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Comparison in Chinese

Sveta Krasikova

1 Introduction

In the recent literature on comparatives, evidence from different languages has been used to argue for the nontrivial semantic variation in the expression of comparison, see Beck et al. (2004); Bhatt and Takahashi (2007); Kennedy (to appear). Beck et al. (2004) initiated the discussion by bringing to light some data from Japanese that present a challenge to the standard degree semantics of comparatives developed for English, cf. von Stechow (1984), Heim (2001). According to Beck et al. (2004), Japanese lacks comparative clauses interpreted as properties of degrees due to the absence of degree abstraction at the LF. This leads them to the hypothesis that the possibility to bind degree variables in the syntax is subject to parametric variation. To generate an LF without degree abstracts Beck et al. (2004) assume that the item of comparison is not compositionally integrated into the structure of a Japanese comparative sentence, but determines the value of the contextual variable on the comparative operator.

A more recent paper by Bhatt and Takahashi (2007) underlines another potential source of cross-linguistic variation in the semantics of gradation, namely the logical type of the item of comparison. Bhatt and Takahashi argue that some languages, like Hindi, employ individual type standards and adopt Heim's 1985 phrasal analysis of comparatives for Hindi. Kennedy (to appear) reconsiders the facts reported in Beck et al. (2004) and suggests that the individual/degree distinction in the type of the standard is sufficient to account for the semantic differences without imposing a ban on degree abstraction at the logical form.

The aim of this study is to support the conclusions reached in Beck et al. (2004) by presenting evidence from Chinese. Focussing on the cluster of properties discussed in Beck et al. (2004), we will demonstrate that Chinese, similar to Japanese, lacks structures whose semantics depends on the mechanism of degree abstraction and propose a semantic analysis of degree constructions in Chinese. We will develop the idea already discussed in Beck et al. (2004) that the lexical entries of gradable adjectives encode the comparative relation per se. Assuming the comparative meaning of gradable predicates implies that their degree argument is not bound by an external comparative operator but lexically and allows to generate an LF without degree abstraction. Thus, the main claim of the paper is that the lexical semantics of degree predicates is responsible for the differences in the expression of comparison and, particularly, it results in the contextual type of comparison advocated in Beck et al. (2004).

The paper is structured in the following way: Section 2 sets the background by introducing the Japanese data that motivated the analysis of Beck et al. (2004). In Sec-

tion 3 we first introduce the basic types of Chinese sentences with degree predicates and then show that the Japanese data pattern discussed in Section 2 is present in Chinese as well. The main conclusion of this section is that Chinese comparatives are not amenable to the standard degree operator analysis developed for English. In Section 4 we propose an analysis based on a new semantics of degree predicates that overcomes the difficulties we came across. Section 5 evaluates the present proposal in light of the discussion about the variation in the semantics of degree constructions and summarises the results.

2 Degree Abstraction Parameter

Beck et al. (2004) discuss three properties of Japanese comparatives that are not predicted by the standard English-based analysis of degree constructions and driven by the observed phenomena they argue that the degree semantics is subject to cross-linguistic variation. First, they observe that Japanese differs from English in that it does not display negative island effects under the comparative, see (1) vs. (2). In (2) the comparative *yori*-clause hosts a negation but this does not result in unacceptability as in the English example in (1). von Stechow (1984) and later Rullmann (1995) argued that (1) cannot receive any interpretation because the coercion operator that mediates between the comparative operator and the embedded clause fails to pick the maximum degree from the denotation of the latter, i.e. the set of degrees d s.t. nobody bought a d-expensive book does not have a maximum. If we adopt this account, the contrast between (1) and (2) suggests that Japanese *yori*-clauses are not interpreted as sets of degrees like their English counterparts, even though they look similar on the surface.

(1) *John bought a more expensive book than nobody did.

(2) John-wa [dare-mo kawa-naka-tta no yori] takai hon-o taka.
John-TOP anyone buy-NEG-PAST NO YORI expensive book-ACC bought
'John bought a book that is more expensive than the book that nobody bought.'

The second phenomenon that Beck et al. (2004) consider to be related to the lack of negative island effects is the absence of subcomparatives of degree in Japanese, cf. (3)-(4) below. Under the standard analysis of comparatives, the interpretation of (3) crucially depends on abstracting over the degree argument of the embedded adjective and thus constructing a predicate of degrees out of the comparative clause. The fact that this option is not available in Japanese, cf. (4), calls into question the applicability of the standard analysis to this language.

(3) This shelf is taller than that door is wide.

(4) * Kono tana-wa [ano doa-ga hiroi yori (mo)] (motto) takai.
this shelf-TOP [that door-NOM wide YORI MO] more tall

Another datum that points to the special status of the Japanese comparative clause concerns variation in acceptability of comparative sentences depending on the involved degree predicates, see (5) vs. (6). Beck et al. (2004) argue that if we assume that the *yori*-clauses in (5) and (6) are relative clauses denoting the maximal plurality

of objects bought by Hanako, we can derive the observed contrast. The cardinality of the set of umbrellas bought by Hanako can be easily calculated and can serve as the appropriate item of comparison in (5b), whereas this set does not lend itself to the kind of comparison made in (6b), i.e. it is not naturally associated with a degree of length.

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

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

Finally, shifting the focus to the matrix clause, Beck et al. (2004) point out that Japanese comparatives with modals in the main clause never display ambiguities attested in English that are argued to be the result of scope interactions between the comparative and the corresponding modal operator, see Heim (2001). The Japanese sentence in (7) can only mean that Laura has an obligation to buy a smaller number of candles than Pete. In contrast, (8) has an additional natural reading conveying that the minimal amount of candles satisfying Laura's obligation falls below the minimal amount satisfying Pete's, i.e. the comparison is between the sets of degrees corresponding to Laura's and Pete's requirements. The availability of the latter reading suggests that in English the comparative can scope over the modal and bind the degree variable left behind. Beck et al. (2004) conclude that Japanese lacks such an option.

