Crosslinguistic Variation in Comparison Constructions*

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Abstract

This paper presents and analyses parallel sets of data on comparison constructions from 14 languages. On the basis of the crosslinguistic differences we observe, we propose three parameters of language variation. The first parameter concerns the question of whether or not a language's grammar has incorporated scales into the meanings of gradable predicates. The second parameter differentiates between languages that allow quantification over degrees in the syntax and those that do not. Finally, we propose a syntactic parameter that concerns options for syntactically filling the degree argument position of a gradable predicate.

key words: comparison constructions, crosslinguistic variation

1. Introduction

This paper presents the results of our joint work on comparison constructions (Project B17, SFB 441, University of Tübingen). The project has elicited crosslinguistic data on comparison constructions from 14 languages. Our goal has been an in-depth study of those languages, with the perspective of figuring out how their grammars differ in order to yield the diverse empirical picture that comparisons present across languages.

The languages we have selected are Bulgarian, Guaraní (an Amerindian language spoken mostly in Paraguay), Hindi-Urdu, Hungarian, Mandarin Chinese, Mooré (a Gur language), Motu (from

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Papua New Guinea), Romanian, Russian, Samoan, Spanish, Thai, Turkish and Yorùbá (a Benue-Congo language). Besides practical issues like accessibility of data and native speakers, our selection has been guided by the goals of getting a diverse set of data and of getting a grasp on the grammatical factors that decide upon the appearance of comparison constructions.

To this end, one important input has been the typological work on comparison by Stassen (1985). He identifies in particular languages that use a verbal strategy – exceed-type languages – and languages that use a conjunctive strategy to express comparison (we will not make use of Stassen's other language types in this paper). Yorùbá and Mooré exemplify the first type and Motu the second. Stassen classifies Samoan as a conjunctive language, and that is why we included it in our study. However, it turns out that the conjunctive strategy is archaic and that present day Samoan uses a construction instead that looks quite similar to English-like comparatives; see Villalta (2008b). This makes our language sample less balanced than it would ideally be. Even so, we have languages in which the surface appearance of a comparison is strikingly different from the familiar English comparative.

Secondly, Beck, Oda and Sugisaki (2004) have proposed a parameter of crosslinguistic variation that distinguishes Japanese from English. The parameter identifies a particular set of data to be tested. Moreover, it reveals that surface appearance is insufficient to draw any conclusions about grammar, since Japanese not only at first glance looks rather similar to English, but has even been analysed in a parallel way in theoretical linguistics. Yet there are important empirical differences that are revealed once one takes a closer look at the data. Comparatives that have a Japanese-like appearance and that have the potential of (dis-)proving the relevance of the parameter proposed by Beck, Oda and Sugisaki exist in Mandarin Chinese, Guaraní, Hungarian, Thai and Turkish.

Finally, there are some subtle differences between the Indo-European languages with respect to comparatives (see e.g. Reglero (2007)). Following up on potential differences in syntax and semantics has lead to an investigation of Bulgarian, Russian, Hindi-Urdu, Romanian and Spanish, for the purpose of contrasting them with English and German (which is identical to English in the respects that interest us here).

We have designed a questionnaire with a set of core data to be tested. The questionnaire was translated into each language. Then data were elicited from naive informants. The set of data to

be tested was augmented according to the specific questions raised by the language under investigation. Since there is a set of core data, however, we have comparable data on comparisons for all 14 languages.

The questionnaire has a general part, in which availability and expression of various comparison constructions (comparative, equative, superlative, etc.) are tested. Besides the form of the relevant comparison construction, we also investigated whether its interpretation is English-like or not (e.g. does 'Mary is as tall as Bill is' truth-conditionally imply that Mary is tall?). The goal of this part is to get an impression of the systematicity of degree constructions in the syntax and semantics of the language.

A second part of the questionnaire is a detailed study of the grammar of comparatives, which are the most studied and best analysed degree construction in English and indeed in other languages as well. This part includes data like difference comparatives, subcomparatives and comparison with a degree, which are suited to determine whether the language has a degree semantics in the sense of a standard theory of comparison (going back to von Stechow (1984)) and whether it confirms or disconfirms the parameter suggested in Beck, Oda and Sugisaki.

Finally, the questionnaire investigates syntactic possibilities in the realization of comparatives, for example, clausal and phrasal comparatives, adverbial and attributive comparatives. This part serves to get a grasp on the syntactic foundation for the expression of comparison and to enable us to decide upon the finer points of crosslinguistic variation e.g. by eliminating orthogonal factors.

The paper is structured as follows: Section 2 presents and explains the important aspects of our questionnaire. The crosslinguistic results are discussed in section 3. Their theoretical interpretation includes a suggestion on what parameters may be at work to produce this crosslinguistic picture. The consequences of our proposals are discussed in section 4. The appendix presents the original questionnaire as well as the core crosslinguistic data in the form of a simple database.

2. The Questionnaire

Our project's goal is to combine thorough empirical study with theoretical analysis. Ours is not a classical typological study; we wholeheartedly endorse Baker and McCloskey's (2007) support of a crosslinguistic methodology that involves a smaller number of languages, but a more detailed, theoretically guided investigation. We extend this methodology from application to syntax to the syntax/semantics interface and compositional semantics, as proposed and demonstrated for complex predicate constructions in Beck (2005). This means that beyond a description of how a given language chooses to express a particular concept, we want an analysis of the chosen structure and an understanding of how the language's grammar constrains expression of the concept. To give an example, Motu expresses the English comparison in (1) as in (2). Both languages convey the information that there is an ordering of Mary's position on the height scale relative to Frank's to the effect that Mary's is higher (i.e. (3)), but the structures used look very different. Why?

(1) Mary is taller than Frank is.

(2) *Mary na lata, to Frank na kwadogī.*
Mary TOP tall, but Frank TOP short
"Mary is taller than Frank."

(3) |----------F-----M------>

We will not, of course, be able to ultimately answer the question why Motu chooses (2). But we propose an analysis of (2) that captures crucial differences to English comparatives, and we furthermore propose a reason for why Motu cannot choose (a structure corresponding to) (1): a parameter of crosslinguistic variation. In order to achieve that, we need a syntactic and semantic analysis of (1), and a reasonably comprehensive set of Motu data that follow up on important features of the English analysis. It is the latter kind of information that our questionnaire is designed to provide.

Subsection 2.1. summarizes the core ingredients to the standard syntactic and semantic analysis of comparison in English. Subsection 2.2. discusses the analysis of Japanese from Beck, Oda &

Sugisaki as a case study in parametric variation. The core data questions contained in the questionnaire are presented in subsection 2.3. Subsection 2.4. explains our elicitation procedure.

2.1. English Comparison Constructions

A theory of how comparison works in English enables us to ask questions about crosslinguistic variation that are guided by linguistic analysis. The pertinent points include assumptions about adjective meaning, syntax and semantics of degree morphology, and matters of Logical Form and compositional interpretation.The theory summarised below is essentially Heim's (2001) version of von Stechow's (1984) seminal work on comparison. See Beck (to appear) for a recent exposition. It is this theory of comparison that the crosslinguistic study and analysis are based on. (There are of course competitors (e.g. Klein (1980)) and alternative versions (e.g. Kennedy (1997)) of this theory; see e.g. Klein (1991) for discussion; also see below for discussion of how the adoption of this theory interacts with certain points made in this paper.)
The foundation of the analysis of English comparison constructions is the lexicon. Adjectives are given lexical entries according to which they relate a degree and an individual, cf. (4). (4b) is an abbreviation for (4a).

(4) a. $[\![\text{ tall }]\!] = \lambda d: d \in D_d. \lambda x: x \in D_e. \text{Height } (x) \geq d$

b. $[\![\text{ tall }]\!] = \lambda d.\lambda x.$ x is d-tall

Degrees are abstract entities (type <d>) that form a scale (i.e. a set ordered by an ordering relation). Klein (1991), following Cresswell (1976), reconstructs degrees as equivalence classes of individuals. There is a scale for physical length, an intelligence scale, a temperature scale etc, which are mutually non-comparable. The reason for assuming such abstract objects in the analysis of English is that there are expressions that operate on them. One such expression is the comparative. The meanings of (5a) and (5b) are paraphrased in terms of degrees. It is the comparative morpheme whose semantics expresses the relation between degrees as in (6a,b).

(5) a. Captain Apollo is taller than 1.70 m.
The largest height degree that Captain Apollo reaches exceeds 1.70 m.

b. Your shoes are longer than this cupboard is deep.
The largest length degree that your shoes reach exceeds the largest degree of depth that this cupboard reaches.

