualities and the grammar of property concepts*. New York: Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780198744580.001.0001>
- Grosu, Alexander & Landman, Fred. 1998. Strange relatives of the third kind. *Natural Language Semantics* 6(2). 125–170. <https://doi.org/10.1023/A:1008268401837>
- Haspelmath, Martin & Buchholz, Oda. 1998. Equatives and similative constructions in the languages of Europe. In van der Auwera, Johan & Ó Baoill, Dónall P. (eds.), *Adverbial constructions in the languages of Europe*, 277–334. Berlin: Mouton de Gruyter. <https://doi.org/10.1515/9783110802610.277>
- Haspelmath, Martin & the Leipzig Equative Constructions Team. 2017. Equative constructions in a world-wide perspective. In Treis, Yvonne & Vanhove, Martine (eds.), *Similative and equative constructions: A cross-linguistic perspective*, 9–32. Amsterdam: John Benjamins. <https://doi.org/10.1075/tsl.117.02has>
- Heim, Irene. 1985. *Notes on comparatives and related matters*. Austin: The University of Texas at Austin. (Unpublished manuscript.)
- Heim, Irene & Kratzer, Angelika. 1998. *Semantics in generative grammar*. Malden: Blackwell.
- Hohaus, Vera & Bochnak, M. Ryan. 2020. The grammar of degree: Gradability across languages. *Annual Review of Linguistics* 6. 235–259. <https://doi.org/10.1146/annurev-linguistics-011718-012009>
- Hohaus, Vera & Zimmermann, Malte. 2021. Comparison of equality with German *so...wie*, and the relationship between degrees and properties. *Journal of Semantics* 38(1). 95–143. <https://doi.org/10.1093/jos/ffaa011>
- Hsieh, I-Ta Chris. 2015. Remark: Long-distance reflexives, blocking effects, and the structure of Mandarin comparatives. *Syntax* 18(1). 78–102. <https://doi.org/10.1111/synt.12026>
- Jacobson, Pauline. 1995. On the quantificational force of English free relatives. In Bach, Emmon & Jelinek, Eloise & Kratzer, Angelika & Partee, Barbara H. (eds.), *Quantification in natural languages*, 451–486. Dordrecht: Kluwer Academic Publishers.
- Kennedy, Christopher. 1999. *Projecting the adjective: The syntax and semantics of gradability and comparison*. London: Taylor & Francis Group.
- Kennedy, Christopher. 2002. Comparative deletion and optimality in syntax. *Natural Language and Linguistic Theory* 20(3). 553–621. <https://doi.org/10.1023/A:1015889823361>
- Kennedy, Christopher. 2007. Vagueness and grammar: The semantics of relative and absolute adjectives. *Linguistics and Philosophy* 30(1). 1–45. <https://doi.org/10.1007/s10988-006-9008-0>