(7) Laura-wa Pete yori (mo) sukunai kazu-no roosoku-o
Laura-TOP Pete YORI MO small number-GEN candle-ACC
kawa-nakerebanaranai.
buy-required

(8) Laura needs to buy a smaller number of candles than Pete.

Two proposals have been recently made to account for the differences between English and Japanese. Beck et al. (2004) assume that Japanese disallows binding of degree variables at the logical form and thus cannot build prototypical degree abstraction structures like subcomparatives, absolute measure phrase constructions or degree questions. This empirical pattern leads the authors to the formulation of the Degree Abstraction Parameter that should affect the semantics of degree operators and regulate the availability of certain types of degree constructions cross-linguistically.

(9) Degree Abstraction Parameter (DAP):
A language {does, does not} have binding of degree variables in the syntax.

Beck et al. (2004) propose that as a result of the negative setting of the DAP Japanese relies on a pragmatic inference strategy in establishing the item of comparison. This means that Japanese only employs context setters akin to the English 'compared to' phrases instead of proper comparative clauses. Thus, the *yori*-constituent denotes an

individual that determines the value of the contextual variable on the comparative operator. The latter combines with a gradable predicate and the subject in the usual way, see (10).

(10) $[\![\text{ER}_C]\!]^g = \lambda A_{d(et)}.\lambda x_e.\max(\lambda d.A(d)(x)) > g(C)$

Kennedy (to appear) follows up on the idea that Japanese *yori*-clauses express predicates of individuals and argues that the comparative selects individual-denoting standards in this language. He proposes an analysis in the spirit of Heim's 1985 analysis of phrasal comparatives in English. It should be noted that, although this strategy is successful in explaining the properties of embedded clauses, it is not DAP-driven and fails to predict the absence of scope interactions with modals in the main clauses of comparative sentences.

3 Comparative Constructions in Chinese

In this section we will first describe the properties of the main types of degree constructions in Chinese—the positive and the comparative sentences. Then we will apply the tests identified in Beck et al. (2004) to check for the availability of degree abstraction in this language. We will show that Chinese patterns with Japanese and thus presents additional evidence in favour of the DAP.

3.1 Basic Data

Due to the lack of comparative morphology, degree constructions in Chinese always feature the unmarked positive form of the gradable predicate. (10) is an example of a simple comparative sentence, where the standard of comparison is introduced by *bi*. There is no agreement in the literature about the syntactic status of *bi* in the comparative. For an overview and analysis of *bi* as a verb see Erlewine (2007). We will not commit ourselves to any of the existing proposals and will remain neutral as to the exact syntactic structure of (11).

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

The comparative *bi* sentence can involve an explicit differential measure phrase or an intensifier adverb *geng*/'even/still', see (12) and (13). The latter is very common if the standard of comparison is not explicit, which lead to the claims that *geng* is the comparative marker. However, the fact that *geng* is incompatible with a measure phrase differential like 5 li mi/'by 5 cm', cf (13), suggests that it is rather some sort of intensifier. See Beck et al. (2004) for a similar conclusion concerning the Japanese particle *motto*.

(12) Lisi bi Zhangsan gao 5 li mi.
Lisi BI Zhangsan tall 5 cm
'Lisi is 5 cm taller than Zhangsan.'

(13) Lisi bi Zhangsan geng gao (* 5 li mi).
Lisi BI Zhangsan GENG tall 5 cm
'Lisi is (even) taller than Zhangsan.'

Turning to the positive construction, it is a well-known (see e.g. Liu (2005); Kennedy (2007) and references therein) that it requires the presence of the degree adverb *hen*/ 'very', see (14). *Hen* cannot co-occur with an explicit standard of comparison. In other words, *hen* is compatible with *bi*-standards or any other expression that refers to the comparison class, cf. (15) and (16) (= Kennedy's 2007 example (8b)), it can tolerate the presence of *geng* or overt differentials.

(14) Lisi *(hen) gao.
Lisi very tall
'Lisi is (very) tall.'[1]

(15) Lisi (*hen) bi Zhangsan (*hen) gao.
Lisi very BI Zhangsan very tall

(16) Lisi (*hen) gao de neg mozhao tianpeng.
Lisi very tall DE can touch ceiling
'Lisi is tall enough to touch the ceiling.'

If *hen* is omitted and no *bi*-phrase is introduced the sentence can still be interpreted as a comparative construction if the context supplies some standard of comparison. For example, in (17)—the so called conjoined comparative—the context is restricted to two people and a comparative interpretation obtains.

(17) Lisi gao, Zhangsan ai.
Lisi tall Zhangsan short
'Lisi is taller than Zhangsan.'

It has been tentatively suggested in Kennedy (2007) that Chinese *hen* is the positive morpheme responsible for the expression of implicit comparison, i.e. *hen* introduces comparison to the contextually set standard. In von Stechow (2006) English *very* has also been treated as the overt realisation of the POS operator, though within a different approach to the semantics of positive constructions, the idea being that *very* is a universal degree operator restricted by a relatively large neutral region, i.e. the span that forms what is called the 'extension gap of the predicate' in the non-degree theories of gradable adjectives. However, if *hen* were the positive marker or POS itself, we would expect it to be an indispensable component of any degree construction lacking an explicit standard. This prediction does not seem to be borne out. In negative contexts *hen* appears to be optional. If present under negation, it corresponds to *very*, cf. (18). Negated *hen*-less sentences are unambiguously interpreted as positive constructions, no matter if the context provides a potential standard of comparison or not. The comparative interpretation is only possible in the presence of *bi*.

