Comparative Deletion and Comparative Subdeletion

Winfried Lechner
University of Athens, Greece

Norbert Corver
Utrecht University, the Netherlands

The Wiley Blackwell Companion to Syntax, Second Edition.
Edited by Martin Everaert and Henk C. van Riemsdijk.

DOI: 10.1002/9781118358733.wbsyncom079

1 Introduction

According to a commonly held view (Cresswell 1976; Von Stechow 1984), the *gradable adjective* in (1), *long*, denotes a binary relation imposing the requirement that the subject possesses the adjectival property at least to the *degree* expressed by the *measure phrase* (*2 m*).

(1) The table is 2 m long.

In the *comparative* construction (2), the degree to which the gradable adjective property holds of the subject is ordered with respect to a second, linguistically specified degree term (*2 m*), also known as the *standard* of comparison. In example (2), *than* serves as the *standard marker*.[1]

(2) The table is longer than 2 m.

The pair in (3) reveals that the standard does not need to be overt but can also be implicitly provided by the *comparative complement* (henceforth also *than*-XP), which represents a type of *degree clause*. The adjectival comparative (3a), for one, characterizes situations in which the table and the room are assigned values by the degree predicate *long* such that the degree to which the table is long exceeds the degree to which the room is long. Similarly, the nominal comparative (3b), where the gradable property surfaces as an attribute AP, establishes an order between the longitudinal extension of two tables.

(3) a. The table is *longer* [$_{\textit{than}\text{-XP}}$ than the room is].
b. This is a *longer* table [$_{\textit{than}\text{-XP}}$ than that one is].

An informal paraphrase for sentence (3a) is given in (4). Note that (4) contains two meta-language degree variables, which occupy the same position relative to the gradable adjective as the overt measure phrase (*2 m*) in (1).

(4) The degree d_1, such that the table is *d_1-long*, exceeds the degree d_2, such that the room is *d_2-long*.

In (3), the gradable property inside the *than*-XP remains unpronounced. *Subcomparatives*, exemplified by (5), minimally differ from regular exponents of comparatives in that both the matrix clause and the comparative complement embed phonologically overt, usually distinct, degree predicates (5):

(5) a. This table is *higher* than that one is *wide*.
b. No, this table is *higher* than that one is *high*. (With contrastive stress on *high*)
(from Chomsky 1977)

One of the earliest observations about structures like (3) was that the silent gradable property inside the comparative complement is not only essential to the

interpretation but also part of the underlying syntactic representation. This can be seen from the fact that the sentence fragments inside the *than*-XPs of (3) cannot be used in isolation (Lees 1961; Hale 1970; Bresnan 1972; 1973):

(6) a. *The room is.
b. *That one is.

Following Bresnan (1975), it has become common practice to take these contrasts to indicate that the strings in (3) are derived from the richer base-generated structures in (7) by the operation of comparative deletion (CD), which renders the gradable property inside the *than*-XP unpronounced (Bresnan 1975; ____ marks the gap).

(7) a. The table is *longer* than the room is *d*-____$_{CD}$. (____$_{CD}$ = long)
b. This is a *longer table* than that one is *d*-____$_{CD}$. (____$_{CD}$ = long table)

More accurately, as seen in (7), the comparative complement contains two gaps: the node reflexively embedding the degree predicate (*long* and *long table*, respectively) and the degree variable that serves as the second argument of the comparison relation (see the informal paraphrase (4)). Current theorizing makes CD responsible for the former type of deletion only, while the degree variable is commonly thought to occupy the foot position of a movement chain (Chomsky 1977, sect. 2). This distinction has, among others, important consequences for the analysis of subcomparatives.

At least at first sight, the surface appearance of subcomparatives such as (5) seems not to have been shaped by CD. However, *amount comparatives* and *amount subcomparatives*, illustrated in (8) and (9), respectively, reveal that this impression is misleading. On the standard analysis (Bresnan 1973), the degree variables in this class of constructions are supplied by hidden occurrences of the degree predicates *much/many*. Since *much/many* obligatorily remains unexpressed also in subcomparatives (9), it can be concluded that there must also be an operation that affects prenominal APs to the exclusion of their NP hosts. This operation has come to be known as comparative subdeletion (CSD) (Bresnan 1973).

(8) a. They have more tables than we have *d*-____$_{CD}$. (____$_{CD}$ = many tables)
b. They have more oil than we have *d*-____$_{CD}$. (____$_{CD}$ = much oil)

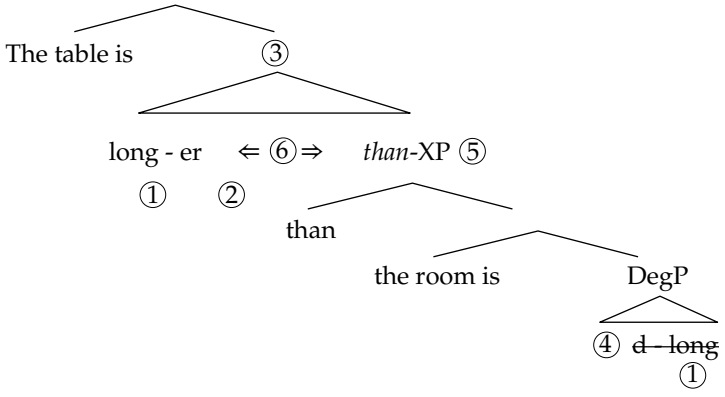
(9) a. They have more tables than we have [*d*-____$_{CSD}$ chairs]. (____$_{CSD}$ = many)
b. They have more oil than we have [*d*-____$_{CSD}$ water]. (____$_{CSD}$ = much)

The central goal of the present chapter is to address the nature of CD and CSD by discussing basic properties of the construction and tracing the emergence of a set of widely shared assumptions about their analysis. More precisely, there are two specific questions that have been prominent in the study of CD and CSD. The first one probes the relation between CD and CSD, searching for criteria that aid in deciding whether comparatives and subdeletion constructions can be subsumed under a unified analysis or have to be treated as fundamentally distinct phenomena.

A second question concerns the type of operations responsible for manipulating the comparative complement and asks whether CD and CSD are best conceived of as manifestations of ellipsis, some type of movement process, or an interpretive rule similar to the one governing empty pronominals (null anaphora). Related to that, the theory has to make explicit at which level of representation the gap is identified, specifying whether CD and CSD are syntactic processes or rules that operate in the semantic component.