(6) a. comparative morpheme for comparison with degree (type <d,<<d,t>,t>>):
$[\![\text{-er}]\!] = \lambda d.\ \lambda P.\ \max(P) > d$

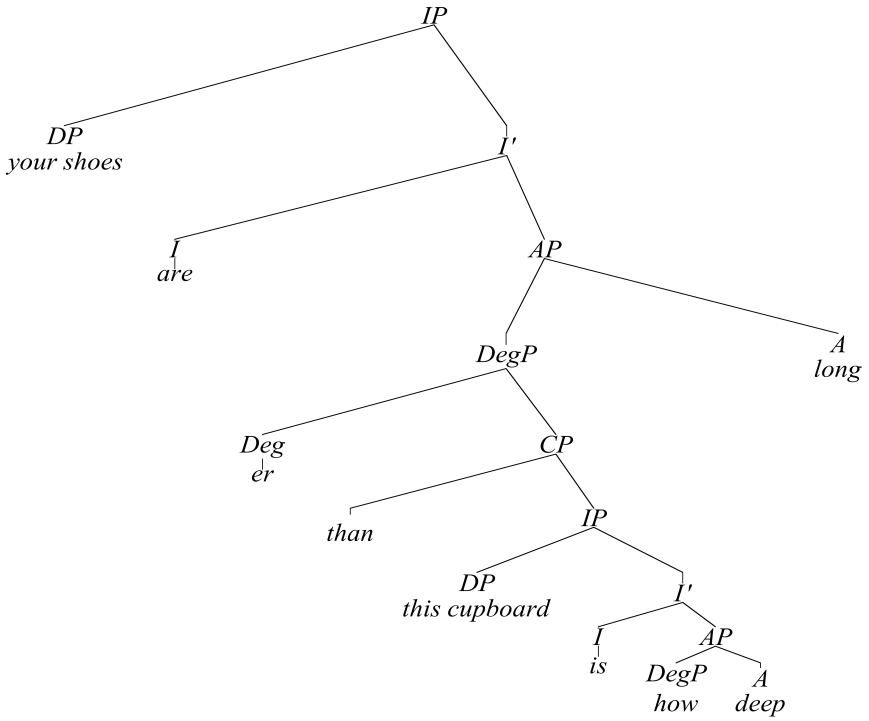
b. comparative morpheme for clausal comparatives (type <<d,t>,<<d,t>,t>>):
$[\![\text{-er}]\!] = \lambda D1.\ \lambda D2.\ \max(D2) > \max(D1)$

(7) $\max(P) = \iota d\colon P(d) = 1 \ \&\ \forall d'[P(d') = 1 \rightarrow d' \leq d]$

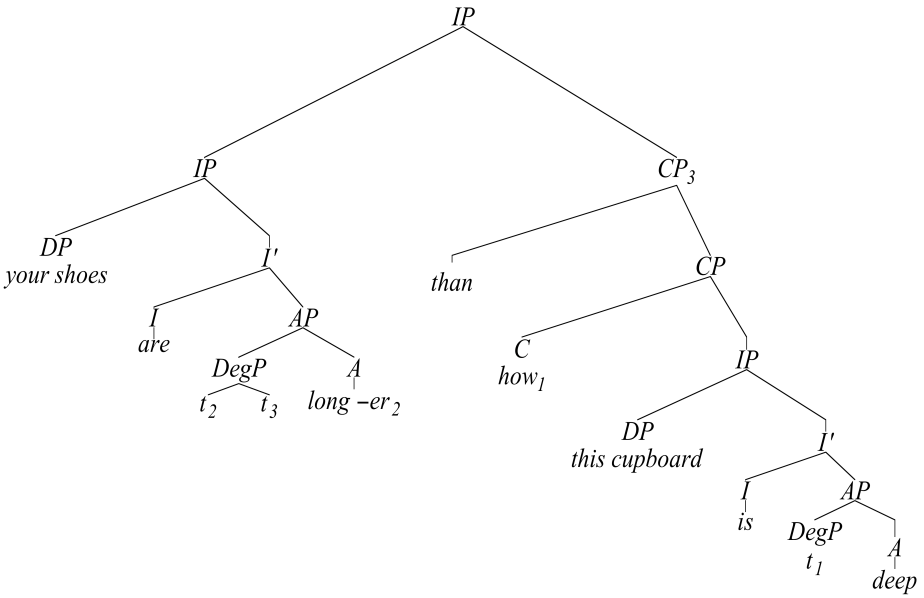
These considerations reveal an important feature of the grammar of comparison in English: comparatives (going back to Bresnan (1973)) are taken to require a very abstract syntax, because semantically, the comparative morpheme is the highest operator in the clause, but syntactically, it appears rather low in the immediate vicinity of the matrix clause adjective. A classical[1] derivation of (5b) is given below ((8) is the underlying structure, (9) the surface and (10) the Logical Form); compositional interpretation of the Logical Form is given in (11).

(8) underlying structure:

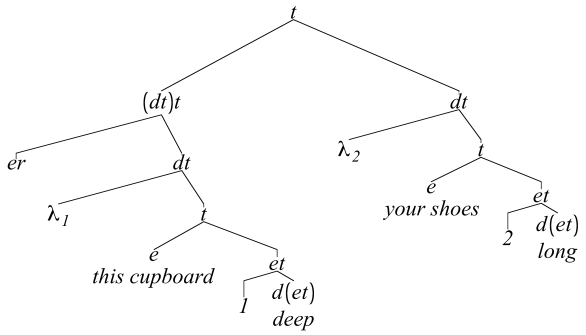
[1] See Bhatt & Pancheva (2004) for a more modern syntax; this issue seems independent of the project pursued in this paper.



(9) surface:



(10) LF:



(11) a. ⟦ [1 [this cupboard t1 deep]] ⟧ = λd. Depth(this_cupboard) ≥ d

b. ⟦[2 [your shoes t2 long]]⟧ = λd. Length(your_shoes) ≥ d

c. ⟦-er⟧ = λD1. λD2. max(D2) > max(D1)

d. ⟦-er⟧ (λd. Depth(this_cupboard) ≥ d)(λd. Length(your_shoes) ≥ d) = 1
iff max(λd. Length(your_shoes) ≥ d) > max(λd. Depth(this_cupboard) ≥ d)
iff Length(your_shoes) > Depth(this_cupboard)

In this derivation, the *than*-constituent originates as the sister of the comparative morpheme. Its surface position is achieved by extraposition. The constituent consisting of the comparative morpheme plus *than*-constituent is called a DegP here, following Heim (2001). It occupies the position SpecAP (a more sophisticated syntactic analysis is conceivable that employs functional categories (e.g. Gergel (2008)); the simple version suffices for our purposes). The comparative morpheme joins the adjective to yield the comparative form (or alternatively is combined with dummy *much* to yield *more*).

At the level of syntax that is the input to compositional interpretation (Logical Form), the *than*-constituent is the first argument of the comparative morpheme. In the case of a *than*-clause, it needs to denote a set of degrees. This is achieved via wh-movement within the *than*-clause and predicate abstraction. The main clause needs to provide a similar set of degrees. We derive this with the help of QR of the DegP. As Heim (2001) observes, the DegP is of type <<d,t>,t>, a quantifier over degrees, and hence the prototypical kind of constituent to undergo QR.

We have given above an example of a predicative comparative. Examples with attributive and adverbial comparatives, as well as other clausal comparatives, differ from our case in terms of position of the AP and the kinds of ellipsis they involve. They are the same in terms of

underlying assumptions about structure and compositional interpretation. Some sample data are given below.

(12) a. Mr Bingley keeps more servants than Mr Bennet does.

b. [[-er [than [2 [Mr Bennet does [~~VP~~ keep t2 many servants]]]]]
[2 [Mr Bingley keeps t2 many servants]]]

(13) a. Colonel Fitzwilliam behaved more amiably than his cousin did.

b. [[-er [than [2 [his cousin did [~~VP~~ behave t2 amiably]]]]]
[2 [Colonel Fitzwilliam behaved t2 amiably]]]

(14) a. Colonel Fitzwilliam behaved more amiably than I had expected.

b. [[-er [than [2 [I had expected [~~XP~~ C.F. behave t2 amiably]]]]]
[2 [Colonel Fitzwilliam behaved t2 amiably]]]

The important aspects of this theory of comparatives are:
– comparison is between degrees
– matrix and *than*-clause provide sets of degrees through abstraction over a degree variable
– the comparative morpheme relates their maxima
– adjectives denote relations between degrees and individuals
With these features of the theory in place, it is straightforward to extend data coverage in many ways (and this is indeed one of the strengths of this analysis). There is a bunch of other quantifiers over degrees that differ from the comparative in terms of their specific meaning, but are otherwise rather similar (examples given under (a), paraphrases under (b) and standard Logical Forms under (c)):

(15) Degree Question (DegQ):[2]

[2] Note that degree questions provide evidence in favour of the degree abstraction employed by the standard analysis of the comparative laid out above. Under general assumptions about the syntax/semantics interface (as explicated e.g. in Heim & Kratzer (1998)), movement of the wh-word *how*

a. How tall is Captain Apollo?

b. For which d: Captain Apollo is d-tall

c. [Q [1 [Captain Apollo is t1 tall]]]

(16) Measure Phrase (MP):

a. Captain Apollo is exactly 1.74 m tall.

b. The largest degree d such that Captain Apollo is d-tall is 1.74 m

c. [[exactly 1.74 m] [1 [Captain Apollo is t1 tall]]]

(17) Equative:

a. Starbuck is as tall as Captain Apollo is.

b. The largest degree of height that Starbuck reaches is at least as high as the largest degree of height that Captain Apollo reaches.

c. [[as[1 [Captain Apollo is t1 tall]]] [1 [Starbuck is t1 tall]]]

(18) Superlative:[3]

a. Helo is the tallest.

b. The largest degree of height that Helo reaches exceeds the largest degree of height that any other relevant person reaches.

c. [Helo [-est C [2 [1[t2 is t1 tall]]]]]

(19) Difference Comparative (DiffC):[4]

a. Helo is 8 cm taller than Starbuck is.

b. The largest degree of height that Helo reaches is 8 cm plus the largest degree of height that Starbuck reaches.

c. [[8 cm -er [1 [Starbuck is t1 tall]]] [1 [Helo is t1 tall]]]

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triggers predicate abstraction, which in this case is over the degree variable introduced by the adjective. This is the same movement as the movement taking place in the *than*-clause.

[3] The variable C in the Logical Form provides the contextually relevant set of other individuals that the superlative compares with.

[4] Note that the analysis of direct reference to degrees, and its combination with comparison operators as illustrated e.g. by the differential comparative, is one of the strengths of the standard analysis of comparison, contra theories that do not employ degrees (Klein (1980)) or reference to degrees in the comparative (Seuren (1973), Schwarzschild (2008)), in which this becomes much more complicated.