(18) Lisi bu (hen) gao.
Lisi neg very tall
'Lisi is not (very) tall.'

[1] When focused, *hen* is interpreted as 'very'.

Besides the constructions introduced above, Chinese makes wide use of context-setters to express both the positive and the comparative, see (19)-(20).

(19) Bi qi Zhangsan, Lisi hen gao.
Compared to Zhangsan Lisi very tall
'Compared to Zhangsan, Lisi is tall.'

(20) Bi qi Zhangsan, Lisi gao 5 li mi.
Compared to Zhangsan Lisi tall 5 cm
'Lisi is taller than Zhangsan by 5 cm.'

In (19) *hen* indicates that we deal with the positive construction. This sentence passes the usual tests for implicit positive-like comparison. For instance, Lisi's height should exceed Zhangsan's height by an amount that counts as considerable in the context. See Kennedy (to appear) for the so-called crisp judgement test. Example (20), on the other hand, features a gap measure phrase that is a hallmark of the comparative construction. Thus, we may draw a descriptive conclusion that the item of comparison can always be provided contextually, irrespective of whether it is a vague interval on the relevant scale, as in the positive case, or a precise degree that can serve as a reference point for a measurement operation, as in the comparative case.

To conclude, despite the absence of comparative morphology, Chinese has tools to distinguish between the positive and the comparative. In non-negated sentences the degree adverb *hen*/'very' precludes the comparative interpretation, whereas in negated sentences, where *hen* is optional, it is the presence of the overt item of comparison that determines whether we deal with the comparative or the positive. Like in English, the standard of comparison can be introduced by so-called context-setters and then used as an object of the comparative relation or to specify an implicit standard in positive constructions.

3.2 DAP Tests

As discussed in Section 2, Beck et al. (2004) provide empirical evidence that the semantics of comparison is subject to parametric variation. In particular, they point to a number of features of the Japanese *yori*-clauses suggesting that Japanese does not have English-like comparative clauses with the semantics of degree predicates. The crucial facts they discuss are the absence of negative island effect under the comparative and the impossibility to form a subcomparative of degree. This empirical pattern leads Beck et al. (2004) to the conclusion that Japanese bans degree abstraction, which they spell out as the negative setting of the DAP, see (9). Matrix clauses seem to support the generalisation that Japanese cannot build degree predicates in the syntax. Japanese comparatives with modals in the matrix never display scope ambiguities, unlike their English counterparts. Modals never seem to split the scope of the comparative. It takes the most local scope and so does not provide us with evidence that it can bind the degree variable.

In the following, we shall apply the DAP criteria identified by Beck et al. (2004) to Chinese.

It has already been discussed in the literature (Fu (1978); Xiang (2006)) that Chinese disallows subcomparatives of degree, see (21). The Chinese paraphrase of the

English subcomparative in (21) is an 'exceed'-type comparative employing the nouns *gao-du*/'height' and *kuan-du*/'width' as can be seen in (22).

(21) * Zhe ge zhuozi bi nage men kuan gao.
this CL table BI this door wide tall
Intended: 'The table is taller than the door is wide.'

(22) Zhe ge zhuozi de gaodu chaoguo le na ge men de kuandu.
this CL table DE height exceed ASP this CL shelf DE width
'The height of this table exceeds the width of this shelf.'

The impossibility to build subcomparatives has been related to the absence of clausal comparatives in Chinese, see Xiang (2006). *Bi* is always followed by a nominal expression and the prototypical cases of clausal comparative in English involve free relative clauses in Chinese, compare (23) and (24).

(23) Lisi is richer than I thought.

(24) Lisi bi [wo xiangxiang de] fu.
Lisi BI I imagine REL rich
Lit: 'Lisi is richer than what I thought.'

However, (21) cannot be rescued by inserting the relative pronoun *de* as in (24) and constructing the maximum from the set of degrees to which the door is wide, as one would immediately expect. This suggests that Chinese comparative sentences, like the Japanese ones, do not involve predicates of degrees in the object position of the comparative relation.

The latter conclusion is confirmed by the absence of negative island effects in Chinese. Consider the contrast between (25) and (26):

(25) *Peter bought a more expensive book than Mary didn't.

(26) Lisi mai de shu bi [Zhangsan mei mai de] gui.
Lisi buy DE book BI Zhangsan NEG buy DE] expensive
'Lisi bought a book that is more expensive than the book that Zhangsan didn't buy.'

The acceptability of (26) and its interpretation given by the English paraphrase indicate that *bi* is followed by a relative clause denoting a set of individuals and not a set of degrees as in (25).

Finally, modalised main clauses of Chinese comparative sentences are not ambiguous in the way predicted by the standard degree-operator analysis of the comparative. The Chinese sentence in (27) cannot be truthfully uttered in the context (28a), unlike its English counterpart. It therefore cannot have the reading paraphrased in (28b) and represented in (29) that corresponds to the wide scope of the comparative with respect to the universal modal. The sentence can only be true in the scenario, in which Lisi buys less candles than Zhangsan in all worlds complying with the rules. This corresponds to the structure with the modal scoping over the comparison.

(27) Lisi xuyao bi Zhangsan shao mai yixie lazhu.
Lisi must BI Zhangsan little buy some candles
'Lisi had to buy less candles than Zhangsan.'

(28) a. To fulfil the requirement Lisi had to buy from 5 to 10 candles. Zhangsan had to buy from 8 to 10.
b. The minimal amount of candles that Lisi had to buy is surpassed by the minimal amount of candles that Zhangsan had to buy.