Since most aspects of the analyses of CD and CSD are closely tied to more general assumptions about the structure and interpretation of comparatives, a survey of CD and CSD is not complete without taking into consideration other, at first sight unrelated properties of the construction. Explicating how these properties relate to CD and CSD is a second major objective of this chapter. Probably all analyses agree that the syntax of comparatives at some point in the derivation resembles the tree diagram in (10), which is underspecified, yet includes designated locations for all of the main ingredients of the construction. Based on this schematic diagram, it becomes possible to identify at least six areas, marked by numbered bullets in (10), in which different theories of comparatives have opted for different analytical choices that, at least indirectly, affect the treatment of CD and CSD. Each numbered bullet is associated with a (set of) fairly precise questions, collected under (11), that will also serve as a loose guide for the discussion to follow.

(10) The table is longer than the room is [*d-~~long~~*].



(11) ① What is the meaning of gradable adjectives?
② What is the semantic contribution of *-er*?
③ What is the constituency of the string AP^*-er*^*than*-XP?
④ What kind of operation is CD/CSD?
- Ellipsis, movement of a type, or silent anaphor?
- Are CD and CSD reducible to a common source?

⑤ What is the internal structure of the comparative complement (*than*-XP)?
⑥ How does the matrix clause combine with the comparative complement?
- By cyclic insertion or Late Merge
- Does the combination result in coordination or subordination?
- What is the syntactic function and semantic contribution of *than*?

Before proceeding, some terminological and taxonomic clarifications are in order. Comparatives belong to the larger family of gradable constructions, which also include equatives (*as long as*), superlatives (*longest*), excessives (*too long to*), *enough* constructions (*long enough to*), and others. Even though the discussion will be restricted to comparatives, many aspects of the analyses to be presented naturally carry over to other members of this family. Second, comparatives and gradable constructions more generally can be found across different morphosyntactic categories (V, A, N, and possibly P) and in all grammatical functions. Thus, along with the predicate and attributive uses illustrated here, adverbs as well as verbal predicates can be graded:

(12) *More surprisingly*, John *ate more* than Mary.

Many languages distinguish between analytic forms of the comparative (*long-er*) and synthetic ones (*more interesting*). While there are systematic differences (only the latter admit metacomparatives, for one), they will for present purposes be treated alike (see Corver 1997b; Embick 2007; Bobaljik 2012):

(13) The table is *longer* than the door is wide.

(14) The book is *more interesting* than the movie is.

Finally, reasons of space make it impossible to include into the discussion many aspects of the syntax of comparative constructions. Notably, we will – apart from some remarks in section 4 – not address the way in which optional ellipsis operations shape the surface appearance of the *than*-XP. To illustrate, while (15a) only involves CSD, (15b)–(15e) have been hypothesized to be the product of pseudogapping (15b), gapping (15c), VP-deletion (15d), and comparative ellipsis (15e), respectively.

(15) a. John bought more apples than Bill bought pears.
b. John bought more apples than Bill did pears.
c. John bought more apples than Bill pears.
d. John bought more apples than Bill did.
e. John bought more apples than Bill.

Structures such as (15e), in which *than* precedes a single NP, are also known as *phrasal comparatives*. In particular, the question of whether phrasal comparatives are to be analyzed as reduced, elliptical clauses or as base-generated constructions that do not involve ellipsis has attracted a fair amount of attention in the literature. (For recent discussion, see Lechner 2004; Pancheva 2006; 2010; Merchant 2009; Bhatt and Takahashi 2011.)

The chapter is organized as follows. Section 2 introduces basic concepts about comparatives, starting with a brief background in scalar semantics, the interpretation of the comparatives morpheme (*more/-er*), and the transparent mapping operations from Logical Form (LF) to semantics. The focus of the discussion will rest on the organization of the comparative complement and the structural relation

among the degree morpheme, the gradable AP, and the *than*-XP. The latter is of particular interest, because assumptions about constituency not only inform the semantics of comparatives and the analysis of CD, but also have consequences for a topic to be taken up in section 4 – the relation between the degree complement and the matrix clause. The discussion also summarizes arguments from the literature for the existence of gaps in subcomparatives. Section 3 provides an overview of different analytic strategies toward CD and CSD. Next, section 4 turns the attention to the nature of the relationship between the comparative complement and the matrix clause, addressing the question of whether the nexus is best characterized in terms of syntactic subordination or coordination. In the final section, we add some remarks about multiple comparatives and review two influential current trends in research on comparatives that expand to cross-linguistic variation.

2 The syntax and semantics of comparatives

2.1 Degree semantics, comparative semantics, and the structure of DegP

The semantics of comparatives builds on more fundamental notions of measurement theory and gradable adjective semantics, relevant aspects of which will be introduced here. Surveys of recent advances in degree semantics can be found in Beck (2011) and Morzycki (2015).

We adopt the standard hypothesis that the ontology of possible denotations is enriched by a sorted domain of numerical degrees D_d. Degrees are points or intervals that are ordered on a *scale* (usually a weak ordering) and serve as the values of gradable adjective meanings. Since adjectives may differ in what kinds of properties they measure (length, age, weight, etc.), scales come in different flavors. This is modeled by assuming that each scale includes a *dimension* parameter that is part of the lexical specification of the adjective, and that scales with different dimensions form mutually exclusive sets of degrees. Thus, the values for *long* and *old* are projected onto two distinct scales, rendering comparison between the two degrees impossible (*incommensurability*; Kennedy 2002):

(16) *The table is as long as the door is old.

A particularly elegant way of integrating the dimensional parameter into the compositional semantics is provided by the use of *measure functions* in the definition of the lexical entries for gradable adjectives. A measure function is a partial map from the domain of individuals D_e to D_d (type <e,d>) that assigns a unique value to each object it is defined for. For instance, LENGTH maps any individual with spatial extension to its maximal degree of length, while WEIGHT returns for each object its maximal mass value:

(17) a. LENGTH = λx_e.x's length
b. WEIGHT = λx_e.x's weight

A natural language predicate like *long* can then be construed as a relation between degrees and individuals (type <d,<e,t>>) that incorporates a measure function in its lexical definition. On this, currently prevalent, conception, *long* applies to a degree d first, and returns all individuals that are ordered at least as high as d on the scale of length. (Note that on this Representational Theory of Measurement, it is not the objects that are ordered, but their degree values; for discussion, see e.g. Lassiter 2011.)