According to the classical view, these degree operators are genuine quantifiers. Heim (2001) (following up on Kennedy (1997)) investigates this feature of the analysis by examining their interaction with other scope bearing elements. She finds scope interaction in particular with certain modal verbs. A key example is (20), in which the comparison can take scope over the matrix clause modal. The relevant reading is (21a), according to which the sentence states a requirement on the minimum length (reading (21b), which imposes a requirement on absolute length, is also possible, but not really relevant here). In (22) we illustrate a situation that makes (21a) true.

(20) This draft is 10 pages long. The paper is required to be exactly 5 pages longer than that.

(21) a. The length the paper reaches in all situations meeting the requirements is 15pp.
= the minimum length required for the paper is 15 pages

b. In all situations meeting the requirements, the length of the paper is 15pp.
= the paper must be exactly 15 pages long

(22) |----------15pp---------->
////////////////////////////// sit1: the paper is exactly 15pp long
// sit2: the paper is exactly 18pp long
// sit3: the paper is exactly 20pp long
sit1 – sit3 are compatible with the requirements
the length that the paper reaches in all of them is 15pp

The Logical Forms of the two possible readings and their interpretations are given below. In (23a), the minimum requirement reading, the DegP takes scope over the modal verb. Heim argues that this is important confirmation of the quantifier analysis of the comparative, and we follow her here.[5]

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[5] This distinguishes Heim's version from Kennedy's (1997) view and analysis, where no scope interaction is perceived or derived. Their disagreement stems from the fact that the operators that the comparative scopally interacts with are restricted to certain modal verbs (see Heim (2001)). Heim's conclusions are still

(23) a. [[exactly 5pp -er than that] [1 [required [the paper be t1 long]]]]
max(λd. ∀w'[R(@,w') → the paper is d-long in w']) = 10pp + 5pp
= the minimum length required for the paper is 15 pages

b. [required [[exactly 5pp -er than that] [1[the paper be t1 long]]]]
∀w'[R(@,w') → max(λd. the paper is d-long in w') = 10pp + 5pp]
= the paper must be exactly 15 pages long

We must distinguish these degree operators from the unmarked, positive form of the adjective. The positive adjective is used to make a vague or context dependent statement about the extent to which an individual has the property expressed by the adjective.

(24) Helo is tall.
Helo reaches a size that exceeds the contextual threshold for tallness.

This is analysed in terms of a combination of the lexical adjective and a positive operator, (25a). There is no reason to think that the positive operator scopally interacts with other operators (e.g., *Helo is not tall* is not ambiguous, nor has there ever been such a claim). Therefore we propose that it combines with the adjective directly.[6] We illustrate with von Stechow's (2006) semantics for the positive, according to which the positive relies on a contextually given neutral interval

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under investigation (e.g. Oda (2008), Beck (in preparation), Krasikova (in preparation)), but will be the basis of our analysis in this paper.

[6] An alternative might be assuming a general lexical ambiguity between a context dependent <e,t> adjective meaning and a <d,<e,t>> meaning (as in e.g. Krasikova (to appear)). Bogal-Allbritten's (2009) crosslinguistic work conceptually supports an operator analysis since it associates identifiable meaning components with morphological units.

The relation between the gradable and the Positive adjective meaning has typically been seen as an invisible operator (POS) combining with the first to yield the second. Alternatively, one could consider the context dependent property meaning <e,t> basic, and derive a gradable <d,<e,t>> meaning from that by means of an operator. Like POS, that operator would be phonologically empty in English. This possibility was brought to our attention by Rajesh Bhatt and Chris Kennedy. Although this alternative view sheds an interesting light on our crosslinguistic study, we once more stick to the standard view as the starting point of our description and analysis.

(L_c), and states that the individual has the adjectival property to an extent that is at least as high as the neutral interval's upper bound, (25b).

(25) a. [Helo is [AP POS tall]]

b. $[\![POS_c <<d,<e,t>>,<e,t>>]\!] = \lambda Adj.\ \lambda x.\ \forall d[d \in L_c \rightarrow Adj(d)(x)]$

(26) a. Helo is tall.

b. POS_c ($\lambda d.\lambda x.$x is d-tall)(Helo) iff $\forall d[d \in L_c \rightarrow Height(Helo) \geq d]$

c. |----------/////////////----------x----------> ∞

L_c Height(Helo)

In this subsection, we have seen an analysis of comparison in English that uses a degree ontology in the semantics, and that has gradable predicates introduce into the syntax degree arguments. English has various operators that quantify over these degree arguments, among them the comparative, but also measure phrases, degree questions etc. The comparative is an operator that interacts scopally with other quantifiers, e.g. modals. English comparatives make the most of the syntax of Logical Form in order to be interpretable.

2.2. Japanese Comparison

Beck, Oda & Sugisaki (2004) argue that comparison in Japanese is different from comparison in English in important respects. Japanese (27) looks superficially similar to English (28a), with *yori* taking the place of *than*. But several empirical differences between the two languages lead Beck, Oda & Sugisaki to propose a different analysis, closer to that of English (28b). We present their core data and their analysis here as motivation for aspects of our crosslinguistic study.

(27) Sally-wa Joe-yori se-ga takai.
Sally-Top Joe-YORI back-Nom tall

(28) a. Sally is taller than Joe.

b. Compared to Joe, Sally is taller.

The following differences to English comparatives are judged to be indicative of a different analysis by Beck, Oda & Sugisaki. In contrast to English, Japanese does not permit direct measure phrases (cf. (29) below), subcomparatives (cf. (30)), or degree questions (cf. (31)). The acceptability of a differential comparative (29b), however, indicates that the semantics underlying the *yori*-construction is a degree semantics.

(29) a. Sally-wa 5 cm se-ga takai.
Sally-Top 5 cm back-Nom tall
Sally is 5cm taller/*Sally is 5cm tall.

b. Sally-wa Joe-yori 5 cm se-ga takai.
Sally-Top Joe-YORI 5 cm back-Nom tall
Sally is 5cm taller than Joe.

(30) a. * Kono tana-wa [ano doa-ga hiroi yori (mo)]
this shelf-Top [that door-Nom wide YORI (mo)]
(motto) takai.
(more) tall

b. This shelf is taller than that door is wide.

(31) a. John-wa dore-kurai kasikoi no?
John-Top which degree smart Q
'To which degree is John smart?'

b. How smart is John?

Beck, Oda & Sugisaki also note that in contrast to English, a matrix clause modal verb in a Japanese comparison construction does not permit the wide scope reading of the comparative operator, i.e. the minimum requirement interpretation (example given in (32)).

(32) Sono ronbun wa sore yori(mo) tyoodo 5_peeji
that paper Top that YORI(MO) exactly 5_page
nagaku-nakerebanaranai.
long-be_required
The paper is required to be exactly 5 pages longer than that.

A final important difference that Beck, Oda & Sugisaki identify concerns examples like (33) below. The English sentence is not acceptable.

(33) Negative Island Effect (NegIs):
* Mary bought a more expensive book than no boy did.

This is a so-called negative island effect – negation in the *than*-clause often leads to unacceptability. Von Stechow (1984) and Rullmann (1995) give a semantic explanation for this effect: the maximum *than*-clause degree in (33) is in fact undefined, hence the whole sentence is meaningless and therefore unacceptable.

(34) λd. no boy bought a d-expensive book max undefined!

Interestingly, the Japanese analogon to (33) is acceptable; the example in (36) has a different, sensible interpretation, as the paraphrase indicates: it means that Mary bought a book that was more expensive than the book that nobody bought. The *than*-clause does not describe degrees at all, but individuals, cf. (35). It seems to be a relative clause, and this is Beck, Oda & Sugisaki's analysis.

(35) λx.nobody bought x

(36) a. John-wa [dare-mo kawa-naka-tta no yori]
John-Top anyone buy-Neg-Past NO YORI

takai hon-o katta.
expensive book-Acc bought
'John bought a book more expensive than the book that nobody bought.'

b. *John bought a more expensive book than nobody did.

These basic facts are summarized in (37):

(37) Japn: *subcomparative (SubC), *measure phrase (MP), *degree question (DegQ), NegI-Effect (NegIs) and Scope not like English
but: Differential comparative (DiffC) ok!

In order to capture these differences to English, Beck, Oda & Sugisaki suggest that Japanese does not permit quantification over degree arguments. This is expressed in the following parameter:

(38) Degree Abstraction Parameter (DAP) (Beck, Oda & Sugisaki):
A language {does/does not} have binding of degree variables in the syntax.

If there is no binding of degree variables, a language cannot have degree operators like the English comparative. This explains the properties Scope (for a degree operator to take wide scope, binding of degree variables is necessary), NegIs (since the *yori*-clause does not denote a set of degrees but a set of individuals, it is fine), DegQ (which again needs binding of degree variables, as seen above), SubC (comparing two sets of degrees requires degree variable binding) and MP (since measure constructions involve quantification over degrees). But of course now we face the question of what the semantics of the normal comparison construction is - if Japanese has the negative setting of the DAP, the analysis developed for English above cannot be applied to Japanese. A different analysis without abstraction over degree variables must be developed.
Beck, Oda & Sugisaki propose an analysis in terms of a context dependent version of the comparative. They consider English *compared to* and Japanese *yori* to be context setters not compositionally integrated with the main clause. They provide us with an individual (type <e>) instead that is used to infer the intended comparison indirectly. Thus we would be concerned in

(39) with a comparative adjective without an overt item of comparison, such as English (40a) (without context) or (40b) (where the intended context is given explicitly). We present Beck, Oda & Sugisaki's semantics for Japanese *kasikoi* in the version developed in Oda (2008) in (39'). The analysis implies that Japanese adjectives are inherently comparative and context dependent. Unlike in English, there is no separable comparative operator. The task of the *yori*-constituent is to tell us about the intended context - Joe in (39), making salient Joe's intelligence as the item of comparison. Note that this analysis employs degree abstraction neither in the main clause (since there is no comparative morpheme) nor in the *yori*-constituent (since if it is a clause, as in (36), it is some kind of relative clause). The analysis is thus compatible with the negative setting of the DAP.