(29) max(d : Lisi was required to buy d-many candles) <
max(d : Zhangsan was required to buy d-many candles)

According to Heim (2001), the ambiguity of English modalised comparatives is an important argument for the analysis of the comparative morpheme as a degree operator that can take scope at LF. Since we do not find this kind of evidence in Chinese, we have to conclude that the main clause of Chinese comparatives does not provide any support for the degree abstraction analysis.

To sum up, the lack of subcomparatives of degree and the absence of a negative island effect speak against the analysis of Chinese comparative clauses as degree predicates and the absence of scope interactions between the comparative and modal operators in the main clause deprive us of crucial evidence for the same kind of treatment of main clauses. These facts suggest that Chinese, similarly to Japanese, cannot build degree abstracts at the LF.

4 Contextual Comparison: Lexical Approach

A possible explanation of the Japanese and Chinese facts that we will explore in this section is that degree predicates in these languages have semantics different from that standardly assumed for English. The absence of degree abstraction could be due to the fact that the degree argument is bound inside the gradable predicate. This would account for the absence of structures involving degree abstraction and thus would conform with the negative setting of the DAP. The goal of this section is to elaborate such a solution, drawing on the insights of the contextual comparison approach by Beck et al. (2004). The core ideas of the analysis of Chinese degree constructions that we shall present below are the following:

- Comparison in Chinese is expressed by gradable adjectives.
- The standard of comparison is a contextually provided interval in both comparative and positive sentences.
- Chinese degree constructions feature a family of degree modifiers, like *hen*, operating on the standard interval.

4.1 Comparative Degree Adjectives

We assume that Chinese, which does not have any degree morphology, does not employ any abstract degree operators either. Instead, the comparative relation is an inherent part of the lexical meaning of degree predicates. In other words, the Chinese *gao*/'tall' compares the height of an individual to another point or interval on the tallness scale. More concretely, *gao* measures the distance between the height of the subject and the standard of comparison. This is expressed by the following lexical entry of *gao*:

(30) $[\![gao_{S_{\text{tall}}}]\!]^g = \lambda D_{(dt)t}.\lambda I_{dt} \in S_{\text{tall}}.\lambda x_e.D(\text{Height}(x) -_{S_{\text{tall}}} \max(I))$,
where $\forall d, d'(d -_{S_{\text{tall}}} d') = \{d'' | d >_{S_{\text{tall}}} d'' >_{S_{\text{tall}}} d'\}$.

According to (30), *gao*, associated with the tallness scale S, expresses a relation between the differential, the standard-of-comparison interval and the individual corresponding to the subject of comparison that holds if the gap between the height of the subject and the maximum of the standard has the length corresponding to the differential.

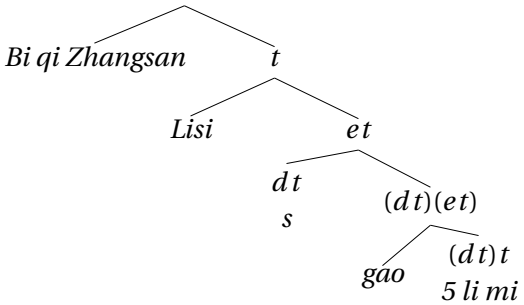
Following Schwarzschild (2005), we analyse differential measure phrases as predicates of intervals, i.e. differentials measure the length of the gap interval. For example, the expression *by 5 cm* denotes a set of intervals on the centimetre scale whose length is 5, see (31). In (30), the differential is true of the set of degrees that corresponds to the region on the scale between the height of the subject and the maximum of the standard.

(31) $[\![5\ cm]\!]^g = \lambda I_{dt}.\text{Length}(I) = 5 \wedge I \in S_{\text{cm}}$

The crucial part of the analysis is the contribution of the constituent that introduces the object of comparison. We follow Beck et al. (2004) who argue for a pragmatic strategy in providing the degree argument for the Japanese comparative and assume that the standard of comparison is fixed by a contextual variable that restricts the covert comparative morpheme. Under this assumption, the semantics of the context-setter comparative, repeated in (32), is the basis for the analysis of other degree constructions. The LF we propose is given in (33) and its interpretation in (34).

(32) Bi qi Zhangsan, Lisi gao 5 li mi.
Compared to Zhangsan Lisi tall 5 cm
'Lisi is taller than Zhangsan by 5 cm.'

(33) *Lisi is taller than Zhangsan by 5 cm.*



(34) $[\![[gao\ 5\ li\ mi]]\!]^g([\![s]\!]^g)([\![Lisi]\!]^g) = \text{Length}(\text{Height}(\text{Lisi}) -_{S_{\text{tall}}} \max(g(s))) = 5$,
where $g(s) = \{\text{Height}(\text{Zhangsan})\}$
= the interval between Lisi's height and Zhangsan's height is 5 cm long.

Bi qi Zhangsan/'compared to Zhangsan' does not contribute to the meaning of the comparative sentence (32) compositionally, but makes the height of Zhangsan salient in the context. The free variable *s* that ranges over intervals and provides the standard of comparison is correspondingly assigned the height of Zhangsan as its value.

The context-setter positive construction exemplified in (35) is analysed similarly.

