Nothing Compares to You

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1. Road Map

Comparative constructions are a classical topic in semantics. The vast majority of the literature on comparatives, though, is focused on languages like English, French or German. These languages are special in that adjectives take comparative morphology, and in that they allow for comparative phrases as well as clauses. Stassen's (1985) survey of comparative constructions shows that this is a rare pattern while commonly, languages develop their comparative grammar from older locative constructions. In my paper, I will take one such type of comparative pattern as my starting point and attempt to provide a minimal semantic analysis for this type of construction. In the last section, I will point out potential applications in the analysis of comparatives in English or German.

The basic pattern that I will investigate is exemplified, among other languages, in Udmurt (Perm language; ≈ 520.000 native speakers; Russia/Europe) and Mandarin Chinese. These languages posses no (native) comparative morphology, and use only phrasal comparatives. Comparisons are built along a pattern that is roughly similar to (1):

(1) *(Seen) from Paul, Henk is tall.* = 'Henk is taller than Paul'

The following examples show positive and comparative statements in Udmurt.

(2) *Puny viž'mo*
dog smart
'the dog is smart'

(3) *Puny viž'mo(-ges) gondyr-leś*
dog smart(.COMP) bear.ABLATIV
'the dog is smarter than the bear'

The research in this paper was initiated by a spirited discussion on Universal Grammar with Eberhard Winkler. He not only drew my attention to Udmurt comparatives, but also helped me to contact Udmurt informants. Warm thanks are due to Mingya Liu who is willing to discuss Mandarin Chinese at all times. Important criticisms were offered by Ariel Cohen, Louise McNally, Paula Menendez-Benito, Magdalena Schwager and the audiences of The Semantics Tea at Göttingen, the DGfS 2009 workshop on Comparison, and SALT XIX. They are not to blame if the resulting account is still less than perfect.

The comparative morpheme *–ges* is optional and a recent loan from Russian grammar. In the following, I will give examples without *–ges* whenever possible.[1] We find that Udmurt adjectives can be used in two ways: The subject can be compared to an implicit standard of comparison (like in English or German), but the standard of comparison can also be explicated, like in (3). I will call such explicated points of comparison the *landmark*, and will use "landmark argument" as a cover term for all constituents that serve to introduce a landmark. Hence, *seen from Paul* as well as *gondyr-leś* are landmark arguments, introducing the landmarks **Paul** and **the-bear**, respectively.[2] The next three sentences use an adjective that allows measure phrases. (6) shows that the measure phrase expresses the difference between subject referent and the landmark.

(4) *ad'ami* *pič'i/lapeg*
man small
'the man is small'

(5) *ad'ami pič'i* *korka-leś* *(or: lapeg 'small')*
man small house.ABL
'the man is smaller than the house'

(6) *ad'ami metr-ly* *korka-leś* *lapeg*
man meter.DAT house.ABL small
'the man is 1m smaller than the house'

If no landmark is expressed, the measure phrase gives the absolute measure of the subject, with a presupposition that '1m' is a small size. In a first approximation, we could suggest the following argument structure for the adjective:

[[*viž'mo*]]
$\lambda\Delta.\lambda c.\lambda x[\ \mu_{SMART}(x) = \mu_{SMART}(c) + \Delta\ ]$

I will use Kennedy's measure functions μ_{ADJ} that map individuals to a degree on the scale that the adjective refers to.

The above tentative analysis looks as if adjectives in Udmurt share the argument structure of three-place verbs. However, there is one important respect which shows that the picture is not so simple. Udmurt does not allow negative quantifiers in the landmark argument. This is shown by the following non-data:

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[1]The only construction where *–ges* seems mandatory are elliptical comparisons: '*Pete is tall. Olin is taller*'. (Eberhard Winkler, p.c., see also Winkler, 2005)

[2]In the second part, I will turn to the question whether *than*-clauses, *than*-phrases, *als*-phrases etc are also landmark arguments. I think they are, but nothing at present hinges on this assumption.

(7) *‚the house is taller than no tree' (‚Das Haus ist größer als kein Baum')*
—*—

Native Udmurt informants with German as second fluent language refused to translate, and word-by-word versions I offered were consistently classed as unacceptable. We will later see similar examples in Mandarin Chinese which are classed as ungrammatical. The status of the English/German sentence in (7) is open to debate, and I'd ask the reader *not* to check her intuitions about the grammaticality and meaning of such examples at the present point. For the languages at issue, we can diagnose a *ban on negative quantifiers* (*BoNQ*) in the landmark argument. This ban holds for comparative as well as equative constructions, as will be shown in the next sections. In survey, the present paper aims to propose an analysis for comparatives with the following characteristics:

- simple comparatives without comparative morphology
- Ban on Negative Quantifiers in the landmark argument

The main analysis will be developed with reference to Mandarin Chinese (mainly because data were easier to get). In Section 2, I revisit the data and Section 3 will be devoted to an analysis of *BoNQ*. Section 4 explores several examples to show how all parts fit together. Section 5 will compare the proposal to other recent work on comparatives, specifically phrasal-only comparatives and comparatives without morphemes. I discuss Hofstetter (2009) on Turkish, Bhatt + Takahashi (2007) on Hindi/Urdu, and Xiang (2003), (2005) on Mandarin Chinese. None of these proposals lends itself to an analysis of *BoNQ* effects. Section 5 will also evaluate Gajewski's (2009) account for *BoNQ* effects in English (which he phrases in the framework of Heim 2000, 2006). His analysis, in essence, shares the assumptions about scoping of the present account, and therefore Gajewski's explanation for the Ban on Negative Quantifiers is, in part, similar to the one that will be given here. However, the present analysis can easily be extended to account for licensed NPIs in the landmark argument. Likewise, the present analysis extends to *BoNQ* in equatives that is attested in Mandarin Chinese and elsewhere. This is due to the fact that my analysis will refrain from using sets of degrees (*pace* Schwarzschild and Wilkinson, 2002 and others), doing justice to the fact that the languages in question express comparatives as relations between individuals, never between (sets of) degrees. Gajewski's (2009) analysis, in contrast, wrongly excludes NPIs in the comparative phrase and makes no predictions about equatives at all.