(39) Sally wa Joe yori kasikoi.
Sally Top Joe YORI smart
Sally is smarter than Joe.

(40) a. Mr Darcy is smarter.
b. Compared to Mr Bennet, Mr Darcy is smarter.

(39') a. $[[\text{kasikoi c}]]^g = \lambda x.\max(\lambda d.\ x \text{ is d-smart}) > g(c)$
b. $[[\text{Sally wa kasikoi}]]^g = 1$ iff $\max(\lambda d.\ S \text{ is d-smart}) > g(c)$
c. c := the standard of intelligence made salient by comparison to Joe
:= Joe's degree of intelligence

See Beck, Oda & Sugisaki and Oda (2008) for further discussion and empirical motivation of the analysis. What matters for present purposes is that a language may lack English-type quantifiers over degrees, even when it employs a degree semantics. For a given language and comparison construction, we need to ask whether the constituent seemingly corresponding to the English *than*-constituent is really a compositional item of comparison denoting degrees, and whether there is a genuine comparison operator.

2.3. Questionnaire Questions

The questionnaire's aim is to find out to what extent other languages share the properties of the grammar of English laid out in section 2.1.

The questionnaire has a descriptive part, which elicits data corresponding to (24) (the positive), (1) (the comparative), (18) (the superlative), (17) (the equative), and a few more like degree questions and comparisons with *too* and *enough* (see the appendix). We check availability of such structures and their interpretation. This part aims at finding out whether the picture that we get from English, that there is a family of morphemes (free and bound) that operate on degree arguments, is reproducible in the target language. The questionnaire also checks for availability of attributive, adverbial and clausal comparatives (like (12), (13) and (14)). This serves to get an idea of the syntactic options for the expression of comparatives. Note also that availability of clausal comparatives is a prerequisite for checking negative island data and subcomparatives: if clausal comparatives are generally unavailable, those two types of data cannot be constructed.

(41) Positive:
Helo is tall.

(42) Comparative:
Mary is taller than Frank is.

(43) Superlative:
Helo is the tallest.

(44) Equative:
Starbuck is as tall as Captain Apollo is.

(45) Attributive comparative:
Mr Bingley keeps more servants than Mr Bennet does.

(46) Adverbial comparative:
Colonel Fitzwilliam behaved more amiably than his cousin did.

(47) Clausal comparative:

Colonel Fitzwilliam behaved more amiably than I had expected.

An important question our crosslinguistic investigation raises is whether the language under investigation shares the degree ontology that English makes use of. Relevant data points for this include availability of comparison with a degree and availability of difference comparatives, repeated below.

(48) a. Captain Apollo is taller than 1.70 m. (CompDeg)
b. Helo is 8 cm taller than Starbuck is. (DiffC)

The next important issue investigated in the questionnaire comes from Beck, Oda and Sugisaki's (2004) proposals regarding crosslinguistic variation in the grammar of comparison, specifically the DAP.

(49) Degree Abstraction Parameter (DAP) (Beck, Oda & Sugisaki):
A language {does/does not} have binding of degree variables in the syntax.

They argue that English has the positive setting of the DAP while Japanese has the negative setting. If a language has the negative setting of the DAP, we expect, according to the analysis presented above, that it will not have degree questions, measure phrases and subcomparatives (as we saw above, this is the case in Japanese.). (We also expect that the data that appear to be comparatives have a different analysis from English comparatives. We focus here on those data points where (non-)availability of a structure gives direct evidence of the parameter setting.)

(50) a. Degree Question (DegQ):
How tall is Captain Apollo?
b. Measure Phrase (MP):
Captain Apollo is exactly 1.74 m tall.
c. Subcomparative (SubC):

Helo's shoes are longer than this cupboard is deep.

Two further types of data support a negative setting of the DAP. The first is the scope effect from above. If a language has no binding of degree variables, then the structure from which the wide scope reading of the comparison could be derived is unavailable.

(51) Scope:
This draft is 10 pages long.
The paper is required to be exactly 5 pages longer than that.

(52) a. [[exactly 5pp -er than that] [1 [required [the paper be t1 long]]]]

b. max(λd.∀w'[R(@,w') -> the paper is d-long in w']) = 10pp + 5pp

c. The length that the paper reaches in all situations meeting the requirements is 15pp.
= the minimum length required for the paper is 15 pages

The second type of data concerns negative island effects.

(53) Negative Island Effect (NegIs):
* Mary bought a more expensive book than no boy did.

If a *than*-clause does not describe degrees at all, but individuals (as it would be forced to do by a negative setting of the DAP), such structures may be acceptable. Hence acceptability and interpretation of data corresponding to (32) are also part of our questionnaire.

2.4. Eliciting the Data

This subsection describes the stages in the development of language specific questionnaires and the process of data elicitation. The material contained in the English version of the questionnaire

provided in the appendix served as the minimal base for the elicitation of data from our language sample. To create questionnaires for the languages at hand we went through the following steps (to be explicated below): familiarising with the relevant structures and morphemes in the target language; constructing examples with the help of the primary informant(s); eliciting data from naïve secondary informants; analysing the elicited data, fixing the questionnaire and repeating the elicitation step if necessary.

Stassen (1985) in addition to the grammars available for our languages was used to gain a first insight into the make-up of basic degree constructions. Relying on the information about the morphological markers involved and the structure of simple comparative sentences, we let our primary informants translate the examples from the minimal questionnaire into the target language. As our primary informants we selected native speakers of the language able to share their intuitions in a second language. After constructing the examples and providing the glosses they were asked to deliver their judgements about the felicity of selected sentences in contexts we constructed in order to convey a first impression about the interpretation of the relevant examples. Some potentially ungrammatical structures, e.g. subcomparatives or comparatives hosting negation in the embedded clause, were constructed without the help of the primary informants or asked to be translated literally.

To keep the judgements uniform, we introduced an acceptability scale based on ratings from 1 to 4, with 1 corresponding to 'acceptable (in the given context)' and 4 corresponding to 'unacceptable (in the given context)'.

The sentences collected from the primary informants were supplied with contexts and a questionnaire with a set of answers based on the ratings mentioned above was developed. We included questions on any language-specific comparative-related phenomena that surfaced during the work with the primary informants and seemed worth investigating. The sentences and partly the contexts were presented in the original script without glosses. From 2 to 6 secondary informants for each language were asked to answer the questions and provide their comments if needed. If the resulting answers were inconsistent, primary informants were consulted again and the questionnaire was adjusted for an additional round of data elicitation.

Since we needed judgements informing us about interpretation in addition to judgements pertaining simply to grammaticality, let us illustrate how we proceeded in those cases. We

believe that the only judgement that a native speaker can reliably provide is an acceptability judgement (and this may correspond to judging grammaticality, truth vs. falsity or felicity; compare Matthewson (2004)). Hence all intuitions about interpretation were elicited with the help of a context that unambiguously fixed the relevant interpretation. We give three examples below, concerning differential comparative, context dependency and scope, respectively.

(54) Context: Adé is looking at the thermometer he put in his garden. The temperature indicated by the thermometer is 25°C. The day before the temperature was 18°C. Could Adé say:

Rũndã	*wã*	*zĩiga*	*yaa*	*tʊʊlga*	*n*	*yɩɩd*	*zaamẽ*	*ne*	*degre*
today	def	place	is	hot	C	exceed	yesterday	with	degree

sẽn	*yɩɩd*	*a*	*nu*.	(Mooré)
ON	exceed	NM	five	

"It's at least 5°C warmer today than yesterday."

(55) Context: Suppose that Sangeeta is 5'6'', which is more than the average height for women in India. Can you say the following sentence in this situation?

Sangeeta	*lambi*	*hai*.	(Hindi-Urdu)
Sangeeta	tall.Fem	is	

"Sangeeta is tall."

(56) Context: A student of yours asks you about the length requirement on his term paper. He is afraid that his draft is too short. According to the university regulations, the minimal length is 25 pp. Can you make the following remark in this situation?

Vash	*chernovik*	*20*	*stranic*.	(Russian)
your	draft	20	pages	

Kursovoj	*nado*	*byt'*	*rovno*	*na*	*5*	*stranic*	*dlinnee*.
paper	necessary	be	exactly	by	5	pages	long-COMP

"Your draft is 20 pp long. The paper needs to be exactly 5 pp longer than that."

Finally, a comment on two data points that can be tricky to collect - measure phrases and scope. There is substantial variation in the acceptability of measure phrases within and across languages

(compare in particular Schwarzschild (2004)). For example, unlike *tall*, English *heavy* cannot combine with a measure phrase, while the German counterpart can. Moreover, there is variation with respect to what a language can express measurement for; not all languages naturally have degree measurement for temperature, for instance.

(57) a. * John is 67kg heavy.

b. Hans ist 67kg schwer.

Hans is 67kg heavy

In collecting our crosslinguistic data, we chose a handful of plausible candidate adjectives for measurement - the ones that we thought we the best possible candidates for combination with a measure phrase. Besides physical height and extent, length of time (e.g. *five hours long*) can very frequently be measured. We only concluded that a language did not permit measure phrases if we could not find any that worked.