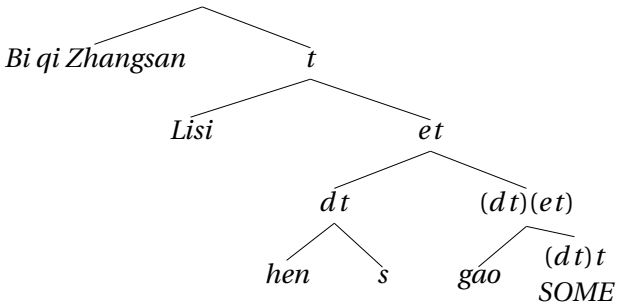
(35) Bi qi Zhangsan, Lisi hen gao.
Compared to Zhangsan Lisi very tall
'Compared to Zhangsan, Lisi is tall.'

We need to take into account the vagueness of the standard in (35), i.e. the difference between the object and the subject cannot be measured, but is rather a vague contextually significant amount, see Kennedy (2007) for the notion of "stand out". We believe that it is the role of the degree modifier *hen* to extend the standard interval in a context-dependent way. Put differently, *hen* turns the original point-like standard that is fixed by the context-setter into a larger interval. This is reflected in the following lexical entry of *hen*:

(36) $[\![hen_{C,S}]\!]^g = \lambda I.\lambda d \in g(C).\forall d' \in I : d \leq_{g(S)} d'$

Hen depends on the scale and a set of degree variables that are determined by the context. It takes an interval corresponding to the standard of comparison and extends its higher bound by a contextually restricted amount w.r.t. the relevant ordering. To see this at work, let us consider the analysis of (35) sketched in (37) and (38). To saturate the first argument of the adjective, we assume a default abstract differential SOME that denotes a set of intervals of indefinite length.

(37) *Compared to Zhangsan, Lisi is tall.*



(38) $[\![gao\ SOME]\!]^g([\![hen_{C,S}\ s]\!]^g)([\![Lisi]\!]^g =$
$\exists n : \text{Length}(\text{Height}(\text{Lisi}) -_{S_{\text{tall}}} \max(\lambda d \in g(C).\forall d' \in g(s) : d \leq_{S_{\text{tall}}} d')) = n,$
where $g(s) = \{\text{Height}(\text{Zhangsan})\}$
= there is some difference between Lisi's height and the maximum of the interval that extends Zhangsan's height by a contextually given degree.

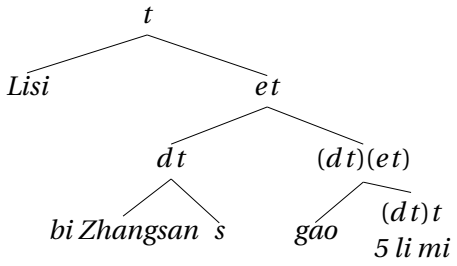
Under this analysis, the sentence (35) is predicted true iff Lisi's height exceeds a contextually set interval that starts from Zhangsan's height.

Besides *hen*, we find other pre-adjectival adverbs that restrict the standard interval in one way or another. As an example, we give the lexical entry for *you-xie*/'a little' that reduces the original standard interval.

(39) $[\![you\text{-}xie_{C,S}]\!]^g = \lambda I.\lambda d \in g(C).\forall d' \in I : d <_{g(S)} d'$

Turning to the *bi* comparative, we propose that it should also be treated as a contextual comparison construction, as shown in (40). *Bi Zhangsan*/'compared to Zhangsan' is semantically inactive. As a context-setter, it restricts the value of *s*. In our opinion, the fact that *hen* does not occur in the *bi*-construction has a syntactic explanation: its position is already filled by the *bi*-phrase.

(40) *Lisi is taller than Zhangsan by 5 cm.*



An alternative to what we said about context-setters above would be to assume that they modify the variable assignment function in such a way that the standard variable is always set to the degree associated with the mentioned individual, as shown in (41).

(41) $[\![\textit{compared to}\ x_{s,M}\ p]\!]^g = [\![p]\!]^{g^*}$,
where $g* = g[s/\lambda d.\exists D : D(d) \wedge g(M)(x) \in D]$; s is the standard variable and M is the salient measure function.

However, the fact that both Japanese and Chinese allow multiple context-setters speaks against this kind of solution, see (42)-(43).

(42) Japanese (Oda, 2007):

John-wa [Mary-ga yonda yori] [Bill-ga yonda yori] [Sue-ga yonda yori] motto takusan-no hon-o yonda.
John-TOP Mary-NOM read YORI Bill-NOM read YORI Sue-NOM read YORI more many-NOM book-ACC read

'John read more books than any of Mary, Bill and Sue did.'

(43) Chinese (Nan Li p.c.):

Lisi bi Majing, bi Zhangsan, bi Wangwu dou gao.
Lisi BI Majing BI Zhangsan BI Wangwu each tall

'Lisi is taller than any of Majing, Zhangsan and Wangwu is.'

Obviously, one can stack context-setters on top of each other and then compute a standard interval that would satisfy each of them, e.g. in (43) we compare Lisi's height to the interval that contains the heights of Majing, Zhangsan and Wangwu.

Summing up, we proposed an analysis of Chinese degree constructions based on the inherently comparative meaning of gradable predicates. The standard of comparison argument is treated as a free variable of the interval type whose value is inferred from the context. Along with the context-setters that fix the standard, Chinese degree constructions can involve pre-adjectival degree adverbs that can extend or reduce the standard interval.

4.2 Analysing Antonyms

According to the lexical entry of *hen* given in (36) above, this adverb has the potential of extending the standard interval with respect to the ordering at hand. The extension

of the standard interval is an important ingredient in the semantics of the positive construction. It results in the comparison with an interval with vague boundaries and is responsible for the context sensitivity of the positives. Importantly, the extension is performed on the scale of the relevant adjective. In this section we will demonstrate how this fits into the analysis of antonyms that we assume to be associated with different scales.