The discussion of Gajewski (2009) will lead to the question whether parts of the present analysis should be transferred to languages like German and English. In the final part of the paper, I will take a broader look at *BoNQ* effects in other languages, and in other guises. It turns out that *BoNQ* effects are a quite widespread phenomenon and should be taken serious by theories of comparatives.

2. Comparison in Mandarin Chinese

The following examples survey some facts about comparatives in Mandarin Chinese. The adjective is always used in the positive form. The landmark argument is marked with the particle *bi*. Measure phrases in sentences without a landmark argument count as "distance to zero".

(8) *Nana gao (liang-li-mi).*
Nana tall (2cm).
'Nana is (2cm) tall.'

The use of all adjectives *ADJ* with measure phrases presupposes that the subject is more *ADJ* than average. Hence, (8) with the measure phrase can only be used if **Nana** is a cockroach or other animal for which 2 cm counts as 'tall'. Unlike English or German, Mandarin Chinese does not possess pairs of unmarked/ marked antonyms, all adjectives are marked in the sense of Bierwisch (1987). No such presuppositions arise if the sentence contains an explicit landmark.

(9) *Nana bi Beibei gao.*
Nana from Beibei tall.
'Nana is taller than/from Beibei.'

(10) *Nana bi Beibei gao liang-li-mi.*
Nana from Beibei tall 2cm.
'Nana is 2cm taller than/from Beibei.'

(11) *Nana bi Beibei cong-ming (hen-duo).*
Nana from Beibei smart (very much)
'Nana is (much) smarter than/from Beibei.'

Notably, (10) and (11) do not presuppose that Nana or Beibei are tall, or smart, respectively. These examples suggest that a simple semantics of the adjective might be a good starting point.

(B) $[\![gao]\!]$
$\lambda\Delta.\lambda c.\lambda x[\ \mu_{TALL}(x) = \mu_{TALL}(c) + \Delta\ ]$

This contrasts with earlier analyses for comparatives in Mandarin Chinese (Xiang, 2003, 2005) which remain closer to a degree set analysis for English (Heim 2000, 2006); see Section 5 for a comprehensive discussion. Let us turn to the Ban on Negative Quantifiers *BoNQ* in the landmark argument. As (12) shows, it is

possible to express a negative comparison in Mandarin Chinese with negation at the sentence level.

(12) *Lang Lang bu bi qi-ta ren-he ren gao.*
Lang Lang not from other any man tall.
'Lang Lang is not taller than any other man.'

However, neither a negative nor a downward-entailing quantifier is allowed in the landmark argument.

(13) **Lang Lang bi qi-ta mei-you ren gao.*
Lang Lang from other no man/men tall.
unavailable: 'Lang Lang is taller than no other man.'

(14) **Lang Lang bi hen-shao ren gao.*
Lang Lang from few man/men tall.
unavailable: 'Lang Lang is taller than few other men.'

Similar restrictions apply in equative constructions.

(15) *Hong he Peter yi-yan cong-ming*
Hong with Peter the-same clever
'Hong is as clever as Peter'

(16) **Hong he mei-you nang-hai yi-yang cong-ming*
Hong with no boys the-same clever
unavailable: 'Hong is (exactly) as clever as no boy'

Mandarin Chinese readily allows other quantifiers in the landmark argument, as well as in equative constructions. This is exemplified in (17) and (18).

(17) *Nana bi qi-ta suo-you/dua-shu/yi-xie xiao-hai dou gao.*
Nana from other all / most / some children DISTR tall.
'Nana is taller than/from all / most / some other children.'

(18) *Hong he qi-ta sho-you xue-sheng yi-yan cong-ming/gao*
Hong with other all student the-same clever/tall
'Hong is as clever/tall as every other student'

Dually, Mandarin Chinese allows for negative quantifiers in subject position of comparative sentences. (*mei* and *mei-you* are variants of the negative quantifier which are preferred for simple and compound head nouns.)

(19) *mei* *ren* *bi* *Lang Lang* *gao.*
no man from Lang Lang tall.
'no man is tall, seen from Lang Lang'

(20) *mei-you* *xiao-hai* *bi* *Lang Lang* *gao.*
no child from Lang Lang tall.
'no child is tall, seen from Lang Lang'

While negative quantifiers are generally unavailable in object position, Mandarin Chinese allows for other DE quantifiers in object DPs, like DE *few*. Yet, these quantifiers are again ungrammatical in the landmark argument of comparisons.

(21) a. *Lisi* *(zi)* *fan-le* *hen-shuo* *cuo-wu*
Lisi (only) make-LE few mistakes
'Lisi made only few mistakes'
b. **Lisi* *bi* *hen-shuo* *xiao-hai* *gao*
Lisi from few children tall
unavailable: 'Lisi is taller than few children'

We can hence conclude that *BoNQ* does not follow from more general restrictions like a ban on quantifiers in the landmark argument, or any general unavailability of downward entailing quantifiers in object position.

3. Deriving *BoNQ*

3.1. Landmark Sets, the Intuition

The main idea that I want to explore is that comparative constructions express a comparison between the subject referent and the elements of a landmark set C. The landmark argument contributes this landmark set C. Quantifiers in the landmark argument do not quantify over comparative propositions. Instead, they take low scope and contribute to the choice of a landmark set C. In the following, I give a list of DPs and their desirable landmark sets.

⟦*Peter*⟧	→	C = { **Peter** }
⟦*the pope*⟧	→	C = { **ιx.POPE(x)** }
⟦*every boy*⟧	→	C = { x | **BOY**(x) }
⟦*most boys*⟧	→	C ⊂ **BOYS** ∧ MOST(**BOYS**, C) ∧ …?…
⟦*some boys*⟧	→	C ⊂ **BOYS** ∧ |C|>1 ∧ …?…
⟦*no boy*⟧	→	C = ∅

A comparative sentence simply asserts that the subject referent exceeds all elements in the landmark set.