Regarding scope data, it is important to realize that Heim's point can only be made with modal verbs, and only some modals produce the relevant minimum requirement reading. In the example below, *should* in contrast to *have to* does not.

(58) The paper should/has to be exactly five pages longer than that.

The same variation between different modals is found in other languages as well (e.g. German, Russian). In the crosslinguistic study, we tried to find the modals that work. Good candidate modals are the ones that occur in the Sufficiency Modal Construction (von Fintel & Iatridou (2005)), a connection pointed out in Krasikova (to appear a). Where possible, we tried to put those modals in the comparative. We cannot *prima facie* exclude the possibility that a language simply lacks the relevant kind of modal entirely and that the scope facts therefore are unrevealing with respect to the nature of the comparative. But see section 3 for our results.

3. Results

This section summarizes those results from the crosslinguistic study that have a significant bearing on the theory of comparison and its options for language variation. For a more complete overview of the data, the reader is referred to our database in the appendix. For a detailed discussion of comparison constructions in the individual languages, we refer to the publications Krasikova (2007), Krasikova (to appear b), Gergel (2008), Fleischer (2007), Savelsberg (2009), Vanderelst (2008), Hofstetter (to appear); Hofstetter (in preparation), Villalta (2008a), Villalta (2008b).

Subsection 3.1. investigates the ontological and lexical foundations that underlie a language's options for the expression of comparison. In subsection 3.2 we specifically check predictions made by Beck, Oda and Sugisaki's (2004) Degree Abstraction Parameter against our languages. More superficial differences in syntactic options are the issue considered in subsection 3.3. In each of our subsections, we propose a parameter of crosslinguistic variation that is at the heart of the differences we observe. The first two are semantic parameters in that they concern the way a language compositionally interprets syntactic structure. The third is a syntactic parameter.

Before we proceed, a general comment on our presentation of the empirical results is in order. We will frequently make statements like 'language X does not have degree questions' or 'language Y does not allow clausal comparatives'. What is meant by this is that the language does not allow a structure parallel to the English degree construction. Mostly, the language in question finds an alternative strategy to express a similar content. Where this is relevant, we list the alternative structure in the appendix along with the unavailable target structure. The reader may verify our empirical claims there.

3.1. Degree Semantics – DSP Effects

The basis of the grammar of comparison in English is the degree ontology used in the semantics. Adjectives - more generally, gradable predicates - have an argument position for degrees. Those

argument positions must be saturated in the syntax. Degree operators have a semantics that does that, indirectly, through quantifying over degrees. In order to determine whether the language under investigation is like English in this respect, we evaluate the questionnaire with respect to:
(i) whether the language has a family of expressions that plausibly manipulate degree arguments: comparative, superlative, equative morphemes, items parallel to *too* and *enough*.
(ii) whether the language has expressions that plausibly refer to degrees and combine with degree operators: comparison with a degree (CompDeg), difference comparative (DiffC).

3.1.1. Conjunctive Strategy - Motu

Motu, our representative of a conjunctive language, gives a clear negative answer to both of these questions. There is no dedicated degree morphology, and both CompDeg and DiffC are impossible. Other types of data that would be indicative of a degree semantics, like measure phrases or degree questions, are unavailable as well (compare the questionnaire in the appendix for an illustration of what the language can and cannot do).

(59) *Mary na lata, to Frank na kwadogi.*
Mary TOP tall, but Frank TOP short
"Mary is taller than Frank."

(60) CompDeg:
**Mary na lata 1.70m.*
Mary TOP tall, 1.70m
Intended: "Mary is taller than 1.70m."

(61) DiffC:
**Mary na lata 2cm ai to Frank na kwadogi.*
Mary TOP tall 2cm by but Frank TOP short
Intended: "Mary is 2cm taller than Frank."

We see no evidence for an underlying degree semantics, and speculate that there is the following parameter of language variation:

(62) Degree Semantics Parameter (DSP):
A language {does/does not} have gradable predicates (type <d,<e,t>> and related), i.e. lexical items that introduce degree arguments.

Motu would, of course, have the negative setting [-DSP]. This leaves us with the task of finding a semantic analysis for Motu adjectives. They occur only in one form, which seems similar to the English positive form in two respects. The example in (63) is not acceptable in a context in which it is impossible to regard Mary as tall and Frank as short, e.g. (63'b). Both adjectives thus seem to carry the meaning of a positive form of the adjective (and this is of course completely different from the English comparative). What counts as tall and short, however, varies somewhat with the context, so (63) is acceptable in the context in (63'a); context dependency has to be part of the Motu adjective meaning as well. Our task is, thus, to come up with an adjective meaning for Motu adjectives that is similar to the English positive form, but does not introduce a type <d> argument (cf. the negative DSP setting hypothesised above).

(63) *Mary na lata, to Frank na kwadogī.*
Mary TOP tall, but Frank TOP short
"Mary is taller than Frank."

(63') a. Context: Mary is 1.70m and Frank is 1.60m.
b. Context: Mary is 2m and Frank is 1.98m.

It is clear that context dependency, apparent vagueness, can come in through different means than the English positive. An English example in which a degree semantics and a positive operator are unlikely to be involved in the semantics of a vague predicate is *behind* in (64). Modifiability in (64b) is a sign of context dependency, but there is no indication of a grammar of degree in the

case of *behind* and other locative prepositions (like combinability with expressions that refer to degrees etc.).

(64) a. The picture is behind the sofa.
b. The picture is right/sort of/not quite behind the sofa.

An analysis of *behind* in terms of context dependency could look as in (65). This follows Klein's (1980) analysis of the English positive, which we do not adopt for English positive adjectives, but find plausible for other examples of context dependency like this one.

(65) ⟦ *behind* ⟧ =λc.λx.λy.y counts as being in a place behind x in c (c a context)
⟦ *behind the sofa* ⟧ =λc.λy.y counts as being in a place behind the sofa in c

Our suggestion is that Motu adjectives have this kind of context dependent semantics. I.e. $tall_{\text{Motu}} \neq tall_{\text{English}}$, but $tall_{\text{Motu}}$ is similar to English *behind the sofa*. Our example in (66) is analysed in (66').

(66) *Mary na lata, to Frank na kwadogī.*
Mary TOP tall, but Frank TOP short
"Mary is taller than Frank."

(66') a. $[\![\text{tall}_{\text{Motu}}]\!] = [\lambda c.\ \lambda x.\ x \text{ counts as tall in } c]$
b. $[\![\text{short}_{\text{Motu}}]\!] = [\lambda c.\ \lambda x.\ x \text{ counts as short in } c]$
$[\![\text{short}_{\text{Motu}}]\!]^C$ must be a subset of $[\lambda x.\ x \text{ does not count as tall in } c]$
c. $[\![\text{Mary na lata, to Frank na kwadogī}]\!]^C = 1$ iff
Mary counts as tall in c and Frank counts as short in c

The sentence is predicted to be true in the context it is uttered in as long as the context can be construed as ranking Mary and Frank on the height scale as depicted below. We expect the

sentence to have a 'descriptive use' Barker (2002), according to which it informs the hearer that Mary is above the current size standard and Frank is below it. But in addition, we expect that the sentence can be used to provide information on the context – a 'sharpening use' in the sense of Barker (2002): 'we are in a context in which people like Mary count as tall and people like Frank count as short'. Sharpening accounts for acceptability of (63) in context (63'a). The unacceptability of (63) in context (63'b) must stem from the fact that a height of 1.98m is very hard to construe as falling into the 'short' section on the height scale. Normal size expectations restrict manipulability of the context.

(67) |----------F----------M----------->
////////////////////// ////: short
|||||||||||||||||||||||||||||||||||||| \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ ||||: not tall; \\\\: tall

This analysis leads us to expect that combination with expressions that refer to degrees is not possible (e.g. CompDeg, DiffC), and this is what we find (both for Motu *tall* and for English *behind*). To sum up, our point is that Motu has no degree operators, not even the positive. Perhaps degrees and scales are a level of abstraction above context dependency that a language may or may not choose to develop.

3.1.2. Exceed-type Languages - Mooré and Yorùbá

Our exceed-type languages present a less clear picture. In Mooré and in Yorùbá, what could be the morphosyntax of degree is limited to verbs expressing 'exceed' and 'reach'. Those verbs also have the uses that the corresponding English verbs have, e.g. (68'a). One prima facie plausible analysis of the exceed-type comparative would have been to take the element corresponding to *exceed* to relate two type <e> objects, as it probably does in English (68').

(68) Owó osù rè ju ti ẹ lọ [Yorùbá]
money month her exceed that your go
"Her income exceeds your income."

(68') a. Your expenses will always exceed your income.

b. $[\![\text{exceed}_{\text{English}}]\!]$: <e,<e,t>>

However, both Yorùbá and Mooré have comparison with a degree and differential comparatives; this is illustrated below for Yorùbá (compare the appendix for more data from those languages).

(69) *Ade ga* *jo* *Isaac lo*.
Ade is_tall exceed Isaac go
Ade is taller than Isaac.

(70) DiffC:
Kathy fi *esebata* *kan* *ga* *ju* *Sandra lo*.
Kathy with foot one is_tall exceed Sandra go
Kathy is one foot taller than Sandra.

(71) CompDeg:
Kathy ga *ju* *esebata* *marun ataabo lo*.
Kathy is_tall exceed foot five and half go
Kathy is taller than five and a half feet.

In view of the availability of comparison with a degree and differential comparatives, it seems that a scale structure of the arguments of Mooré and Yorùbá *exceed* ought to be assumed. We might as well call those arguments degrees, then. We tentatively conclude that these languages can talk about degrees and have the positive setting of the DSP. The morpheme we call 'exceed' could then be analysed as a comparative morpheme; that is, we suggest (72):[7]

[7] More precisely, the data in the appendix suggest that Mooré and Yorùbá have a phrasal comparative morpheme and the 'comparison with a degree' comparative operator in (6a).