(18) a. **[long]** = $\lambda d \lambda x.\text{LENGTH}(x) \geq d$
b. **[wide]** = $\lambda d \lambda x.\text{LENGTH}(x) \geq d$
c. **[tall]** = $\lambda d \lambda x.\text{HEIGHT}(x) \geq d$
d. **[old]** = $\lambda d \lambda x.\text{AGE}(x) \geq d$

From this, it follows that well-formed instances of subcomparatives (*The table is longer than the room is wide*) are legitimized whenever the adjective meaning refers to the same measure function.

The lexical entries for gradable adjectives are mapped onto their positive, comparative, and superlative forms by a family of DEGREE HEADS, which are located in the head position of a functional DegP. These degree heads syntactically select their degree complement, as witnessed by the fact that different degree heads combine with different degree clauses (*as tall as*, *taller than*, *too tall to*, etc.). It is therefore plausible to parse the *than*-XP in the complement position of DegP, and the gradable AP in SpecDegP (for alternative parses, see section 2.2):

(19) $[_{\text{TP}}$ John is $[_{\text{DegP}}$ $[_{\text{AP}}$ tall$]$ $[_{\text{Deg}'}$ -er $[_{\textit{than}\text{-XP}}$ than 6 ft$]]]]$

A widely used lexical entry for the comparative head *more/-er*, given in (20), takes a degree expression d, a gradable adjective denotation A, and the subject x as its arguments (type <d,<<d,<e,t>>,<e,t>>>) and states that x's maximal degree of A-ness exceeds the standard value d (Von Stechow 1984; Rullmann 1995). The maximality operator **max** is defined in (21). **Max**, if applied to a predicate of degrees, exhaustivizes the degrees the predicate is true of, returning a singular, maximal degree (Rullmann 1995). Assume, moreover, that measure phrases denote degree descriptions of type d and that the complementizer *than* is semantically vacuous (Von Stechow 1984; see section 4.1 for an alternative view).

(20) **[more/-er]** = $\lambda d \lambda A_{<d,<e,t>>} \lambda x.\max(\lambda d'.A(d')(x)) > d$

(21) [max] $=_{\text{Def}}$ $\lambda D_{\text{ıd}}[D(d) \wedge \forall d'[D(d') \rightarrow d' \leq d]]$

(22) **[6 ft]** = 6 ft

The sample computation in (23) demonstrates that the above ingredients correctly capture the truth conditions of (19). The degree head (20) combines with the standard of comparison (*6 ft*) first, and takes the gradable adjective as its second argument. As desired, sentence (19) comes out as true just in case John's maximal degree of height exceeds 6 feet.

(23) [(19)] = [**-er**]([**than 6ft**])([**tall**])([**John**]) =
= $\lambda d\lambda A_{<d,<e,t>>}\lambda x.\max(\lambda d'.A(d')(x) > d)$ (6ft)($\lambda d\lambda x.\text{HEIGHT}(x) \geq d$)(j) =
= $\lambda x[\max(\lambda d'.\lambda d\lambda x[\text{HEIGHT}(x) \geq d](d')(x)) > 6$ feet] (j) =
= $\lambda x[\max(\lambda d'.\text{HEIGHT}(x) \geq d') > 6$ feet] (j) =
= $\max(\lambda d'.\text{HEIGHT}(j) \geq d') > 6$ feet =
= $\iota d[\text{HEIGHT}(j) \geq d \wedge \forall d'[\text{HEIGHT}(j) \geq d' \rightarrow d' \leq d]] > 6$ feet
'The maximal degree of John's height exceeds 6 feet.'

In order to avoid clutter, we will from now on use the simpler and equivalent standard meta-language format (24) for gradable adjective denotations of type <d,<e,t>>. (24) maps individuals to their maximal degree of tallness.

(24) [**tall**] = $\lambda d\lambda x.x$ is d-tall

So far, the semantic rules admit comparative complements of the simplest possible type only, those in which the constituent following *than* denotes a degree description. However, as can be easily seen, this leaves most comparatives we encountered in section 1, repeated in (25), impervious to analysis:

(25) a. The table is longer than the door.
b. The table is longer than the door is wide.
c. John wrote a longer letter than Sam has written.
d. John owns more books than Sam owns.

The solution resides with the independently motivated assumption that the comparative complements in (25) all include a movement chain created by *empty operator* (OP) *movement*. This chain creates suitable semantic objects that can then be integrated into the comparative semantics. We will make explicit the consequences of this assumption for the syntax–semantics mapping first, delaying the discussion of the syntactic evidence for empty operator movement to a separate subsection. Moreover, for reasons of exposition, it is instructive to consider the subcomparative in (25b) first because these structures hide fewer of the semantically relevant components and are therefore more informative about the mapping from syntax to interpretation.

2.2 The composition of the *than*-XP

Chomsky (1977) demonstrates that there is good reason to believe that the syntactic representation of the comparative complement of (26b) includes an empty operator chain. Comparatives resemble in this respect headed (27) and free relative clauses (28). In all three constructions, an empty operator binds a trace of suitable type in its base position.[2]

(26) a. The table is longer than the door is wide.
b. The table is longer [$_{\textit{than}\text{-XP}}$ than OP_1 the door is d_1-wide].

(27) a. the table that you bought
b. the table [$_{CP}$ OP_1 that you bought t_1]

(28) a. whatever you bought
b. whatever [$_{CP}$ OP_1 you bought t_1]

Direct evidence for the claim that the constructions implicate movement comes from the observation that the gap cannot be filled:

(29) a. *The table is longer than the door is *that/3 feet* wide.
b. *the table that you bought *it/that table*
c. *I liked whatever you bought *it/that*.