For proportional quantifiers like *most*, *some* we will consider a subset of the noun extension that is of the appropriate size (i.e. contains most, more than one of the objects in the noun extension). The …?… part indicates that we might want to add more restrictions on C in such cases. These will be discussed below.

The quantifier *no* should yield the empty set. Comparison to "everyone in the empty set" is senseless. As it yields trivial truth conditions, the respective sentences count as ungrammatical. Here, I follow similar arguments by e.g. Dowty 1979 on durational phrases; Barwise/Cooper 1981; von Fintel 1993, Gajewski 2002, 2009; Hackl/Fox 2006, among others. The assumption that a comparison to nothing-at-all is inherently senseless seems a convincing instance of the hypothesis that grammar can ban constructions with inherently trivial truth conditions.

If there is no comparison phrase, the landmark argument will be instantiated indexically. Mandarin Chinese allows for two options. If no measure phrase is expressed, then C = { $\mathbf{JoeDoe}_{\mathbf{Adj}}$ } where $\mathbf{JoeDoe}_{\mathbf{Adj}}$ is a hypothetical average individual with respect to the dimension measured by the adjective.[3] If a measure phrase but no landmark phrase is expressed, the landmark C contains an abstract object of size zero. I will not attempt to predict why C = { $\mathbf{JoeDoe}_{\mathbf{Adj}}$ } and measure phrases do not co-occur. One could speculate that this incompatibility is a consequence of different granularities. The size of a folk average **JoeDoe** seems located on a scale that is less fine-grained than the scales of measure phrases. Note that adverbial modifiers like *very, extremely, moderately* (or their equivalents in Mandarin Chinese) can express that the subject is **very**, **extremely**, or **moderately** far away from **average**. This coheres with the assumption that **average** is located on a coarse-grained scale with few distinct points whereas the denotations of measure phrases are located on more precise scales. However, such an idea needs to be fully spelled-out.

3.2. Deriving Landmark Sets: The Details

I will now define a function which maps a quantifier **Q** to a landmark set F(**Q**). This function will be parameterized (it needs to "know" the dimension of the adjective) and will make a choice in cases where different sets could equally well serve as landmark sets. Let DP = *Det N* denote a generalized quantifier **Q**.

According to Johnsen (1987), we know that for quantifiers **Q** = ⟦*Det N* ⟧ which are denotations of natural language determiner phrases, the extension of N can be recovered as the minimal "set where **Q** lives on". Let NOUN(**Q**) be the partial function on generalized quantifiers which maps **Q** on the set it lives on:

[3] Average individuals allow us to keep all other parts of the analysis constant. Note that JoeDoe will, in many cases, not be an actual living being. Compare the zero individual.

$$\text{NOUN}(\mathbf{Q}) = [\![N]\!] \text{ where } \mathbf{Q} = [\![Det\ N]\!]$$

From these, we define the candidates for landmarks, CAND(**Q**). Note that candidates for landmarks are a subset of what has been called *witness set* in Barwise and Cooper (1981).

$$\text{CAND}(\mathbf{Q}) := \{ X \mid X \subseteq \text{NOUN}(\mathbf{Q}) \wedge \mathbf{Q}(X) \wedge \neg\exists Y(Y \subset X \wedge \mathbf{Q}(Y)) \}$$

These candidates comprise all small subsets in NOUN(**Q**) of which the quantifier is true. For instance, for *most mice*, CAND(*most mice*) comprises all subsets of the mice in question which are large enough to count as "most" and for which one mouse less would make them too small to be "most mice".

The landmark set C is chosen from the set of candidates CAND(**Q**). I will use the notation $f(\mathbf{Q})$ for the final choice of landmark set.[4] If CAND(**Q**) is a singleton, this choice is fully determined. If there is a true choice, different pragmatic strategies can operate.

Scalar inference driven choice: If we consider the logical strength of alternative comparative statements, it can make sense to assume that $f(\mathbf{Q})$ is a set which contains only small elements. Else, the speaker could have decided to use a more comprehensive quantifier in her statement. For instance, if someone states that *Bei Bei* is taller than 50% of the other children, there is a pragmatic inference to the end that *Bei Bei* is not taller than any larger proportion of the children. Else, the speaker could have made a stronger statement. In a scalar inference driven choice, $f(\mathbf{Q})$ will adhere to the following additional requirement:

$$\neg\exists Y(Y \in \text{CAND}(\mathbf{Q}) \wedge \max\{ \mu_A(y) \mid y \in Y \} < \max\{ \mu_A(c) \mid c \in f(\mathbf{Q}) \})$$

This choice will attribute the logically weakest meaning to a positive comparison:

(22) *Bei Bei bi qi-ta duo-shu xiao-hai (dou) gao.*
Bei Bei from other most children (DIST) tall
'Bei Bei is taller than most other children'

Under this interpretation, it follows that the children not contained in the landmark set are indeed taller than Bei Bei. Allowing for a certain vagueness, we could rephrase this as "If you line up all kids according to size, Bei Bei would be placed at the higher end but is not among the absolutely tallest ones". According to my informants, (22) can indeed be used in this sense.

[4]Hence, $f(\mathbf{Q})$ and C will both stand for the landmark set, where $f(\mathbf{Q})$ is used when meaning composition is in focus. I hope that no confusion arises from this notational homonymy.

Specific use: f(**Q**) is a set in CAND(**Q**) that the speaker has in mind. The speaker might not know whether C contains smallest elements or just any elements. This use corresponds to the a. reading for (23). The reading in b. shows the scalar inference reading. This reading is dispreferred, according to the informant, at least for the quantifier *some* in the present example.

(23) *Bei Bei bi qi-ta yi-xie xiao-hai (dou) gao*
Bei Bei from other some children (DIST) tall
a. *‚Bei Bei is taller than some children (I know)'*
b. *‚Bei Bei is taller than some (of the smallest) children'* (dispreferred)

Epistemically open use: Sometimes, a speaker might use a proportional quantifier without any further knowledge about the respective landmark set. For instance, someone could gather information about a race in which Bei Bei is taking part. This person could interview an arbitrary selection of runners about Bei Bei and find that some of them passed Bei Bei in the race. She can report that *Bei Bei was slower than several other runners*, referring to a set of unknown runners as landmark set. It remains open whether Bei Bei in fact was slower than many or even most other people. While it could be argued that the witness set is specific in some sense ("*the runners that I interviewed"*), the restrictions on f(**Q**) will be practically nil for persons who hear this report. They will barely learn that there is *some* set of runners such that Bei Bei was slower than the slowest one of these.