(72) ⟦ exceed$_{\text{Mooré/Yorùbá}}$ ⟧ = ⟦-er⟧

Other exceed-type languages may not share those properties, though; no general prediction follows regarding whether a particular exceed-language is [+DSP] or [-DSP]. This depends on DiffC and CompDeg judgements. One could also look for other [-DSP] languages among the conjunctive languages.

3.2. Degree Abstraction – DAP Effects

Let us next investigate languages that provide clear evidence in favour of an underlying degree semantics. Mandarin Chinese has both differential comparatives and comparison with a degree (cf. the appendix). Thus we will take it to be [+DSP].

(73) DiffC:

Lisi bi	*Zhangsan*	*gao*	*5 li mi.*	[Mandarin Chinese]
Lisi Comp	Zhangsan	tall	5cm	

Lisi is 5cm taller than Zhangsan.

(74) CompDeg:

Lisi bi	*yi mi qi*	*gao.*
Lisi Comp	170	tall

Lisi is taller than 1,70m.

At the same time, there are important differences to English that are indicative of a negative setting of the DAP repeated below.

(75) Degree Abstraction Parameter (DAP) (Beck, Oda & Sugisaki):
A language {does/does not} have binding of degree variables in the syntax.

Chinese does not have scope interaction (Scope), nor does it display English-like negative island effects (NegIs). It does not allow subcomparatives (SubC), measure phrases (MP) or degree questions (DegQ).

(76) NegIs:

Lisi mai	*de*	*shu*	*bi*	*Zhangsan mei mai*	*de*	*gui*.
Lisi buy	DE	book	Comp	Zhangsan Neg buy	DE	expensive

Lisi bought a more expensive book than the one that Zhangsan didn't buy.

(77) Scope:

Lisi xuyao	*bi*	*Zhangsan shao*	*mai*	*yixie*	*lazhu*.
Lisi must	Comp	Zhangsan few	buy	a_little	candles

Lisi was required to buy fewer candles than Zhangsan.

#Lisi's minimally required number was below Zhangsan's.

(78) DegQ:

* *Lisi shi*	*duo*	*gao?*
Lisi is	much	tall

How tall is Lisi?

(79) MP:

* *Zhe*	*ge*	*xiangzi*	*shi*	*20 gongjin*	*zhong*.
Def	CL	suitcase	is	20 kg	heavy

The suitcase weighs 20kg.

(80) SubC:

* *Zhe*	*ge*	*zhuozi*	*bi*	*nage*	*men*	*kuan*	*de*	*gao*.
Def	CL	table	Comp	def	door	wide	DE	high

The table is higher than the door is wide.

In other words, structures that require binding of degree variables and the positive setting of the DAP are absent.[8] We take Chinese to be [-DAP], just like Japanese. This implies that the semantics of comparison must derive an appropriate meaning without binding of degree variables. For analyses of the comparison constructions in Chinese and Japanese that work without abstraction over degree variables, see Krasikova (2007a), Beck, Oda and Sugisaki (2004), and in particular Oda's (2008) analysis presented in section 2. We take Samoan, Mooré and Yorùbá to fall into the same class of languages with a [+DSP], [-DAP] parameter setting, since they lack scope interaction, MPs and DegQs (see the appendix for details).

Another group of languages including for example Russian shows some similarities to Chinese in not permitting subcomparatives, measure phrases or degree questions (Data shown in the appendix). But, unexpectedly if they had a [-DAP] setting as well, they do show scope interaction, and they exhibit the exact same negative island effect as English.

(81) Статье надо быть ровно на 5 страниц длиннее.
paper.Dat necessary be exactly by 5 pages long.COMP
The paper has to be 5 pages longer.
Minimum requirement reading ok.

(82)* Света купила более дорогой подарок, чем никто другой.
Sveta buy.past much.COMP expensive present what.Instr nobody other
Sveta bought a more expensive present than nobody else.

---

[8] A reviewer points out to us that the possibility of differential comparatives combined with the impossibility of direct measure phrases raises the question of how to analyse degree expressions like 'six feet'. It seems that they can be referential in the comparative, thus not raising the problem of degree abstraction, while they must be quantificational as direct measure phrases in order to uniformly require degree abstraction. The latter can be seen to be supported by Schwarzschild's (2004) discussion of measure phrases, who argues that the combination with a direct measure phrase requires extra steps of composition - hence their less than universal acceptability. By contrast, degree expressions in comparatives are more widely acceptable and don't seem to raise issues of combinability. We do not completely understand this issue at this point. But see Oda (2008) for interesting discussion of differentials in the [-DAP] language Japanese. She argues that their behaviour supports the [-DAP] setting we assume.

This means that we need a more fine-grained distinction than what Beck, Oda and Sugisaki developed. The difference between Japanese-like languages and Russian-like languages is the issue of the next subsection.

3.3. Degree Phrase Expression – DegPP Effects

We assume that scope interaction and negative island effects indicate a [+DAP] parameter setting in Russian. This raises the question of why subcomparatives, measure phrases or degree questions are not possible, i.e. how the language differs from English-like languages.

Note that all three types of data involve an adjective combining with a syntactic element that we would characterise as a DegP. The SpecAP position is filled in overt syntax in each case - by the trace in (83a), by *how* in (83b) and by the measure phrase in (83c).[9] The SpecAP position is the degree argument position of a gradable predicate. It is filled by degree operators.[10] We represent below the surface structure of the relevant examples.

(83) a. Helo's shoes are longer than the cupboard is deep.
[than [how1 [the cupboard is [**AP** t1[A deep]]]]]

b. How deep is the cupboard?
[**AP** how [A deep]]

c. The cupboard is exactly 35 cm deep.
[the cupboard is [**AP** [exactly 35 cm] [A deep]]]

---

[9] Although we cannot see the trace, it must be present in the syntax, for example because of movement constraints in *than*-clauses.

(i) a. John is taller than I thought he was.
b. ?? John is taller than we wondered who was.

[10] There is one kind of element that can fill the degree argument position without, perhaps, being an operator: a referential direct measure expression as exemplified in (i), where the degree pronouns *that* and *so* might be of type <d>. We have not elicited the relevant data. This gap in our study might have consequences for the formulation of the DegPP. We thank Sonja Tiemann for discussion of this point.

(i) a. (Peter is 6; tall). John is that tall, too.
b. (Today it is 75 degrees.) I'm surprised that it is so warm.

We hypothesise that filling SpecAP, the position dedicated to the degree argument of an adjective (or gradable predicate) is constrained. In the Russian-type languages, it seems to be impossible to fill this position overtly. The above data are distinguished from normal comparatives - *than*-clause and main clause - in the following way:

Firstly, a normal *than*-clause does not overtly fill the SpecAP position of the adjective. The ellipsis remedies the problem with 'filling overtly' the SpecAP position. Structures corresponding to (84) are fine in Russian.

(84) Helo's shoes are longer than mine are.
[than [how1[mine are ~~[AP t1 long]]~~]]

Secondly, *-er* (or rather, its crosslinguistic counterparts) must not be sitting in the position SpecAP in overt syntax. Only at LF is the degree argument position of the gradable predicate filled - by the trace of the comparative DegP.

(85) overt syntax: Helo's shoes are [AP _ [A' long -er]] [than mine are _]
LF : [[DegP -er [than [how1[mine are ~~[AP t1 long]]~~]]] [1[AP t1 [A' long]]]

We propose the following parameter.[11]

(86) Degree Phrase Parameter (DegPP):
The degree argument position of a gradable predicate {may/may not}
be overtly filled.

---

[11]This parameter is supposed to pertain to the degree argument slot of a gradable predicate, not the well-formedness of expressions like '8 cm' in sentences of the language. In particular, the difference degree argument slot of the comparative and the degree argument of the comparative in comparison with a degree are not supposed to fall under this parameter. Neither case represents the degree argument slot of a gradable predicate.

Note that the SpecAP position is filled by expressions that trigger binding of the degree argument, hence the question as to the setting of the DegPP arises only for languages that have the setting [+DAP]. We take Guaraní and Turkish to fall into the same class of languages with parameter settings [+DSP], [+DAP], [-DegPP].

There are some languages in which the question 'can the degree argument position of an unmarked adjective be filled?' appears to be answered with 'well, depends'. This can be seen from the data in the appendix for Romanian, in which the relevant data points subcomparatives, measure phrases and degree questions are only possible with the addition of the morpheme *de*. It can also be seen for Spanish, which allows the subcomparative, but only under particular syntactic circumstances (Reglero (2007)). We regard these as rescue strategies; that is, we suppose that the languages concerned have the negative setting of the DegPP, but that this is obscured by the availability of a fairly obvious alternative. Gergel (2008) proposes that Romanian has a visibility condition on the occurrence of the elements we call DegPs, which can be met by the introduction of a functional head. This shows that the DegPP is perhaps a shorthand for a set of syntactic circumstances that need to be outlined in more detail. We will stick to it for the moment for expository reasons.

A look at the appendix will reveal, finally, that there are some languages that behave in the relevant respects just like English or German: Bulgarian, Hungarian and Thai. Furthermore, Hindi-Urdu doesn't look identical to English, but for independent reasons. Hindi-Urdu does not have *than*-clauses. Bhatt & Takahashi (2007) derive this fact from an independent property of Hindi-Urdu, namely that finite clauses in this language cannot combine with postpositions. Since Hindi-Urdu *se (than)* is a postposition, there are no *than*-clauses.

(87) * *Aaj maine socha tha se zyaadaa garam hai.* [Hindi-Urdu]
Today I think was SE more hot is
Intended: It is warmer today than I thought.