Semantically, empty operator movement in relative clauses results in set formation (Quine 1960) or, equivalently, a predicate derived by λ-abstraction over the individual variable that is bound by the empty operator. Adopting the same mechanism for comparatives, it is usually assumed that the comparative complement denotes a degree predicate (Von Stechow 1984):[3]

(30) **[OP_1 the door is d_1-wide]** = λd.the door is d-wide

That degree predicates indeed include a variable that is accessible to binding by syntactic operations can be inferred from degree questions, in which a fronted *wh*-phrase abstracts over this degree variable (Beck 1996; 2011):

(31) a. How high is the desk?
b. [how-Q [λ_1 the desk is d_1-high]]

Abstraction or set formation by syntactic movement is not only attested in empty operator movement constructions, but has, among others, become the standard strategy for rendering object quantifiers interpretable (Heim and Kratzer 1998). To illustrate, the generalized quantifier (GQ; type <<e,t>,t,>) in (32) cannot combine with transitive predicates (type <<e,<e,t,>). Quantifier raising (QR), therefore, evacuates the object from its base position and attaches it as a prefix to a propositional node, from where it binds an individual variable.

(32) a. *Surface syntax*
John [$_{VP}$ read $_{<e,<e,t>>}$ [every book]$_{<<e,t>,t>}$].
b. *Quantifier raising*
[[every book]$_{<<e,t>,t>}$ [λ_1 John [$_{VP}$ read t_1]]]
c. *Semantic composition*
$\lambda Q_{<e,t>} \forall x[book(x) \rightarrow Q(x)]$ (λx.John read x)

There is now an interesting homology that can be exploited in the treatment of the phenomena (26)–(28). Beginning with (28), free relatives internally host a derived predicate, while externally they function either as definite descriptions or as universally quantified expressions, depending on context and analysis. The former interpretation can be produced by a domain-generalized version of the maximalization operator (21) (*nominalization*, adopting Russell's 1905 terminology), which returns the maximal individual that has the property expressed by the relative predicate

(type e; Rullmann 1995). Alternatively, if one wishes to give certain free relatives a true universal, generalized quantifier meaning (type <<e,t>,t>; but see Jacobson 1995), they need to QR to avoid a type conflict, just like the quantificational object in (32).

Both of these options have also been explored in the study of comparatives, assigning the degree clause either an analysis as a nominalized degree predicate (Von Stechow 1984) or a GQ of degrees (Heim 2000). On the former account, the *than*-XP, which denotes a derived degree predicate (see (30)), is maximized, yielding the nominalized degree (33a). This degree term serves then as the first argument of the degree head *-er*, defined as in (34) (Von Stechow 1984), which subsequently combines with the gradable adjective and the subject:

(33) a. $[_{TP}$ The table is $[_{DegP}$ $[_{AP}$ long] $[_{Deg'}$ -er $[_{\textit{than}\text{-XP}}$ than OP_1 the door is d_1-wide]]]]
b. [max (**than**) **the door is wide**]
= ιd[the door is d-wide ∧ ∀d′[the door is d′-wide → d′ ≤ d]]
c. [**more/-er**]([**max than the door is wide**])([**long**])([**the table**])

(34) [**more/-er**] = $\lambda D_{<d,t>}\lambda A_{<d,<e,t>>}\lambda x.\exists d[A(d)(x) \wedge d > \max(D)]$

In (33), the *than*-XP is interpreted in situ. But the maximality analysis also affords the degree clause the freedom to undergo covert raising. As degree descriptions semantically behave like names, degree clause exportation is not reflected truth conditionally, though, at least not in the scope relations between the degree head and other operators. The analysis differs in this respect from quantificational theories, to be discussed in turn.[4]

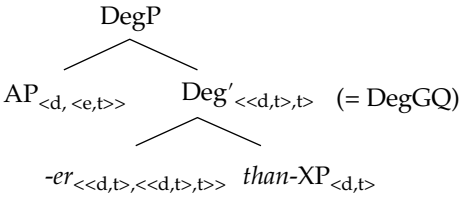
The analogy with free relatives drawn above also suggests an alternative analysis, on which comparatives embed GQs of degrees that need to undergo QR in order to resolve a type mismatch (Hackl 2000; Heim 2000; Bhatt and Pancheva 2004). This approach, commonly used in current research, translates the degree head *-er* as the degree counterpart of quantificational determiners in the individual domain (*every*, *no*, etc.; type <<e,t>,<<e,t>,t>>). In both kinds of constructions, the quantificational head combines with a property of degrees and individuals, respectively, and generates a second-order property. (35) spells out four members of this family of quantificational degree determiners (type <<d,t>, <<d,t>,t>>), all of which deliver identical truth conditions (see Pancheva 2012):

(35) a. [**more/-er**] = $\lambda D_{<d,t>}\lambda D'_{<d,t>}.D \subset D'$
(Bhatt and Pancheva 2004)
b. [**more/-er**] = $\lambda D_{<d,t>}\lambda D'_{<d,t>}.\exists d[D(d) \wedge \neg D'(d)]$
(Seuren 1973; Klein 1980)
c. [**more/-er**] = $\lambda D_{<d,t>}\lambda D'_{<d,t>}.\exists d[D'(d) \wedge d > \max(D)]$
(Von Stechow 1984)
d. [**more/-er**] = $\lambda D_{<d,t>}\lambda D'_{<d,t>}.\max(D') > \max(D)$
(Heim 1985)

What all quantificational theories of comparatives have in common is that they require changes in the surface constituency because the GQ formed by *-er* and the *than*-XP (type <<d,t>,t>) cannot be interpreted in situ. This holds irrespective

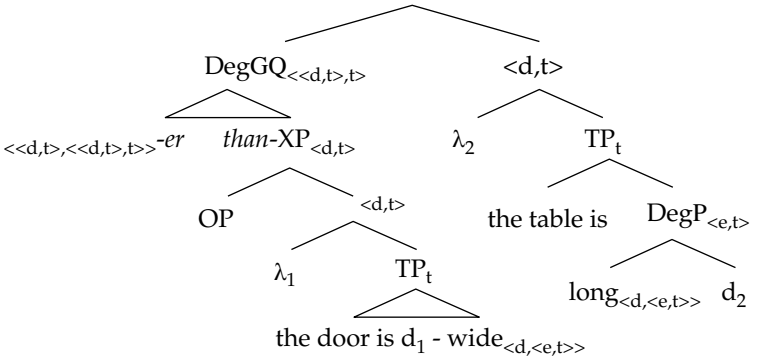
of the phrase structure assigned to AP, *-er*, and the degree complement. Consider the analysis adopted here first, according to which AP is located in SpecDegP, and *-er* forms a constituent with the *than*-XP. For ease of reference, the latter unit will from now on also be designated DegGQ.