Worst possible choice use. The present analysis predicts that an increased domain NOM(**Q**) can allow for new choices of landmark sets that lead to logically stronger propositions. If we have to chose a witness set of **runners** in a sentence like *Bei Bei was slower than some other runner*, we could select for the fastest (*scalar inference use*), a set of known runners (*specific*) or just any old set of runners (*epistemically open*). However, a sentence like *Bei Bei was slower than <u>any</u> other runner* indicates that Bei Bei's slowness exceeds the slowness of everyone in just all kinds of landmark sets that we might select, exploring the full domain NOM(**Q**) in the widest possible sense. Following Chierchia (2004, 2006), such domain widening only makes sense if the resulting proposition is logically stronger than the proposition that can be computed with reference to a smaller domain. This is so if we assume that a larger domain is exploited in order to select a landmark set with very slow runners. Under that choice, the sentence *Bei Bei was slower than any other runner* conveys a superlative ('slower than the slowest') not an existential statement. Hence, we could make sense of the use of NPIs in landmark arguments in the present analysis. They invite a *worst possible choice* of a landmark set for an existential quantifier, and hence lead to a quasi-universal superlative reading.

I deliberately refrained from discussing this case with reference to any specific language. The status of polarity sensitive items in landmark arguments is

tricky to assess. German *irgendein, jemals* are clearly NPIs, as they never have a free choice use. They can be used in landmark arguments.

(24) *Helge ist schwerer als irgendein (anderer) Jockey jemals war.*
Helge is heavier than any (other) jockey ever was
'Helge is heavier than any other jockey ever has been'

Gajewski (2009) tentatively assumes that English *any* in comparison phrases might be free choice *any*. Yet, *ever* does not show free choice readings and is likewise allowed in comparison phrases in English. In view of this fact, an NPI analysis of *any* in comparison phrases would be preferable. This thread is not followed in Gajewski (2009).

(25) *Sandy is taller than <u>any</u> other child.*
(26) *Sandy was happier than <u>any</u> guest who <u>ever</u> entered our bar.*

In Mandarin Chinese, NPI *renhe* ('any') can occur in the landmark (*bi*) argument but requires the particle *dou*.

(27) *Bei Bei bi renhe (qi-ta) xiao-hai *(dou) gao*
Bei Bei BI any (other) child DOU tall
'Bei Bei is taller than any other child'

The function of *dou,* sometimes glossed as 'distributive operator', with *renhe* remains to be explored. Xiang (2008) sketches a very interesting analysis for *dou* which fits the present picture nicely. She reviews several uses of *dou* where it serves (a) to exhaust all choices to be made in a set of sets or (b) to chose maximal elements in a set of ordered alternatives. The paper argues convincingly against a purely distributive or universal-quantifying analysis for *dou*. In examples like (27), we could hence assume that *dou* either serves to ensure that the sentence is true for *all possible choices* of landmark sets in the set of candidates (including the worst case choice). Alternatively, *dou* could ensure that the candidate landmark set with the tallest children is chosen. The formal spell-out of the paper unfortunately is too vague to determine the optimal version.

Overall, this survey shows typological evidence in favor of NPI licensing in landmark arguments of comparatives. An analysis of comparatives that can in principle integrate NPI licensing is hence desirable.

Let me finally comment on the flexibility of the present approach, which contrasts with the pre-set semantic composition of other analyses. Other analyses of comparatives commonly are tantamount to the reading that is produced by the scalar inference driven choice of landmark set. This preference could be hard-wired into the analysis and the remaining choices between different landmark sets would all yield logically equivalent outcomes. However, I think

that the flexibility inherent in the present proposal offers interesting possibilities that are warranted by data.

4. Semantic Composition

4.1 Positives and Comparatives

In the present section, I show the semantic composition of several types of examples. As before, I make use of Kennedy's measure functions μ_{ADJ}. For instance, μ_{TALL} is the degree function which maps an object to its degree of tallness on a scale determined by the adjective's lexical meaning (Kennedy, 1999).

(28) *Nana bi BeiBei gao (liang-li-mi).*
Nana BI Bei Bei tall (2cm).
'Nana is (2cm) taller than/from Beibei.'

$[\![gao]\!]$
$\lambda\Delta.\lambda c.\lambda x[\ \mu_{TALL}(x) = \mu_{TALL}(c) + \Delta\ ]$

This adjective denotation can combine with a measure phrase like $[\![$ *liang-li-mi* $]\!]$ = 2cm.

$[\![gao\ liang\text{-}li\text{-}mi]\!]$
$\lambda\Delta.\lambda c.\lambda x[\ \mu_{TALL}(x) = \mu_{TALL}(c) + \Delta\ ]$ (2cm)
$= \lambda c.\lambda x[\ \mu_{TALL}(x) = \mu_{TALL}(c) + 2cm\ ]$

If no measure phrase is expressed, I assume that existential closure over Δ can take place. This is a standard way to saturate arguments in other cases which can be extended to the adjective.

(29) $\lambda c.\lambda x\ \exists\varepsilon\ [\ \mu_{TALL}(x) = \mu_{TALL}(c) + \varepsilon\ ]$

Depending on the instantiation of the landmark argument *c*, the contribution of (29) can be that the subject's tallness exceeds the norm, or the tallness of some explicit landmark. I will first discuss the positive use of *gao* in Mandarin Chinese In this case, *c* is instantiated by the "norm entity" for the adjective in question ($\mathbf{JoeDoe}_{TALL}$). Interestingly, bare positives are marked for most adjectives in MChinese and degree adverbs like *hen* ('very') must be used. They express that there is a *considerable* difference to the norm entity.

(30) *Nana* ?(*hen*) *gao.*
Nana very tall.
'Nana is tall.'