Unavailability of *than*-clauses in turn makes subcomparatives and testing the negative island effect impossible. But this has nothing to do with the grammar of comparison – it simply means that these constructions cannot be used to test the grammar of comparison in Hindi-Urdu. We take this issue to be orthogonal to the questions we investigate in this paper (a similar point holds for Turkish, Mooré, Samoan and Yorùbá). Other than that, Hindi-Urdu is English-like with respect to the three parameters investigated here (see Bhatt & Takahashi for a study of more fine-grained differences between English and Hindi-Urdu).

3.4. Overview

The table below summarises the behaviour of the languages we investigated with respect to the data that we treat as key data for the identification of parameter settings. A comment on the notation in the table: DiffC, CompDeg, DegQ, MP, SubC mean availability of the constructions so named. Scope means availability of the relevant reading of a comparison operator taking wide scope over another quantifier like a modal. NegIs means a negative island effect that is parallel to English. Where such a data question cannot be raised in a language for independent reasons, we note this with ‘n/a’ for ‘not applicable’.

We see that {DiffC, CompDeg} cluster together (although in Japanese, comparison with a degree is frequently odd. We take there to be an independent explanation for this fact.[12] For the purposes of our analysis we have taken Japanese CompDeg as a 'no' value.). The data points {Scope, NegIs}, where applicable, similarly cluster together. Finally, {DegQ, MP, SubC} also generally behave in a parallel fashion (although this can be partially obscured by different rescue strategies; the bracketed ‘(no)’ in the table alludes to the availability of some rescue strategy or other in the

[12] Beck, Oda and Sugisaki provide an analysis of the Japanese comparison construction along the lines of English (i). They further analyse both the Japanese and the English ‘compared to’-phrase as a context setter. Interestingly, it seems to be strange to give as the "context" a direct value of the required variable, cf. (ii). Thus we propose that there is an independent reason which makes many CompDeg data (though not all) awkward in Japanese.

(i) Compared to John, Mary is tall.
(ii) ?? Compared to 1.70m, Mary is tall.

language in question).[13] Besides the clusters, we have found dependencies. For example, in our sample only languages that have difference comparatives show scope interaction or degree questions. Only languages that show scope interaction permit subcomparatives and so on. The table clearly reveals an imbalance in our language selection that could not later be remedied: Motu as the sole representative of the conjunctive strategy is alone in exhibiting the negative value for some of the key properties of comparisons.

Lg\Fact	DiffC	CompDeg	Scope	NegIs	DegQ	MP	SubC
English	yes	yes	yes	yes	yes	yes	yes
German	yes	yes	yes	yes	yes	yes	yes
Bulgarian	yes	yes	yes	yes	yes	yes	yes
Hindi-Urdu	yes	yes	yes	n/a	yes	yes	n/a
Hungarian	yes	yes	yes	yes	yes	yes	yes
Thai	yes	yes	yes	yes	yes	yes	yes
Romanian	yes	yes	yes	yes	(no)	(no)	(no)
Spanish	yes	yes	yes	yes	(no)	(no)	(no)
Guaraní	yes	yes	yes	yes	no	no	no
Russian	yes	yes	yes	yes	no	no	no
Turkish	yes	yes	yes	n/a	no	no	n/a
Chinese	yes	yes	no	no	no	no	no
Japanese	yes	%	no	no	no	no	no
Mooré	yes	yes	no	n/a	no	no	n/a
Samoan	yes	yes	no	n/a	no	no	n/a
Yorùbá	yes	yes	no	n/a	no	no	n/a

[13] We should also note that the Turkish degree question does not seem to be as fully ungrammatical as one might expect (its status would be better described with 'questionable'; measure phrases are slightly worse). However, neither does it seem to be a canonical structure to express the relevant question, justifying the 'no' in the relevant position in the table.

Motu	no	no	n/a	n/a	no	no	n/a

We have conducted a statistical analysis of the significance of the clusters and dependencies found in the data. Specifically, we used the Fisher Exact test to rule out that the phenomena in each cluster or dependency that we considered are independent. Since Fisher Exact does not distinguish between unidirectional (dependencies) and bidirectional (clusters) implications, we applied the method described in Maslova (2003) to check if the detected significance is valid for the uni- or bidirectional case. For this purpose, the results obtained for the original distribution of features (column 2 in (88)) are augmented by the results for the modified distribution of features (columns 3 and 4 in (88)) that have to be insignificant for a symmetrical dependency to hold.

(88) Statistical analysis

Cluster/Dependency	Fisher Exact (A and B)	Fisher Exact (A and A = B)	Fisher Exact (B and A = B)
DegQ <=> MP	**p < 0.01**	**p = 1**	**p = 1**
DegQ/MP <=> Subcomp	**p < 0.01**	**p = 1**	**p = 1**
Scope <=> NegIs	**p < 0.01**	**p = 1**	**p = 1**
DegQ/MP => Scope	**p ≈ 0.05**	**p ≈ 0.05**	**p = 1**
SubComp => NegIs	p > 0.01	–	–

According to (88), the p-values for the two clusters {DegQ, MP, SubC} and {Scope, NegIs} are significant for the original distribution and insignificant for both additional ones, which suggests that we are dealing with the statistically significant symmetrical dependency.[14,15] For the implication DegQ/MP => Scope Fisher Exact revealed marginal significance in two out of three cases which means that we have a marginally significant unidirectional dependency. The

[14] Fisher Exact yielded no results for the cluster {DiffC, CompDeg} because of the predominance of positive values for the two variables. However, the phi coefficient in this case is significant (phi = 0.685).
[15] The dependencies MP/DegQ => DiffC und Scope => DiffC also suffer from the low occurrence of [– DiffC] – the sample is short of languages that disallow differential comparatives – and, therefore, statistical testing cannot produce meaningful results in these two cases. The statistical analysis is hindered by the gap in the data collection pointed out above.

conditional SubComp => NegIs comes out not significant, so no argument can be based on this finding. More data ought to be gathered in order to conclusively show the dependency. Since both clusters and the dependency MP/DegQ => Scope are significant, our theoretical conclusions are still supported by the statistical analysis.

We conclude that it is highly unlikely that our data exhibit the clusters we observe by accident. A linguistic theory is thus called for that makes a systematic connection between availability of DiffC and CompDeg, and similarly for the elements of the other clusters. Furthermore, linguistic theory has to ensure that whatever properties of the grammar allow DiffC are a prerequisite for availability of scope interaction and DegQ, and so on.[16]

This is the aim of this paper. The clusters of properties identify of course our proposed parameters. This is summarized below.

(89) Degree Semantics Parameter (DSP):
A language {does/does not} have gradable predicates (type <d,<e,t>> and related), i.e. lexical items that introduce degree arguments.

(90) Degree Abstraction Parameter (DAP) (Beck, Oda & Sugisaki):
A language {does/does not} have binding of degree variables in the syntax.

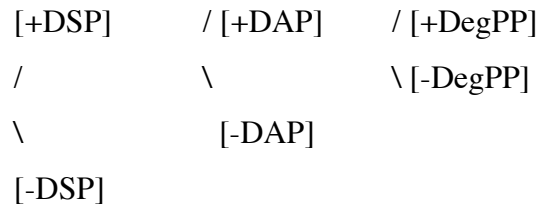
(91) Degree Phrase Parameter (DegPP):
The degree argument position of a gradable predicate {may/may not}
be overtly filled.

Lg\Para	DSP	DAP	DegPP
English	+	+	+
German	+	+	+
Bulgarian	+	+	+

[16] Note that an analysis of Heim's data with modals that does not involve quantification over degree variables fails to predict that Scope clusters with NegIs, and that it is a prerequisite for DegQ, MP and SubC. The crosslinguistic correlations we found are evidence that attempts to modify Heim's analysis will have to keep in mind.

Hindi-Urdu	+	+	+
Hungarian	+	+	+
Thai	+	+	+
Romanian	+	+	-
Spanish	+	+	-
Guaraní	+	+	-
Russian	+	+	-
Turkish	+	+	-
Chinese	+	-	-
Japanese	+	-	-
Mooré	+	-	-
Samoan	+	-	-
Yorùbá	+	-	-
Motu	-	-	-

The following are the dependencies between the parameter settings: It only makes sense to ask whether a language has abstraction over degree variables if that language has a degree ontology in the first place – i.e. only if we determine a setting [+DSP] need we inquire into the setting of the DAP. If we determine a setting [-DSP] we must have [-DAP] as well. Similarly, the phrases we call DegPs are operators over degrees. They can only occur if the language allows such operators, i.e. has the setting [+DAP]. In this way the parameters explain the dependencies between the data clusters. This is summarized in the form of a decision tree below.

(92)


4. Summary and Conclusions

4.1. Summary

A closer analysis has confirmed the first impression one has: the grammar of comparison is subject to substantial crosslinguistic variation.

The following languages are like English and German with respect to the grammar of comparison: Thai, Bulgarian and Hungarian. English-like but without the relevant subordinate clauses, hence without clausal comparatives, is Hindi-Urdu. This difference to English is orthogonal to the issue of comparison and must be seen as an independent property of the language's grammar.

Next, there are languages which are very similar to English but have a relatively superficial constraint on the appearance of degree phrases in the Spec position of an AP. In Russian, Turkish and Guaraní this position may not be filled. In Romanian and Spanish, this position may only be filled under restricted syntactic circumstances.

A group of languages somewhat farther removed from English-type languages is the one that uses a degree ontology, but has limited means of dealing with degrees at the syntax/semantics interface of the language. In Japanese, Chinese, Yorùbá, Samoan and Mooré there is no quantification over degree variables. This restriction is stated in terms of a ban on abstraction over degree variables.