(36)



The gradable adjective is of type <d,<e,t>> and its sister of type <<d,t>,t>. Hence, the two nodes do not match type-wise. As a result, DegGQ needs to undergo (covert) movement to a propositional node, as schematized in (37) (for an early precursor, see Dresher 1977, 375 ff.):

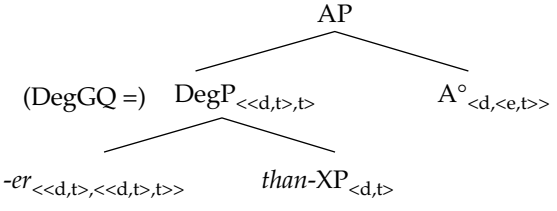
(37)



Given that, in analogy to GQs in the individual domain, degree GQs strand degree variables, the binder index of DegGQ (λ_2) abstracts over this variable, producing a degree predicate (<d,t>) that the DegGQ can then apply to. The derivation looks for all means and purposes like the one standardly employed to render object quantifiers interpretable in LF-transparent theories of quantifier scope.[5,6]

The same type of repair strategy can be used if the degree head is taken to select its argument in the reverse order, such that the *than*-XP and the AP are projected on the right, or if one opts for the alternative parse for DegP in (38). On this 'classical' analysis of the DegP (Chomsky 1965; Selkirk 1970; Bresnan 1973; Heim 2000), DegGQ/DegP is situated in the specifier of AP. Again, DegGQ needs to QR in order to resolve a type conflict:

(38)



A third option for combining the basic ingredients of comparison that is consistent with a GQ analysis is one where the gradable adjective is closer to the degree head than the degree complement, as in (39) (Corver 1990; Kennedy 1999[7]). Then, the order of the arguments in the lexical rule of *-er* must be reversed, resulting in (40):[8]

(39) $[_{\text{DegP}}\ [_{\text{Deg}'}\ [_{\text{Deg}'}\ \textit{-er}_{<<d,t>,<<d,t>>}\ \text{AP}_{<d,<e,t>>}]\ \textit{than}\text{-XP}]]$

(40) $[\textbf{more/-er}] \quad = \quad \lambda D_{<d,t>}\lambda D'_{<d,t>}.D \supset D'$

Again, considerations of type compatibility require re-arrangement of the surface constituency. In this particular case, both the degree head and the *than*-XP have to scope; details of the derivation can be found in the discussion of (45) below.[9]

Thus, the quantificational analysis can be implemented on the basis of all three possible phrase structures for the DegP that have been suggested in the literature, summarized in (41):[10,11]

(41) a. $[_{\text{DegP}}$ AP $[_{\text{Deg}'}$ *-er than*-XP]]
(Izvorski 1995; Lechner 1999; 2004; and others)

b. $[_{\text{AP}}\ [_{\text{DegP}}$ *-er than*-XP] A°]
(Bresnan 1972; and others)

c. $[_{\text{DegP}}\ [_{\text{Deg}'}\ [_{\text{Deg}'}$ *-er* AP] *than*-XP]]
(Corver 1990; Kennedy 1999; Alrenga, Kennedy, and Merchant 2012; and others)

There are a number of strategies to adjudicate among these analytical options, among them constituency, selection, compatibility with different models of morphosyntax, and scope. Given the wealth of choices provided by different sets of syntactic and semantic assumptions, none of these criteria is strong enough, though, to single out any of the candidates in (41) as the optimal factorization. For instance, at least at first sight, (41a) and (41b) seem to be better suited to capture the insight that different types of degree heads combine with different types of degree clauses (e.g. *wider than* vs. *as wide as*; Bresnan 1973). But, as pointed out by Alrenga, Kennedy, and Merchant (2012), adherents of (41c) can express apparently local selectional restrictions on the degree clause also by means of non-local feature valuation. On this view, the comparative degree head *-er* in (41c) would bear an unvalued morphosyntactic feature that is valued by a matching feature on the c-commanding *than*-XP. Thus, selectional requirements by themselves do not favor (41a)–(41b) over (41c).

In a similar vein, all three options in (41) are compatible with different, yet consistent sets of assumptions as to how comparative morphology ends up on the head of AP. If (41a) is adopted, the degree head can be assumed to check an uninterpretable feature in its AP specifier, triggering comparative exponence on the adjectival head (Lechner 2004). More complex mechanisms, possibly involving additional functional structure on top of DegP, are at work in periphrastic comparatives (e.g. *more beautiful* and *more books*). On the parse in (41b), the agreement relation is simply reversed: the unvalued feature is located on the adjectival head and

checked by a matching feature on the c-commanding DegP. Finally, a local construal of the degree head and the AP, as in (41c), is equally amenable to a straightforward morphosyntactic analysis, in terms of either checking, feature transfer, or Local Dislocation (Embick 2007; and others). The latter operation, which applies under adjacency and is sensitive to metric properties of the lexical head (*smarter* vs. *more beautiful*), is also compatible with the structure in (41a).

Hence, it can be noted that a decision among the competing analyses in (41) cannot be based on generalizations pertaining to the surface shape of simple constructions. Turning to interpretive properties next, the scope criterion is not discriminating between (41a)–(41b) versus (41c) either, at least if comparatives are treated as degree quantifiers.[12] This is so because one central feature of the quantificational account consists in the requirement that the comparative relation encoded by *-er* and the *than*-XP is not interpreted in its surface position. We will briefly turn to evidence for the assumption that *-er* and the *than*-XP scope. The relevant observations come from two sources: scope interaction between *-er* and intentional operators, and correlations between Principle C effects and ellipsis scope.

Heim (2000) notes that (42) is ambiguous. It can express either a maximal length requirement ((42a)) or the condition that the paper be no shorter than 15 pages ((42b)). These two readings are the product of two different scope options between the comparative head *-er* and the modal *required*, as indicated in (43). (*Acc* denotes the accessibility relation for worlds/situations.)[13]

(42) (This draft is 10 pages.) The paper is required to be exactly 5 pages longer than that.
   a. $\lambda w.\forall w' \in \text{ACC}(w)(w') \rightarrow \max(\lambda d.\text{the paper is d-long in } w') = 15 \text{ pages}$
   'In each acceptable world, the paper is no longer than 15 pages.'
   b. $\lambda w.\max(\lambda d.\forall w' \in \text{ACC}(w)(w') \rightarrow \text{the paper is d-long in } w') = 15 \text{ pages}$
   'The paper is exactly 15 pages long in those worlds where it is shortest.'