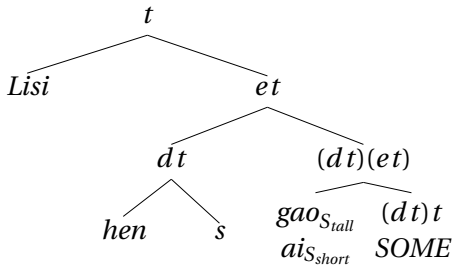
Let us consider the analysis of the positive sentences in (44)-(45) based on a pair of antonyms. If the standard interval is not specified by the context-setter as in these examples, it is set to some default degree, e.g. the average height in the context. We assume that *short* has the same lexical entry as *tall* differing from it only in the ordering that it is associated with, cf. (46).

(44) Lisi hen gao.
Lisi very tall
'Lisi is (very) tall.'

(45) Lisi hen ai.
Lisi very short
'Lisi is (very) short.'

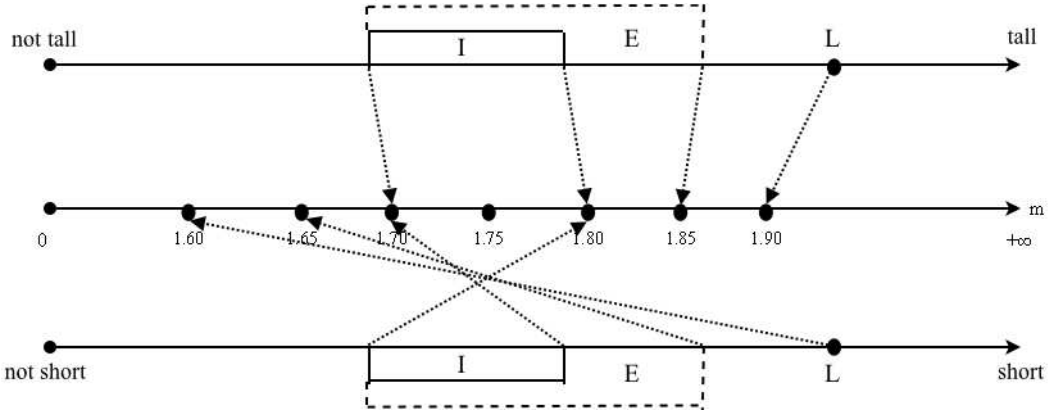
(46) $[\![ai_{S_{\text{short}}}]\!]^g = \lambda D_{(dt)t}.\lambda I_{dt} \in S_{\text{short}}.\lambda x_e.D(\text{Height}(x) -_{S_{\text{short}}} \max(I))$,
where $\forall d, d'(d -_{S_{\text{short}}} d') = \{d'' | d >_{S_{\text{short}}} d'' >_{S_{\text{short}}} d'\}$.

(47) *Lisi is (very) tall/short.*



According to (47), (44) is true iff Lisi's height is greater than the extended standard interval, whereas (45) is true iff Lisi's height is less than the extended interval, the extension being performed with respect to the given ordering in each case. The following scheme illustrates the truth conditions (L = Height(Lisi); $I = [\![s]\!]^g$; $E = [\![hen\ s]\!]^g$):

(48) Shortness vs. tallness degrees



The conjoined comparative that we repeat in (49) can now be analysed as involving two different orderings: the sentence is true iff Lisi's height exceeds Zhangsan's height on the tallness scale and the opposite holds on the shortness scale, see (50). We derive these truth conditions if we assume that the context is restricted to two individuals and the values of the standard variables are set to their heights.

(49) Lisi gao, Zhangsan ai.
Lisi tall Zhangsan short
'Lisi is taller than Zhangsan.'

(50) $\exists n : \text{Length}(\text{Height}(\text{Lisi}) -_{S_{\text{tall}}} \text{Height}(\text{Zhangsan})) = n \wedge$
$\exists n : \text{Length}(\text{Height}(\text{Zhangsan}) -_{S_{\text{short}}} \text{Height}(\text{Lisi})) = n$

To conclude, we assume that antonyms employ the same measure function but different ordering. Thus, *tall* and *short* make use of *Height* that assigns individuals their height degrees, but they are associated with reciprocal scales.

4.3 Degree Modifiers

In the previous sections, we argued that two semantically different kinds of degree adverbs are operative in comparative constructions. Differential adverbs measure the length of the gap interval between the standard and the subject of comparison. Adverbs like *hen*/'very' are the standard argument modifiers. In this section we will consider their distribution.

Recall that *hen* is optional in sentences with negation, cf (51). In (51a) *hen* can only be understood as making the standard interval considerably larger, i.e. it corresponds to the English *very*.

(51) a. Lisi bu hen gao.
Lisi NEG very tall
'Lisi is not very tall.'

b. Lisi bu gao.
Lisi NEG tall
'Lisi is not tall.'

Under our analysis, (51a) describes the state of affairs represented in (52), i.e. for the sentence to be true Lisi's height has to lie on the interval that spans from the beginning of the tallness scale up to the maximum of the extended interval.

(52) $\text{Height}(\text{Lisi}) \in [0; \max(E)]$
|----------{[--*I*--]-*E*---}--->$_{\text{tall}}$
$[I]$ the average height interval
$\{E\}$ the extension of $[I]$ by *hen*

(51b) makes a stronger claim, allowing Lisi to have an average height at most, as illustrated in (53).

(53) $\text{Height}(\text{Lisi}) \in [0; \max(I)]$
|----------[---*I*---]-------->$_{\text{tall}}$
$[I]$ the average height interval

Thus, the present account predicts that *hen* leads to a weakening of the truth conditions under negation. In non-negated sentences the absence of *hen* does not produce such effects. In fact, it does not influence the truth conditions at all. We assume that *hen* can be omitted in negative contexts to allow for a stronger claim[2]. In nonnegative contexts it cannot induce any strengthening and is therefore inserted to indicate that an extension of the standard can be made.