- Kennedy, Christopher. 2009. Modes of comparison. In Elliott, Malcolm & Kirby, James & Sawada, Osamu & Staraki, Eleni & Yoon Suwon (eds.), *Proceedings from the Main Session of the 43rd Annual Meeting of the Chicago Linguistic Society*, 139–163. Chicago: Chicago Linguistic Society.
- Kennedy, Christopher. & McNally, Louise. 2005. Scale structure, degree modification, and the semantics of gradable predicates. *Language* 81(2). 345–381. <https://doi.org/10.1353/lan.2005.0071>
- Krasikova, Sveta. 2008. Comparison in Chinese. In Bonami, Olivier & Hofherr, Patricia Cabredo (eds.), *Empirical issues in syntax and semantics volume 7*, 263–281. Paris: Colloque de Syntaxe et Sémantique à Paris.
- Ladusaw, William A. 1980. *Polarity sensitivity as inherent scope relations*. Bloomington: Linguistics Club, Indiana University.
- Lechner, Winfried. 2001. Reduced and phrasal comparatives. *Natural Language and Linguistic Theory* 19(4). 683–735. <https://doi.org/10.1023/A:1013378908052>
- Lin, Jo-wang. 2009. Chinese comparatives and their implicational parameters. *Natural Language Semantics* 17(1). 1–27. <https://doi.org/10.1007/s11050-008-9033-3>
- Liu, Luther Cheng-Sheng. 1996. A note on Chinese comparatives. *Studies in the Linguistic Sciences* 26(1/2). 215–236.
- Luo, Qiongpeng. 2019. *Yuyixue yu xingtai jufa bianyi: Yi Ying Han yu liangji dengbiji weili* [Semantics and morphosyntactic variation: The case of scalar equatives in English and Mandarin]. *Waiguoyu* [Journal of Foreign Languages] 3. 47–59.
- Luo, Qiongpeng & Cao, Yuzhen. 2018. Equatives are not all equal: A correlative analysis of scalar equatives in Mandarin Chinese. (Paper presented at the 54th Annual Meeting of Chicago Linguistic Society (CLS 54), Chicago, April 26–28 2018.)
- Luo, Qiongpeng. & Xie, Zhiguo. 2018. Degrees as nominalized properties: evidence from differential verbal comparatives in Mandarin Chinese. In Sauerland, Uli & Solt, Stephanie (eds.), *Proceedings of Sinn und Bedeutung 22 (SuB 22)*, vol. 2, 89–106. Berlin: Leibniz-Centre General Linguistics. <https://doi.org/10.21248/zaspil.61.2018.486>
- Mendia, Jon Ander. 2017. *Amount relatives redux*. Amherst: UMass Amherst. (Doctoral dissertation.)
- Mendia, Jon Ander. 2020. Reference to *ad hoc* kinds. *Linguistics and Philosophy* 43(6). 589–631. <https://doi.org/10.1007/s10988-019-09280-9>
- Moltmann, Friederike. 2009. Degree structure as trope structure: A trope-based analysis of positive and comparative adjectives. *Linguistics and Philosophy* 32(1). 51–94. <https://doi.org/10.1007/s10988-009-9054-5>
- Penka, Doris. 2017. The semantics of equatives in English and German. (Paper presented at the workshop Microvariation in Semantics, Berlin, September 6 2017.)
- Rett, Jessica. 2013. Semilatives and the argument structure of verbs. *Natural Language and Linguistic Theory* 31(4). 1101–1137. <https://doi.org/10.1007/s11049-013-9201-0>
- Rett, Jessica. 2015. Measure phrase equatives and modified numerals. *Journal of Semantics* 32(3). 425–475. <https://doi.org/10.1093/jos/ffu004>
- Schwarzschild, Roger & Wilkinson, Karina. 2002. Quantifiers in comparatives: A semantics of degree based on intervals. *Natural Language Semantics* 10(1). 1–41. <https://doi.org/10.1023/A:1015545424775>
- Scontras, Gregory. 2017. A new kind of degree. *Linguistics and Philosophy* 40(2). 165–205. <https://doi.org/10.1007/s10988-016-9200-9>

- Seuren, Pieter A.M. 1973. The comparative. In Kiefer, F. & Ruwet, N. (eds.), *Generative grammar in Europe*, 528–564. Dordrecht: D. Reidel. https://doi.org/10.1007/978-94-010-2503-4_22
- Song, Yu Zhu. 1984. Yu *xiang* youguan de jige wenti [Several issues related to *xiang*]. *Yuyan Jiaoxue yu Yanjiu* [Language Teaching and Linguistic Studies] 1984(1). 13–25.
- Sun, Yenan. 2019. *Same* as the parameter of an equation construction. In Franke, Michael & Kompa, Nikola & Liu, Mingya & Mueller, Jutta L. & Schwab, Juliane (eds.), *Proceedings of Sinn und Bedeutung 24*, vol. 2, 306–318.
- Sun, Yenan. 2021. Decomposing *same*. *Natural Language and Linguistic Theory*. (<https://link.springer.com/article/10.1007/s11049-021-09522-1>) (Accessed on 2021-08-15.)
- von Stechow, Arnim. 1984. Comparing semantic theories of comparison. *Journal of Semantics* 3(1–2). 1–77. <https://doi.org/10.1093/jos/3.1-2.1>
- Treis, Yvonne. 2018. Comparative constructions: An introduction. *Linguistic Discovery* 16(1). i–xxvi. <https://doi.org/10.1349/PS1.1537-0852.A.492>
- Wellwood, Alexis. 2015. On the semantics of comparison across categories. *Linguistics and Philosophy* 38(1). 67–101. <https://doi.org/10.1007/s10988-015-9165-0>
- Zhu, Dexi. 1982. Shuo *gen...yiyang* [On *gen...yiyang*]. *Hanyu Xuexi* [Chinese Language Learning] 1982(1). 1–5.

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