Existential closure over Δ is specified below; it can be achieved by a general closure procedure at LF (= e.g. positives in Udmurt, rare cases in MChinese) or as the literal contribution of *hen*.

(31) $\lambda c.\lambda x\ \exists\varepsilon\ [\ \mu_{TALL}(x) = \mu_{TALL}(c) + \varepsilon\ ]$ (*presupposed: ε is considerable*)
$[\![hen]\!] = \lambda P.\lambda c.\lambda x\ \exists\varepsilon\ [\ P(\varepsilon)(c)(x) \wedge$ '*ε* considerable']
where P ranges over relations between degrees and two individuals

The landmark phrase's head denotes a generalized quantifier Q. I use *f* for the computation of a landmark set C := *f*(Q). Case/thematic role information in *bi* contributes (32) where Q is a variable of type <<e,t>,t>, P is a binary relation instantiated by the adjective.

(32) $[\![bi]\!] = \lambda Q\lambda P\lambda x.\ \forall c(\ c \in f(Q) \rightarrow P(c)(x)\ )$

I will replace *f*(Q) by C in order to indicate that a quantifier has been combined with *f* and led to the choice of a set C.

(33) $[\![bi\ DP]\!] = \lambda P\lambda x.\ \forall c(\ c \in C \rightarrow P(c)(x)\ )$

If we combine this with the relation in (31), we get

(34) $[\![bi\ DP\ gao]\!] = \lambda x.\ \forall c(\ c \in C \rightarrow \exists\varepsilon\ [\ \mu_{TALL}(x) = \mu_{TALL}(c) + \varepsilon\ ]\ )$

This states that the subject referent *x* is such that its degree of tallness exeeds the one of each member of the landmark set C by some positive value *ε*. Depending on the landmark set C, different properties arise. I list several options, and the resulting variant of (34):

(34) a. DP proper name or definite, C = { **a** }
$\lambda x.\ \exists\varepsilon\ [\ \mu_{TALL}(x) = \mu_{TALL}(\mathbf{a}) + \varepsilon\ ]$
'property of being taller than **a'**

b. No landmark phrase, C = { **joe-doe** }
$\lambda x.\ \exists\varepsilon\ [\ \mu_{TALL}(x) = \mu_{TALL}(\mathbf{joe\text{-}doe}) + \varepsilon\ ]$
'taller than average' (positive use of '*gao*', adjectives in general)

c. Downward-entailing quantifiers, C = ∅
$\lambda x.\ \forall c(\ c \in \varnothing \rightarrow \exists\varepsilon\ [\ \mu_{TALL}(x) = \mu_{TALL}(c) + \varepsilon\ ]\ )$

a property trivially true for all x, and therefore marked.

d. Quantifier *five* over a larger domain, C = {$\mathbf{a_1, \ldots a_5}$}
$\lambda x.\ \forall c(\ c \in \{\ \mathbf{a_1, \ldots a_5}\ \} \rightarrow \exists \varepsilon\ [\ \mu_{TALL}(x) = \mu_{TALL}(c) + \varepsilon\ ]\ )$

In (34.d) the resulting meaning depends on a choice. If {$\mathbf{a_1, \ldots a_5}$} are specific objects, we get the property of being taller than *some known five objects.* If {$\mathbf{a_1, \ldots a_5}$} are the result of a scalar inference driven choice, we compute the property of being taller than *the smallest five objects.* Under the worst case choice of {$\mathbf{a_1, \ldots a_5}$}, we'd get the property of being taller than *the tallest five objects.* These properties, finally, can combine with the subject denotation.

4.2 Equatives in Mandarin Chinese

If an adjective is used in an equative construction, it is specified by the adverbial *yi-yan* = 'the same'. This instantiates the measure argument Δ with value 0.

(35) *Hong he Nana yi-yan cong-ming*
Hong with Nana the-same clever
'Hong is as clever as Nana'
$[\![\textit{cong-ming}]\!] = \lambda\Delta.\lambda c.\lambda x[\ \mu_{CLEVER}(x) = \mu_{CLEVER}(c) + \Delta\ ]$
$[\![\textit{yi-yan cong-ming}]\!]$
$= \lambda\Delta.\lambda c.\lambda x[\ \mu_{CLEVER}(x) = \mu_{CLEVER}(c) + \Delta\ ]\ (0)$
$= \lambda c.\lambda x[\ \mu_{CLEVER}(x) = \mu_{CLEVER}(c)\ ]$

The contribution of the landmark argument remains the same as in comparatives.

(i) $[\![\textit{he Nana}]\!] = \lambda P\lambda x.\ \forall c(\ c \in \{\mathbf{Nana}\} \rightarrow P(c)(x)\ )$
(ii) $[\![\textit{he Nana yi-yan cong-ming}]\!]$
$= \lambda P\lambda x.\ \forall c(\ c \in \{\ \mathbf{Nana}\ \} \rightarrow P(c)(x)\ )\ (\lambda c.\lambda x[\ \mu_{CLEVER}(x) = \mu_{CLEVER}(c)\ ])$
$= \lambda x.\ \forall c(\ c \in \{\ \mathbf{Nana}\ \} \rightarrow \lambda c.\lambda x[\ \mu_{CLEVER}(x) = \mu_{CLEVER}(c)\ ](c)(x)\ )$
$= \lambda x.\ \forall c(\ c \in \{\ \mathbf{Nana}\ \} \rightarrow [\ \mu_{CLEVER}(x) = \mu_{CLEVER}(c)\ ]\ )$
'being as clever as **Nana**'

For empty landmark set C, the property again becomes trivial. If the landmark set is non-singleton C, the property is 'the subject referent is equal in dimension μ_{CLEVER} to all elements in C'. The analysis hence entails that all elements in C are *Adj*-wise equal to each other. This prediction is empirically justified.