(43) a. *required* [[exactly 5 pages *-er* than that] [the paper be d-long]]
   b. [exactly 5 pages *-er* than that] [*required* [the paper be d-long]]

In order to generate the non-surface scope option (43b), the degree clause must be allowed to move out of its base position. This finding is consistent with the view that, as posited by the quantificational analysis, the unit [*-er than*-XP] indeed partakes in covert scope-shifting operations. Note on the side that on the nominalization analysis (34), which treats the comparative complement as a degree description, the *than*-XP may also undergo QR. However, unlike in the quantificational approach, this movement is semantically vacuous, since degree descriptions (type d) do not create new scope options.

Additional support for the assumption that the degree head *-er* moves comes the interaction between the scope position of *-er* and binding theory. Implementing a generalization originally due to Williams (1974),[14] Bhatt and Pancheva (2004) show that names inside the *than*-XPs are evaluated for Principle C in the scope position of the comparative head.[15]

To begin with, the surface string (44) represents an instance of antecedent-contained deletion that has both a narrow ellipsis interpretation (*than Mary's boss works*) and a wide ellipsis reading (*than Mary's boss tells her to work*). As is common with such structures, these two ways of ellipsis resolution is correlated with two attachment sites for the elliptical sentence. If the *than*-XP is interpreted within the embedded clause (see LF ((44a)), antecedent containment is resolved locally. That the *than*-XP is in fact attached low is confirmed by the inability of the name (*Mary's*) to co-refer with the dative pronoun *her* inside the matrix clause ((44) is from Bhatt and Pancheva 2004, ex. 69).

(44) $[_{TP1}$ Her father tells her$_1$ $[_{TP2}$ to work harder than Mary$_1$'s boss does]]
  a. *Her father tells *her$_1$* $[_{TP2}$ [-er than λ_2 *Mary$_1$'s* boss works d_2-hard]$_{<<d,t>,t>}$ $[\lambda_3$ [to work d_3-hard]]$_{<d,t>}$]
  'Her father tells her$_1$ to work harder than Mary$_1$'s boss works.'
  b. [[-er than λ_2 *Mary$_1$'s* boss tells *her*$_1$ to work d_2-hard]$_{<<d,t>,t>}$ $[\lambda_3$ $[_{TP1}$ her father tells *her$_1$* to work d_3-hard]$_{<d,t>}$]]
  'Her father tells her$_1$ to work harder than Mary$_1$'s boss tells her to work.'

If, alternatively, the *than*-XP is interpreted in the higher clause, which results in wide ellipsis (see (44b)), the disjoint reference effect disappears, indicating that ellipsis resolution has a structural basis. Thus, the LF position of the *than*-XP can be triangulated by inspection of a correlation between two *a priori* autonomous properties – the size of ellipsis and possible coreference patterns.

Furthermore, Bhatt and Pancheva (2004) argue that the best explanation of this assembly of facts resides with a theory on which the degree head moves independently, freely choosing among suitable landing sites, followed by countercyclic insertion of the *than*-XP into the scope position of *-er*. The derivation of the wide-scope interpretation (44b) then looks as in (45).

(45) a. Step 1: Move *-er* to scope position (wide ellipsis interpretation)
  [*-er* $[\lambda_3$ $[_{TP1}$ her father tells her$_1$ to work d_3-hard]]]
  b. Step 2: Late Merge of *than*-XP
  [[-er than λ_2 *Mary$_1$'s* boss tells *her*$_1$ to work d_2-hard]
  $[\lambda_3$ $[_{TP1}$ her father tells *her$_1$* to work d_3-hard]]]

Late Merge of the comparative complement is essential for the analysis of Principle C obviation ((44b)) to succeed because it ensures that the *than*-XP does not strand a copy in its "base" position below the pronoun, which would correspond to the sister node of the degree variable d_3 in (45). Otherwise, covert movement of the unit [*-er than*-XP] should change coreference options no more than QR does in (46):

(46) *We showed him$_1$ every book that Bill$_1$ wanted.

By contrast, a disjoint reference effect can be avoided on the analysis in (45), since in step 2, the name (*Mary's*) is merged together with the *than*-XP outside the c-command domain of the coreferential pronoun. Note in passing that the same mechanisms used above also render interpretable the syntactic structure (39), in

which the degree head and the AP form a constituent to the exclusion of the *than*-XP: first, *-er* scopes, binding a degree trace in the sister position of the AP. Then, the *than*-XP is countercyclically introduced in the scope position of *-er*.

Alrenga, Kennedy, and Merchant (2012) demonstrate that adopting a semantics for comparatives that encodes the comparison relation in the standard marker *than* instead of the degree head *-er* makes it possible to obtain the results reported above without the need to make reference to Late Merge, affording a more direct transition from syntax to interpretation.[16] Ignoring semantic details, on this analysis scope matching between degree head and degree clause is derived as outlined in the partial, typed LF-representation (47), which presupposes the lexical entry for *than* in (48) (Alrenga, Kennedy, and Merchant 2012, (6); *sup* denotes the supremum function, which singles out the least upper bound of a set). The *than*-XP is base-generated in its surface position, from where it binds a degree variable inside the matrix clause (binder λ_3). Since the degree clause does not reside within the c-command domain of the pronoun, *her* and *Mary* are correctly predicted to be able to corefer.

(47) $[[\lambda_3$ her father tells her_1 to work d_3-more-hard$]_{<d,t>}$
$[_{<<d,t>,t>>}$ than$_{<<d,t>,<<d,t>,t>>}$ $[_{<d,t>}$ λd_2 $Mary_1$*'s* boss works d_2-more-hard$]]]$

(48) $[\textbf{than}] = \lambda D_{<d,t>} \lambda D'_{<d,t>}.\ \sup(D') > \sup(D)$
(Alrenga, Kennedy, and Merchant 2012, ex. 6b)

Crucially for the present purposes, this result of Alrenga, Kennedy, and Merchant (2012) alerts to the fact that there is more than one possible explanation for the ellipsis-scope correlation, not all of which need to resort to countercyclic Late Merge.