According to the analysis that we developed in the previous section, any sentence with a gradable adjective involves a differential degree adverb since the latter is analysed as the argument of the adjective. A positive sentence is assumed to contain the abstract SOME. Note, however, that overt differentials of any kind are unacceptable in positive sentences, as the following examples illustrate:

(54) * Lisi hen gao yi-xie/de duo/5 li mi.
Lisi very tall a little/much/5 cm
Intended: 'Lisi is a little / much / 5 cm taller.'

Why is *hen* incompatible with differential measure phrases? Let us consider what our analysis predicts for (54). To compute the meaning we need to come up with a standard of comparison. The differential then measures the length of the gap between Lisi's height and the maximum of the inferred standard. *Hen* has the potential of extending the standard and making its boundaries fuzzy. Since in this case the maximum of the standard can never be pinned down precisely, i.e. mapped to a definite degree on the numerical scale, defining the distance from it to Lisi's height appears impossible. The general problem with sentences like (54) is that they suffer from the clash between the vagueness of the standard and the precision of the distance measurement. This is not a problem specific for Chinese. English positive sentences do not allow measure expressions either.

To sum up, *hen* is obligatory in positives without negation where its role is to extend the boundaries of the standard of comparison and make them vague. It is optional in negated sentences to allow for a stronger claim. Overt differentials are ruled out in positives with *hen* as the result of a conflict between the precision of the gap measurement and the undefined bounds of the extended standard interval.

4.4 Other Degree Constructions

In this section we shall consider how our proposal can deal with Chinese degree constructions other than the positive or the comparative. The focus will be on the interpretation of sentences which are standardly analysed as involving degree operators different from the comparative.

These cases present a good testing ground for the lexical approach to contextual comparison that we pursue in this study. The main idea of this approach is that the comparison is expressed by the adjective, i.e. the degree argument of the adjective is bound lexically. A natural question to ask in this set up is how to analyse degree constructions such as superlatives, equatives or too/enough sentences that are assumed to involve a semantic relation different from simple comparison. We shall demonstrate

[2] We found that *hen* is optional in *if*-clauses, in the restriction of the universal quantifier and other DE contexts. However, a more thorough investigation is needed to support our hypothesis.

the strategy that we adopt for the treatment of these cases by concentrating on the analysis of the superlative. We shall then briefly consider the form and some properties of equatives and measure phrase constructions but their detailed analysis will have to be left for another occasion.

The main claim of this section is that all types of degree constructions in Chinese are based on the comparative relation and the resulting interpretations ultimately depend on the proper choice and restriction of the standard argument. The latter can be modified by degree adverbs like *hen*/'very,' *zui*/'most' and specified by various kinds of context-setters.

The Chinese superlative features the adverb *zui* that occurs before the degree predicate:

(55) Lisi shi (ta men ban) zui gao de xuesheng.
Lisi be his class most tall DE student
'Lisi is the tallest student in his class.'

Similarly to *hen*, *zui* does not co-occur with *bi* context setters but it allows for other expressions specifying the comparison class as the following example shows:

(56) Zai zhe xie ren dang zhong, Lisi yao pa zui gao na zuo shan.
in DEF some people among Lisi need climb most tall that CL mountain
'Among other people Lisi needs to climb the highest mountain.'

We propose that *zui* can be analysed as a modifier of the standard degree argument, i.e. a function of the type $(d\,t)(d\,t)$ that introduces a certain restriction on the standard interval. Specifically, it requires that the values that the relevant measure function (e.g. Height) assigns to all individuals salient in the context be included in or lie below this interval.

(57) $[\![zui_{C,M}]\!]^g = \lambda I.\lambda d.I(d) \wedge \forall x \in g(C) : d \geq g(M)(x)$,
where C and M are variables ranging over a set of individuals and a measure function respectively.

In other words, *zui* guarantees that the standard interval includes the highest value the relevant measure function returns for individuals in the set C. If we assume that $g(M)$ = Height and $g(C)$ is a set of mountains salient in the context, modifying the initial standard interval by *zui* gives us an interval that includes the highest mountain in $g(C)$. If we now feed this modified standard into the adjective meaning we can derive the superlative interpretation, namely that the height of Lisi's mountain exceeds the height of the highest mountain from the relevant set.

In the contextual approach that we developed, the role of the superlative *zui* can be reduced to modifying the standard degree argument. This option allows us to derive the normal superlative meaning without having to introduce a superlative operator and thus retaining the inherently comparative meaning of the adjective that we introduced in the previous sections.

One more way to specify the standard can be exemplified by the so-called complex stative construction that conveys the meaning paraphrasable by the English *too* / *enough* / *so* ... *that* intensional comparison constructions. The following example is due to Li and Thompson (1981):

(58) Ta gaoxing de shui bu zhao.
she happy DE sleep NEG succeed
'She is so happy that she cannot sleep'

We suggest that in (58) the DE-clause is a context setter that restricts the value of the standard variable on the adjective *gaoxing*/'happy'. Informally, the sentence is predicted true iff the degree of her happiness exceeds the happiness interval corresponding to the worlds in which she cannot sleep. This condition naturally implies that she cannot sleep in the actual world.

We find different ways to express the equative. The most common one is shown in (59). Interestingly, this kind of equative can have different realisations: it can involve an explicit standard of comparison accompanied by a differential measure phrase; or else the adjective can be modified by *hen*, see (60)-(61).

(59) Lisi gen Zhangsan yiyang gao.
Lisi with Zhangsan same tall
'Lisi is exactly as tall as Zhangsan.'