In summary, I have proposed a simple theory of direct comparison which is so far tailored for morphology-free comparison in languages like Mandarin Chinese or Udmurt. The landmark argument of the adjective introduces a landmark set, and the overall sentence expresses a comparison of the subject

referent to all elements in the landmark set. Quantifiers in the landmark argument have a special status in that they are interpreted *in situ*, determining the set of candidates that could become the landmark set. They do not undergo quantifier raising. This leads to the prediction that negative (downward-entailing) quantifiers are not allowed in the landmark argument. This conforms with the observation that there is a Ban on Negative Quantifiers in the landmark argument. In the next section, my own proposal to account for BoNQ effects will be compared to Gajewski (2009), the one and single recent paper where BoNQ effects for English are acknowledged and treated.

5. Recent Theories

5.1. Direct Comparison

Hofstetter (2009) discusses comparatives in Turkish where, like in our case, the adjective can be used in positive as well as comparative statements along the pattern in (1). Hofstetter (p. 193, (13)) proposes the following comparative operator which relates two individuals and an adjective.

$$[\![\text{Comp.Op}_{\text{turk}}]\!] = \lambda x_e \lambda A_{<d,<e,t>>} \lambda y_e .\ \text{MAX}(\lambda d.A(x)(d)) > \text{MAX}(\lambda d.A(y)(d))$$

He assumes that quantifiers combine with adjectives exactly as they combine with verbs, including the Heim-Kratzer (1998) treatment to combine quantifiers with polyadic relations via QR. Hofstetter reports that Turkish allows negative quantifiers in the comparison phrase with a fully compositional meaning. QR-ing a negative quantifier from the landmark argument yields an *inverse superlative reading*, 'for no x is SUBJECT more ADJ than x'. He illustrates his observation with the following example (the structure of the negative quantifier remains somewhat unclear in the paper).

(36) *Maria hiç kimse.den uzun değil*
Maria somebody.Abl tall not
'Maria is not taller than anybody', intended as: 'Maria is shortest'

Hofstetter's account would predict, wrongly, that negative quantifiers are acceptable in comparative phrases in Chinese, and contribute compositionally.

(37) **Lang Lang bi qi-ta mei-you ren gao.*
Lang Lang from other no man/men tall.
wrongly predicted: 'Lang Lang is the smallest man'

Note in passing that Hofstetter qualifies the English counterpart as ungrammatical; (38) corresponds to his starred example (21) (p. 197).

(38) *Maria is taller than nobody.*
variant judgments: ungrammatical / 'Mary is smallest'

Bhatt + Takahashi (2007) offer a direct comparative analysis for Hindi/Urdu, arguing extremely carefully that phrasal comparatives should not be viewed as an elliptic form of clausal comparatives. The core semantic ingredient of their analysis is the following three-place version of the comparative operator.

(39) $[\![\textit{-er}]\!] = \lambda x \lambda P_{<d,t>} \lambda y . \exists d(P(y,d) \wedge \neg P(x,d))$

Adjectives denote relations between an individual and all those degrees *d* which are exceeded by the individual, e.g. $[\![\textit{tall}]\!] = \lambda d \lambda x(\text{TALL}(x,d))$. Quantifiers in the comparative phrase, like in Hofstetter's analysis, must undergo QR and take scope over the comparison relation. As a result, the analysis predicts inverse superlative readings for negative quantifiers in the comparison phrase. The paper does not discuss data of this kind for Hindi/Urdu.

Xiang (2005) adopts a similar analysis for comparatives in Mandarin Chinese. No mention is made of negative quantifiers in the landmark argument, i.e. they should be allowed and should give rise to inverse superlative readings. Possibly, the author relies on a general (syntactic?) ban of *no* from object phrases. However, as we have seen, no such ban holds for other downward-entailing quantifiers like *few*. Therefore, we need to predict the special status of downward-entailing quantifiers in landmark arguments.

Gajewski (2009) is one of the few who acknowledges that DE quantifiers have a "marked" feeling for many speakers of English. He classes sentences like (40) as ungrammatical and sets out to modify Heim's (2000, 2006) analysis of comparatives so as to account for this effect. At the present point, I will simply take his judgment for granted and discuss his analysis. The incredulous reader is referred to Section 6.

(40) **Pedro is more stubborn than no (other) donkey.*

Gajewski's analysis rests on two crucial ingredients. First, he adopts an earlier proposal by Bresnan (1973) according to which the DP in the comparison clause combines with $\lambda x. \neg$(*x* is *P* to degree *d*). Hence, we talk about sets of degrees *not* reached by the object referents instead of sets of degrees that *are* reached by the object referent(s). The following show combination with *all N* and *no N*.

EVERY *x* (N(*x*) ; ¬(*x* is *P* to degree *d*))
NO *x* (N(*x*) ; ¬(*x* is *P* to degree *d*))

Next, Gajewski's composition consists in lambda-abstraction over the degree argument. The following sets of degrees result; I rewrite them as intervals to show what they look like in our two examples.

$$\{\, d \mid \text{EVERY } x\ (\ \text{N}(x)\ ;\ \neg(\ x \text{ is } P \text{ to degree } d)) \,\} =]\ \text{MAX(N)};\ \propto\ ]$$
$$\{\, d \mid \text{NO } x\ (\ \text{N}(x)\ ;\ \neg(\ x \text{ is } P \text{ to degree } d)) \,\} = [\ 0\ ;\ \text{MAX(N)}\ ]$$

MAX(N) stands for the maximal degree reached by some element in N. The interval defined by the EVERY set starts just above this maximum, the interval defined by the NO set ends exactly with this degree. The actual comparison, according to Gajewski, is termed as the requirement that the set of degrees reached by the subject referent **a** has non-empty intersection.

$$\{\, d \mid \mathbf{a} \text{ is } P \text{ to degree } d \,\} \cap \{\, d \mid \text{EVERY } x\ (\ \text{N}(x)\ ;\ \neg(\ x \text{ is } P \text{ to degree } d)) \,\} \neq \varnothing$$
$$\{\, d \mid \mathbf{a} \text{ is } P \text{ to degree } d \,\} \cap \{\, d \mid \text{NO } x\ (\ \text{N}(x)\ ;\ \neg(\ x \text{ is } P \text{ to degree } d)) \,\} \neq \varnothing$$

The interval notation clarifies what these requirements amount to. The first requirement is met if the subject referent **a** is actually more *P* than the first degrees *d* that are not reached by any of the elements in *N*, or in prose, '**a** is *P*-er than every *N*'. The second requirement is trivially met. It states that two intervals, both starting with zero, have non-empty intersection. Gajewski proposes that this trivial semantic denotation causes the sentence to be ill-formed.