Finally, Motu does not appear to have predicates with an argument slot dedicated to scalar structures – degrees. This is a profound difference in terms of the organisation of the lexicon.

4.2. Conclusions

We have grouped our empirical findings into clusters each of which provides evidence on a point of decision in the grammar. These decision points are called parameters. The DSP is a semantic parameter that concerns systematic lexical variation. It has a conceptual predecessor in Chierchia's (1998) work on the denotations of nouns. The DAP is a semantic parameter that

concerns the syntax/semantics interface, and the mechanisms of compositional interpretation that are available there. It is conceptually kin to Beck's (2005) proposals on the interpretation of complex predicates. Finally, the DegPP is a syntactic parameter, or perhaps a first approach to a family of syntactic constraints that may or may not be operative in a given language. As a potentially similar case, wh-questions come to mind, which also have to be syntactically marked in many languages (either by a head or by movement), but not in all.

It has been very important for our theoretical reasoning that empirical properties can be seen as coming in clusters, and that there are dependencies between them in that some options appear to be prerequisites for others. This is the original motivation for a parameter of grammar as the one grammatical property that decides on all instances in the cluster (compare Chomsky (1981) for use of the term 'parameter' in such a connection). In terms of future work, our analysis makes the prediction that the same clusters and dependencies show up in other languages. Our theory could be falsified by the discovery of a language that has degree questions and measure phrases, but an (otherwise unexpected) absence of scope mechanisms for degree operators, for instance. For the purpose of proposing relevant clusters and dependencies, we have replaced the traditional typological strategy of gathering data from 80+ languages by the collection of a smaller language sample – a sample large enough to allow a statistical evaluation of the correlations that our data show. Both strategies require a careful selection of the language sample. We believe that given that, our methodology is a useful tool for crosslinguistic research. It is impossible under normal circumstances to conduct a detailed syntactic and semantic analysis of 80+ languages – indeed, the 14 languages we have investigated occupied the eight coauthors for the better part of two years. But properties of the grammar will only be revealed by such a detailed study. This makes working with a smaller sample imperative. Statistical analysis can augment data collection by telling us which correlations are unlikely to be accidental, hence should be anchored in the theory of grammar.

It should also be stressed once more that our parameters were proposed after detailed syntactic and semantic study of the constructions in question in each of our languages. To give an example, the issue of whether a language has degree questions hasn't been and cannot be resolved by simply making an informant translate 'How old are you?' into the target language – this will most likely yield some well-formed question inquiring after the relevant information in any language.

Rather, the elicited structure needs to be carefully examined as to its formal ingredients and properties. It has to be excluded that it corresponds to 'What is your age?', 'What have you as an age?', 'Is the number of your summers large?' and any number of other irrelevant possibilities. Linguistic analysis and claims about parameter settings are inseparable.

The plausibility of the particular points of variation that we have proposed ought to be investigated further. Can we find reasons for the proposed parameters, can they be related to other properties of the grammar, can they be deduced from something?

Kennedy (to appear) looks for a reason for (most of the effects of) the DAP in the lexicon, specifically the entry of the comparative morpheme. Krasikova (2007) also looks for a lexical explanation for why the DAP should exist as a restriction, but in her case it's systematic lexical variation concerning adjective meanings. Those are not the only possibilities of deriving the DAP. It is conceivable that variable binding is more restricted in some languages than in others, in which case one should look for constraints on anaphoricity, relative clause formation and on QR in Japanese and other [-DAP] languages. Alternatively, Gergel (2008) suggests that the binding of degree variables in particular is subject to a visibility constraint in Romanian – supporting the view that there is something special about degree variable binding. These questions open up the possibility of much future research into correlations of the parameters proposed here for comparison constructions with other properties of the grammar.

It seems to us that comparatives may be something that a language develops over time. Perhaps they all start with a [-/-/-] setting and may then incorporate scales into the grammar, moving to [+/-/-]. This is a change that Samoan, perhaps, has just undergone (see Villalta (2008b)). Next, we want to quantify over members of those scales, yielding [+/+/-]. This stage is exemplified by Guaraní. Now the grammar needs to decide on the particular formal means that indicate quantification over degrees. Languages differ in their morphosyntactic options for doing so. This speculation leads to an expectation regarding directionality of language change: change might generally move 'upwards' in the tables above.[17]More concretely, according to our analysis it

[17] It also may provide an insight into the behaviour of Turkish: perhaps the slightly fuzzy results we got regarding degree questions and measure phrases are indicative of a change in the setting of the DegPP towards a positive value that Turkish is in the process of undergoing.

should not be possible for a language like Motu to develop degree questions, but not change in any other respect.

Applying a parallel reasoning to language acquisition, we might expect that a child should not acquire degree questions (i.e. something that requires [+DAP] and [+DegPP]) before degree morphology (i.e. evidence for [+DSP]), for example. Similarly, difference comparatives or comparison to a degree should come no later than measure phrases. This, however, is all just speculation at present.

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Appendix 1: Questionnaire

The following list of examples is an English version of that part of our questionnaire that is discussed in the paper. It provided the starting point for the crosslinguistic investigation by being translated into the target language. The actual set of data collected is larger; compare http://www.sfb441.uni-tuebingen.de/b17/daten/index.html. The data were tested for well-formedness and interpretation in the way described in section 2.

(1) a. Adé is taller than Isaac. [predicative phrasal[18]]
b. Isaac is richer than Adé.

(2) a. Isaac ran faster than Adé. [adverbial]
b. Naila sang louder than Adé.

(3) Naila wrote more letters than Sandra. [quantity]

(4) Adé has a faster car than Isaac. [attributive]

(5) a. Today it's warmer than yesterday. [possibly clausal]

[18] We use the term "phrasal comparative" purely descriptively without any theoretical implications on the kind of analysis for the data it covers.

b. Naomi is richer than I thought.

(6) a. Adé wrote more books than Sandra wrote letters. [clausal]

b. Adé sang louder than Isaac whistled.

(7) a. Adé is as tall as Isaac.[Equative]

b. Sandra ran as fast as Naomi rode her bicycle.

(8) a. Adé is less tall than Isaac. [less; negative comparison]

b. Adé is smaller than Isaac.

(9) a. Isaac is tall. [Positive; antonym; negation]

b. Adé is small.

c. Adé is not tall.

(10) a. Out of them all, Adé is the tallest. [Superlative]

b. Sandra drove the fastest car.

(11) a. Isaac is too tall to play in the junior team. [too; enough]

b. Adé is tall enough to play in the junior team.

(12) a. Naomi is 2cm taller than Sandra. [differential]

b. It's at least 5°C warmer, than yesterday / than I thought.

(13) a. Sandra is 1 meter tall. Naomi is taller than that. [Comparison with degree]

b. Naomi is taller than 1 meter.

(14) Sandra bought a more expensive book than nobody did. [Negative Island]

(15) An African elephant can be larger than an Indian elephant. [Scope: Possibility]

(16) a. Your book has to be exactly 5 pages longer than that. [Scope: Necessity]

b. Context: You want to start to write a book. You ask me how many pages you have to write for the book to be published. I show you another book which has 25 pages and say (16a). What do you think: is your book accepted by me if it has the following number of pages?

(i) 27 pages [Yes/No]

(ii) 30 pages [Yes/No]

(iii) 34 pages [Yes/No]

(iv) 46 pages [Yes/No]

(17) a. How tall is Naomi? [Degree Question]

b. How many books has Isaac?

c. How fast can Naomi run?

(18) a. Naomi is 1.70m tall. [Measure Phrase]

b. The film is three hours long.

(19) a. This table is taller than that door is wide. [Subcomparative]

b. The knife is longer than the drawer is deep.

Appendix 2: Database

The following database contains the crosslinguistic data on comparative constructions in 15 languages. Examples in 14 languages have been elicited with the help of the questionnaires exemplified by Appendix 1. Additionally, we included the relevant Japanese data from Beck, Oda and Sugisaki (2004) to support the empirical claims in the body of the paper. The database consists of 15 tables each of which contains example sentences from one language. The tables are sorted alphabetically. Examples appear partly in the original script and are provided with the gloss, the translation, the grammaticality/felicity judgement and the context/reading where necessary. Each language table contains up to 19 examples pertaining to the different phenomena discussed above and presented in the following order: (i) descriptive part exemplifying the basic types of degree constructions in the given language (predicative phrasal, adverbial and attributive comparative, comparative of quantity, clausal comparative, equative, *less*-comparative, positive, superlative, too/enough constructions; (ii) data pertaining to the DSP (differential comparative, comparison with a degree); (iii) data pertaining to the DAP ('negative island effect' test, tests for scope interactions of the comparative with the modals); (iv) data pertaining to the DegPP (degree question, measure phrase construction, subcomparative).

The judgement field contains felicity judgements for the scope interaction examples (supplied with the relevant contexts or readings) and grammaticality judgements for the rest. The following

ranking has been used in both cases: ok(grammatical/felicitous); ?(slightly marked/slightly odd); ??(marked/odd); *(ungrammatical/infelicitous). The judgements have been elicited using the following scale of answers: “Yes, I can say this sentence (in the given context)”; “Maybe I can say this sentence (in the given context)”; “I would rather not say this sentence (in the given context)”; “I cannot say this sentence (in the given context)”.

“n/c” and “n/a” in the judgement field indicate that the example cannot be constructed or the test is not applicable. In the latter case, the comment field in the footer row contains a short explanation.

“n/c” and “*” rows usually contain alternative examples (Alt) along with the literal ones (Lit). The former reflect alternative ways to express the relevant meaning, e.g. in the form of paraphrases or by resorting to ‘rescue’ strategies.