In closing this subsection, it should be noted that apart from the maximality and the quantificational account, there is a third influential analysis of comparative semantics, in which comparatives are treated as hidden conjunctions (Seuren 1973; Klein 1980; Schwarzschild 2008 calls this the "A-not-A analysis"; for a recent incarnation, see Alrenga and Kennedy 2014):

(49) a. The table is longer than the door is.
b. $\exists$d[the table is d-long $\wedge$ $\neg$[the door is d-long]]

We will return to potential benefits of A-not-A analyses in the discussion of subdeletion in section 4.1. The remainder of section 2 expands on two syntactic issues: empirical ramifications of the empty operator analysis (2.3), and morphosyntactic evidence for a gap in subdeletion constructions (2.4).

2.3 Evidence for empty operator movement

The classic diagnostics for *wh*-movement (Chomsky 1977) include the four criteria that dislocation operations (i) leave a gap, (ii) can cross over bridge verbs, (iii) comply with syntactic locality constraints, and (iv) relocate an (overt) element to a higher position in the tree. The first criterion has been seen to be satisfied by

empty operator movement, which creates derived degree predicates. The present subsection reports findings from the literature documenting that comparatives also pass the second to fourth movement tests.

As for now, the discussion pursues the limited goal of demonstrating that comparative formation involves movement of some kind, ignoring for the moment whether the degree clause contains one dislocation operation or two (on this issue, see section 3). This qualification is important in order to avoid potential confusion arising from the fact that early syntactic analyses conflated what is nowadays known to be two distinct relations: CD and abstraction over the degree variable, both made visible in (50) (see section 2.2):

(50) The table is longer than OP_1 the door is d_1-$\_\_\_\__{CD}$. ($\_\_\_\__{CD}$ = long)

Although, as of writing, there is a broad consensus that empty operator movement results in binding of the degree variable and that CD targets the gradable predicate only, in the initial stages of the debate (i.e. in the 1970s), neither the semantics of comparatives nor the relation between syntax and semantics had been sufficiently mapped out to make such a distinction. As a result, evidence that was taken to support a movement analysis of CD is, on current understanding, to be reinterpreted as evidence for OP-movement inside the *than*-XP. The proper analysis of CD itself – movement, ellipsis, or some other mechanism – will be at the center of section 3.

2.3.1 Locality and crossover (diagnostics (ii) and (iii))

Strong support for the claim that the *than*-XP includes a movement chain is provided by the fact that both comparative and subcomparative constructions are sensitive to island constraints. Observe first that comparatives can be construed at a distance (Ross 1967; 1986), as long as the embedding predicate is a bridge verb (diagnostic (ii); the empty operator chain will from now on be omitted unless relevant):

(51) a. John met more linguists than you met.
b. John met more linguists than we thought you said Bill believed Sue met ____.
c. *John met more linguists than I quipped that Sue had met ____.

(52) and (53) illustrate for both comparatives and subcomparatives the effects of the Complex Noun Phrase Constraint, the Coordinate Structure Constraint, the Sentential Subject Constraint, the *Wh*-Island Constraint, and the Adjunct Condition, respectively (diagnostic (iii)):

(52) a. *John bought more oranges than we had discussed [a plan [to buy____]]. (____ = d-many oranges)
b. *John bought more oranges than we had bought [apples and ____].
c. *John bought more oranges than [that he had sold ____] was generally believed.
d. *John bought more oranges than Sue wondered [whether to buy ____].
e. *John bought more oranges than Bill slept [after he had sold ____].

(53) a. *John bought more oranges than we had discussed [a plan to buy [____ apples]].
b. *John bought more oranges than we had bought [three pears and ____ apples].
c. *John bought more oranges than [that he had sold [____apples]] was generally believed.
d. *John bought more oranges than Sue wondered [whether to buy [____apples]].
e. *John bought more oranges than Bill slept [after he had sold [____apples]].
(____ = many)

Crossover effects are widely held to constitute another test signaling movement. As the contrasts in (54) and (55) reveal, both CD and subdeletion are subject to strong crossover:

(54) a. More students flunked than $\_\_\_\__1$ thought they$_1$ would (flunk).
(____= many students)
(Bresnan 1975, ex. 16)
b. *More students flunked than they$_1$ thought $\_\_\_\__1$ would (flunk).

(55) a. As many new students flunked as [____old students]$_1$ imagined they$_1$ would (flunk).
(____= many)
(Bresnan 1975, ex. 125)
b. *As many new students flunked as they$_1$ imagined [____old students]$_1$ would (flunk).

Hence, signature properties that are characteristic of movement also show up in comparatives, indicating that comparative formation is at least co-determined by the principles restricting movement.

2.3.2 Overt reflexes of empty operator movement (diagnostic (iv))

In some varieties of American English, the comparative complement can also contain an overt, fronted *wh*-phrase that directly follows *than* (diagnostic (iv); Hankamer 1971; Bresnan 1972; Huang 1977; for Greek, see Merchant 2009).

(56) a. John is taller than what Mary is.
(Chomsky 1977)
b. No one sold more Kool-Aid than what Jimmy sold.
(Huang 1977)
c. I hope you can walk quicker than what you eat.
(Huang 1977)
d. They're just as quick with their tongues as what you are.
(Jespersen 1954–1958, 3: 9.6)

Chomsky (1977) takes this to signal that the degree clause is internally organized as in (57),[17] leaving aside for the moment what exactly the *wh*-operator in SpecCP binds (see remarks on (50)).

(57) John is taller [than [$_{CP}$ what$_1$ Mary is t$_1$]].

Indirect justification for the presence of an overt, fronted *wh*-phrase has been identified in Den Besten (1978). In Dutch degree constructions, a *wh*-movement chain is in complementary distribution with the complementizer *dat*. As seen in (58a), *dat* is blocked from occurring inside a *than*-XP:[18]

(58) Dutch

a. *Jan had meer mensen uitgenodigd dan dat hij vorig
John had more people invited than that he last
jaar ____ had uitgenodigd.
year had invited
'John had invited more people than he had invited last year.'

b. Jan zal eerder Kees uitnodigen, dan dat ie Marie
John will rather Kees invite, than that he Mary
zal uitnodigen.
will invite
'It is rather the case that John will invite Kees than that he will invite Mary.'