Interestingly, this analysis, like my own, rests on the assumption that quantifiers in the comparison phrase receive low scope. Not only does lambda abstraction over degrees *d* take place above the DP quantifier. The crucial point is to combine the DP quantifier with the property of *not* having a certain degree. The analysis from the very beginning, so to speak, is only "interested" in degrees that exceed the referents of the comparison phrase. Heim (2000, 2006), in contrast, would suggest to *first* compute the set of degrees that most, all, many, some *N* reach, and only *afterwards* ensure that the subject referent exceeds these.[5] Gajewski's way to reinforce very low DP scope can be seen as a mirror image of my own assumption that DPs are interpreted inside the landmark argument. Low scope for DPs in the landmark argument hence seems a core factor in the analysis of BoNQ intuitions. How far do the analyses differ in other respects?

[5]I refer to the simpler theory versions endorsed in Heim 2000/2006. Of course, she then endorses assumptions about DP scope and operator scope to ensure the correct readings. Given that the many variants that are eventually covered, I refrain from a comprehensive discussion here, all the more as Gajewski 2009 excellently locates the essential failure of all these versions to capture BoNQ intuitions for English. A preliminary summary of his criticisms could be "whatever assumptions we make for the quantifiers *every* and *most*, we systematically have to assume the exact opposite for the scope of *no* and *few* in order to derive BoNQ intuitions". I will not dwell on the implausibility of assuming that *no* takes just that scope which leads to a trivial reading, instead of taking a different scope like all other quantifiers and yielding a sensible reading.

My own analysis proposes to choose landmark sets of objects to which the subject referent **a** is compared. Gajewski's proposal endorses no such choice. This leads to different predictions when we look at existential quantifiers in the comparison phrase.

(41) a. *Sandy is taller than some (other) child.*
b. *Sandy is taller than any (other) child.*

Version a. and b. of (41) both are grammatical. Let me for the moment assume that *any* in (b.) is the polarity sensitive existential (see discussion above). The set of degrees that Gajewski's account computes from the comparison phrase is hence be the same for (a.) and (b.), and is the following:

$$\{ d \mid \text{SOME } x \text{ (N}(x) \text{ ; } \neg \text{(} x \text{ is } P \text{ to degree } d)) \} =] \text{ MIN(N); } \propto]$$

The interval of degrees starts just at the first degrees that are above the *P*-ness of some object in *N*, and goes up to infinity. This does not provide a very good starting position for an explanation why *any*, *ever* and other NPIs are licensed in comparison phrases. In a pragmatic approach based on domain widening (Chierchia 2004, 2006), we'd predict that widening the *N* domain can only make a difference if even smaller objects can be considered after domain widening. In the following, I compare original and widened *N'*. The resulting intervals differ only if MIN(N') < MIN(N).

$$\{ d \mid \text{SOME } x \text{ (N}(x) \text{ ; } \neg \text{(} x \text{ is } P \text{ to degree } d)) \} =] \text{ MIN(N); } \propto]$$
$$\{ d \mid \text{SOME } x \text{ (N'}(x) \text{ ; } \neg \text{(} x \text{ is } P \text{ to degree } d)) \} =] \text{ MIN(N'); } \propto]$$

If MIN(N') < MIN(N), then the proposition that **Sandy**'s size exceeds MIN(N) is logically stronger than the proposition that **Sandy's** size exceeds MIN(N'). Therefore, domain widening can only lead to logically weaker propositions. Therefore, the present comparative semantics, in combination with Chierchia (2004, 2006) and similar approaches, will wrongly predict that *any, ever* should not be licensed. In logical approaches to NPI licensing, we'd test whether *some N* in (41) can be replaced by *some N"* where *N"*$\subset$ *N,* preserving truth. Once again, the answer is to negative, at least for Gajewski's analysis. If we replace *N* by a more restricted domain *N"*, MIN(*N*") could be higher than MIN(*N*). The subject referent (**Sandy**) might exceed MIN(*N*) in size but not MIN(*N*"). Hence, under Gajewski's analysis we'd predict that the comparison phrase is not a downward-entailing context and NPIs should not be licensed. Gajewski proposes a free choice analysis of *any* but, as I argued above, this is not tenable if we consider more NPIs and more languages.

The landmark set analysis, in contrast, rests on the choice of a witness set to which the subject referent is compared. The analysis, at present, is designed for

morphology-free comparatives like those in Mandarin Chinese or Udmurt. As such, it does not make any predictions for English or German landmark arguments, be it with NPIs or without. However, as I showed in Section 3, the landmark analysis does provide for the means to choose landmark sets according to various strategies, including a *worst case* strategy. This strategy will predict that the worst possible choice in a larger domain can be even worse than the worst possible choice in a smaller domain. (Vive versa, the context is predicted to be downward-entailing because a smaller domain *N"* can only lead to gentler *worst case* choices than a broader domain *N*.) Likewise, the available choices in CAND(**Q**) offer alternatives on which Mandarin Chinese *dou* can operate. Therefore, a landmark set analysis is suited to predict NPI licensing.

Finally, let me mention that sets-of-degree analyses can not easily be generalized to equatives. This is infelicitous because equatives give rise to *BoNQ* judgments as well. It would be desirable that ideas to explain *BoNQ* intuitions in comparatives can be reused for equatives. The following examples illustrate the effect; it is important to note that only '*strictly'* equatives should be considered.

(42) a. *?Sandy is exactly as smart as no other pupil.*
b. *?Sandy ist genauso schlau wie niemand sonst.*

The sentences in (42) cause the reader to stop and puzzle in exactly the same way as Gajewksi's data in (40). To the extent that we find an explanation for (40) desirable, we'd also need one for (42). I won't speculate which amendments could be made in an interval-based analysis to host the judgments in (42).