(60) Lisi gen Zhangsan yiyang dou bi Majing gao (5 li mi).
Lisi with Zhangsan same each BI Majing tall 5 cm
'Both Lisi and Zhangsan are taller than Majing by 5 cm.'

(61) Lisi gen Zhangsan yiyang dou hen gao.
Lisi with Zhangsan same each very tall
'Both Lisi and Zhangsan are (very) tall.'

A fully spelled out analysis of the *gen ... yiyang* sentences is outside the scope of this paper. It seems unlikely that (59) involves an equative morpheme of the English kind. The data in (59) and (60) rather require a comparative interpretation. Thus, (60) could be analysed as stating that Lisi and Zhangsan are similar to each other with respect to exceeding Majing's height by 5 cm and (59) can be given the analogous paraphrase "Lisi and Zhangsan are similar to each other with respect to the degree by which they exceed some standard of comparison." This would fit into the lexical approach we proposed. However, this is but a speculative remark about what might be going on in (59)-(61).

Another widely used construction involving degree adjectives that we want to comment on briefly comprises the family of the *you ... (name)* sentences exemplified in (62)-(64).

(62) Zhe xiangzi you *(5 kg) zhong.
DEF suitcase have 5 kg heavy
'The suitcase weighs 5 kg.'

(63) Zhe xiangzi you duo zhong?
DEF suitcase have much heavy
'How much does the suitcase weigh?'

(64) Zhe xiangzi you [zhe ge bao (name)] zhong.
this suitcase have DEF CL bag that heavy
'The suitcase is as heavy as this bag.'

The copula *you*/'have' is a distinctive feature of this type of construction. Note that *you* is not possible in a simple positive sentence without a measure phrase, cf. (62). Therefore we do not think that (62) can be analysed as the English measure phrase construction where the degree argument of the gradable predicate is realised as a measure expression. Our guess is that we are dealing with a resultative construction involving a complex accomplishment predicate where the part before the gradable adjective expresses the resulting state, i.e. (62) means that the suitcase has reached 5 kg in weight. The degree question in (63) and the equative in (64) should obviously be treated in the same way.

To conclude this section, a number of degree constructions, like the superlative, can be analysed based on the comparative relation. The standard interval is modified by pre-adjectival degree adverbs or specified by context setters. This leads to a variety of interpretations. The treatment of other constructions with degree adjectives, like equatives, is rather involved and seems to be based on mechanisms different from those standardly applied to their English counterparts.

5 Conclusion

The main goal of this paper was to present evidence from Chinese in favour of the Degree Abstraction Parameter proposed in Beck et al. (2004) and explore a possible source for its negative setting in some languages. The DAP, which draws a binary division between languages with respect to their ability to build degree abstracts in the syntax, can be seen as a descriptive generalisation of some phenomena related to the semantics of degree constructions. We have shown that Chinese comparatives are characterised by the absence of degree abstraction structures. Thus, they confirm that the "minus DAP" pattern discovered in Japanese is not incidental. To reach this conclusion we used the tests identified and applied to Japanese by Beck et al. (2004), namely the availability of scope interactions in the main clause of the comparative sentence, the ability of the comparative clause to host negation and the availability of subcomparatives. The latter two tests revealed that Chinese as well as Japanese does not have English-like comparative clauses with the semantics of degree predicates. Instead, it employs individual type standards. This property has been recently reported for a number of languages, e.g. Hindi-Urdu in Bhatt and Takahashi (2007), Turkish in Hofstetter (2008). One could suppose that either the absence of clausal comparatives due to certain syntactic limitations Bhatt and Takahashi (2007) or the lexical restriction on the type of standard argument of the comparative Kennedy (to appear) is the reason behind the observed cross-linguistic variation. We do not think such an approach is tenable, at least for the languages we considered in this paper. The absence of scope interactions between the comparative and modal operators in the main clause suggests that the source of variation is not located exclusively in the embedded clause. It indeed stems from the absence of degree abstraction, which supports the DAP hypothesis.

One can consider different triggers for the negative setting of the DAP. For example, it is conceivable that the lack of degree abstraction is due to the more general restrictions on semantic binding, operative outside of the degree domain as well. In this study we explored an alternative explanation, namely that the *minus DAP* languages have different lexical semantics for degree predicates. We suggested that the source of

variation is to be looked for in the lexicon; see Chierchia (1998) for the same strategy in the nominal domain.

According to the present proposal, a Chinese comparative sentence does not involve an abstract degree operator but a degree predicate with comparative semantics, i.e. *gao*/'tall' means *taller* incorporating the meaning of the usually independently posited comparative morpheme. This move allows to shift the binding of the degree argument to the lexical level and make the LF free of degree abstraction structures. We assumed, following Beck et al. (2004), that the degree argument is not provided compositionally, but pragmatically by a context-setter that fixes the value of the interval-denoting contextual variable. Thus, Chinese comparatives—as well as Japanese ones—do not provide us with expressions that semantically contribute to the calculation of the standard of comparison like English *than* clauses. For this purpose, context-setters parallel to the English *compared to* phrases can be employed. Otherwise, the standard is set to some default neutral interval in the given context, as it is the case in the positive construction. Consequently, all degree constructions are based on the comparative relation. We showed how this kind of analysis accounts for the comparative, positive and superlative constructions. It remains an open question how exactly other types of degree sentences—like equatives, measure phrase constructions, degree questions—should be treated. We pointed to some properties of those constructions that make the application of the standard analysis problematic and sketched possible analyses compatible with the present approach.

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Sveta Krasikova
University of Tübingen
svetlana.krasikova@uni-tuebingen.de