6. English, German: Direct and Indirect *BoNQ* Effects

In the last part of the paper, I will turn to the empirical reality of *BoNQ* judgments in English and German. Scholars and informants agree that negative quantifiers in comparative clauses are ill-formed. This holds for English and German.

(43) a. **Sam is smarter than no other student is.*
b. **Sam ist klüger als kein anderer Student ist.*

Reactions change when speakers judge sentences with negative quantifiers in comparative phrases. Some of my first informants (mostly trained linguists) readily understood the QR inverse superlative reading for the examples in (44). These usually had been working on comparatives before. Some informants produced the inverse superlative paraphrase after some reflection. Some native speakers refuse (44.b) altogether (prominently Bierwisch 1987:107, ex. 121.b but also Gajewski 2009 and Hofstetter 2009).

(44) a. *Sam is smarter than no other student.*
b. *Sam ist klüger als kein anderer Student.*

Most surprisingly, however, a number of native speakers spontaneously paraphrased (44.b) as "Sam is the smartest of all students". In order to substantiate these anecdotal reactions, we devised an pilot study on German to test such sentences with a larger body of persons.[6] Subjects were shown a picture like in Figure 1 and given a one-sentence description of 'the suspect'. Based on this description, they had to decide who was the most likely 'suspect', multiple answers were allowed.

fig. 1: 'Who's the suspect' material with animals

They were presented with comparative sentences with universal and negative quantifiers, in both the subject and comparative phrase. (I omitt glosses, given that the crucial properties of the English and German examples are identical.)

(45) a. *Der Täter ist dicker als alle anderen.*
,the suspect is fatter than all others'

[6]I want to thank Heinke Knappe and Stefanie Rößler for their help and patience in devising the experiments, finding subjects and gathering the results. The full study is presently being written up as BA thesis.

b. *Alle sind dicker als der Täter.*
‚everyone is fatter than the suspect'
c. *Der Täter ist dicker als niemand (sonst).*
‚the suspect is fatter than nobody (else)'
d. *Niemand ist dicker als der Täter.*
‚nobody is fatter than the suspect'

In addition, filler descriptions with and without comparatives where added. Subjects' answers on who they considered 'the suspect' offers evidence how they interpret the comparative sentence. We conducted an offline questionaire study (45 subjects) and a study with EPrime which allowed to control for reading times (26 subjects). The material is still being evaluated, but the following trends are already clearly visible: Negative quantifiers in the comparative phrase were not classed as "incomprehensible", subjects did compute a meaning for these stimuli. In the offline study, at least 50% of the answers to sentences of the crucial type in (45.c) showed that subjects computed the superlative reading, i.e. they interpreted (the German counterpart of) *The suspect is fatter than nobody* as 'the suspect is fattest'. Error rates range as high as 80% for some stimuli. In the EPrime study, the error rates were likewise significantly higher for stimuli with negative quantifiers in the comparison phrase. All other stimuli were interpreted in line with a standard Heimian analysis of comparatives, occasional errors granted. The reading time study showed only a very slight delay effect for stimuli with negative quantifiers in the comparative phrase. The standard deviation for the crucial stimuli is significantly higher than that of other stimuli. This suggests that some subjects rated without hesitation and others started thinking about the sentences' meaning. Surprisingly, *niemand* in subject position likewise caused a delay, such that the interacting causes of delay effects remain to be investigated.

The study has the character of a pilot study in that the material contained neither equatives nor other downward-entailing quantifiers. However, the results suggest that negative quantifiers in the comparative phrase are problematic for native speakers of German. Speakers systematically compute a meaning which is entirely unpredicted by any semantic theory of comparatives that I know of, no matter whether the theory predicts *BoNQ* effects or not. What they understand is a superlative reading which comes close to a superlative interpretation of equatives that has been observed elsewhere in the literature.

(46) *Sammy is as smart as no one else.*
Sammy ist so schlau wie niemand / keiner sonst.
= ‚Sammy is the smartest of all'

Bierwisch (1987: 107) proposes to derive this reading as part of the standard semantics of equatives. However, other authors have classed it as an exceptional interpretation, and most recently Umbach (2009) argues in favor of an emphatic *so* construction. We can diagnose that apart from equatives, comparatives

likewise can be re-interpreted as 'emphatic superlatives'. These readings do not follow by ordinary semantic composition of the (visible) parts of the sentence.

Our pilot study hence offers indirect evidence for *BoNQ* in German: Our informants were reluctant to interpret negative quantifiers in the comparative phrase as taking wide scope after quantifier raising. Frequently, informants failed to see the resulting inverse superlative (*smarter than no one* = 'dumbest'). Instead, they produced an emphatic superlative reading which, to my knowledge, has never been acknowledged, neither in grammars of German nor in the linguistic literature. Computation also seems to have caused more delay for some speakers. These facts can be understood if we assume that the standard interpretation of quantifiers in the landmark argument of German comparatives is one where to *BoNQ* judgments: Negative quantifiers are not interpretable. As a reaction, speakers *either* see the second, QR reading *or* resort to exceptional rescue interpretations. It would not be consistent with the empirical findings to claim that QR in general causes problems, because universal quantifiers were interpreted unproblematicaly. Several follow-up questions need to be pursued.

i. How do speakers react to downward-entailing quantifiers like *nur wenige* ('few') or *selten* ('rarely')?
ii. How do speakers react to 'exactly' equatives and 'so' equatives with negative quantifiers?
iii. Specifically, do speakers access the emphatic superlative reading faster in these cases (which would suggest that it is a standard way to interpret equatives, but an *ad hoc* interpretation for comparatives)?
iv. Would they grade downward-entailing quantifiers in landmark arguments as 'marked' in a study which asks for grammaticality judgments?
v. Can information structure render the QR reading more accessible?
vi. What are the facts for English?

At present, we can preliminarily conclude that German shows (weak) *BoNQ* in the landmark argument. In addition, German is one of the languages that clearly allows for existential NPIs in the landmark. Taking these two observations together, it looks like a rewarding project to adapt the landmark set analysis of comparatives to German. A preliminary exploration suggests that this project seems feasible. For space limits, however, I will leave it for another occasion.

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