In (58b), this restriction is suspended because the construction does not express a comparison between degrees. As a result, (58b) contains neither a gap created by CD nor an empty operator chain. The contrast between (58a) and the implicit comparative (58b) therefore illustrates, first, that *dat* can be used as a diagnostic for the application of *wh*-movement within a comparative clause and, second, that the restriction on *dat* cannot be morphological or phonological in nature.

French Stylistic Inversion provides further support for the empty operator movement hypothesis. Kayne and Pollock (1978) observe that subject verb inversion is contingent on fronting of an overt *wh*-element. Since Stylistic Inversion is also found with comparatives, it can be concluded that in (59), a fronted *wh*-phrase occupies SpecCP (see Milner 1978):

(59) French

a. Pierre a plus de livres que n'en a Paul.
Peter has more of books than NEG.of.them has Paul
'Peter owns more books than Paul does.'

b. Elle est aussi triste que l'etait Jeanne hier.
she is as sad as it.was Jeanne yesterday
'She is as sad as Jeanne was yesterday.'

Stylistic Inversion attests to another criterial property of *wh*-movement in comparatives: it applies in a local, successive cyclic fashion. As shown in (60a), inversion of the subject (*Paul*) with the verb (*était*) is also possible in embedded contexts. Given that inversion is dependent upon the presence of a derived position (a filled SpecCP), it follows that the operator must have moved successive-cyclically via an intermediate landing site in the lower SpecCP position ((60b)):

(60) French

a. Pierre est plus gentil que tu ne disais qu'était Paul.
'Pierre is more kind than you said that Paul is.'

b. Pierre est plus gentil [$_{CP}$ OP$_1$ [$_{C'}$ que tu ne disais [$_{CP}$ t$_1$ [$_{C'}$ que était *Paul* t$_1$]]]]

Note that successive cyclicity does not follow from semantic considerations but reflects syntactic properties of the movement operation.

To summarize, in certain languages, *wh*-expressions in SpecCP either surface overtly or serve as the trigger for other syntactic processes (e.g. Stylistic Inversion and *dat* drop in Dutch). This constitutes solid evidence for the assumption that movement is implicated in the formation of comparative complements.

2.4 Evidence for a gap in subcomparatives

Although it was already recognized early on that comparatives contain a gap created by CD, the existence of such a silent position did not reveal itself as readily in subcomparatives like (61). The issue remained under debate presumably because, while clearly distinct semantically, comparative complements suspiciously resemble their declarative counterparts (62) in their surface appearance:

(61) a. The desk was longer than *the table was wide*.
b. I met more linguists than *you met biologists*.

(62) a. John said that *the table was wide*.
b. John said that *you met biologists*.

This imbalance between CD and CSD instigated the search for syntactic criteria that react to the presence of a gap in subcomparatives. We will briefly review the most prominent of these diagnostics in subsection 2.4.1. A separate subsection (2.4.2) considers data corroborating the existence of a gap in subdeletion constructions from so-called *of*-comparatives.

2.4.1 Evidence from regular subcomparatives

Apart from interpretative properties, Bresnan (1975) lists a number of additional arguments for the presence of a gap in subdeletion constructions. In current notation, this gap corresponds to the degree predicate *much/many*, which introduces the degree variable to be bound by empty operator movement. Thus, the underlying representation of (61) would be as in (63):

(63) a. … than OP_1 the table was d_1-$\_\_\_\__{CSD}$ wide ($\_\_\_\__{CSD}$ = much)
b. … than OP_1 you met d_1-$\_\_\_\__{CSD}$ biologists ($\_\_\_\__{CSD}$ = many)

It was already noted in section 2.2 (see (29)) that postulating a silent version of *much/many* in subcomparatives explains why the construction does not tolerate measure phrases or degree modifiers (*too*). They are blocked for the same reason that overt manifestations of *much/many* do not co-occur with this class of expressions.

(64) a. *The desk was longer than the table was that/five feet/too wide.
b. *John met more linguists than I met many/three/most/a few biologists at the party.

A related argument is based on the behavior of measure verbs in subcomparatives:

(65) a. *This mouse weighs ounces.
b. This mouse weighs six/that many ounces.

(66) a. John weighs more pounds than this mouse weighs ounces.
b. *John weighs more pounds than this mouse weighs six/that many ounces.

The verb *weigh* selects a measure phrase as its complement. As evidenced by (65a), this measure phrase cannot consist of a bare plural only, but needs to be filled by a degree description. In subcomparatives, the relations are reversed, as is expected if the gap that CSD has created is the equivalent of a degree-type measure phrase.

A phonological diagnostic for the presence of a gap is associated with the phenomenon of tensed auxiliary contraction (King 1970; Bresnan 1971). Contraction is known to be blocked directly in front of a deletion site:

(67) *They'll water the plants on Tuesday, and I'll on Thursday.

The paradigms in (68) and (69) demonstrate that phonological reduction is also prohibited before positions arguably affected by CSD. Hence, subcomparative formation and contraction are mutually exclusive:

(68) a. I am cleverer than you are prudent.
b. *I'm cleverer than you're prudent.

(69) a. It was as much trouble then as it is fun now.
b. *It was as much trouble then as it's fun now.

The strength of this phonological argument has been disputed in Grimshaw (1987), though, who contends that the effects visible in (68) and (69) are weak and accordingly revises the acceptability status of (68b) and (69b) to "?" In particular, contraction appears to produce much better results with CSD than with CD:

(70) a. I'm cleverer than you are.
b. *I'm cleverer than you're.

(71) a. It was as much trouble then as it is now.
b. *It was as much trouble then as it's now.

Empirical evidence for the presence of a gap in subcomparatives has also been adduced from other languages. Bennis (1977) points out that in Dutch, nodes inside a compared NP can be filled by the clitic pronoun *er* ('of-them/it'; see also Bennis 1978 and Den Besten 1978):

(72) Dutch
a. Ik ken meer taalkundigen dan jij ontmoet hebt.
I know more linguists than you met have
'I know more linguists than you have met.'

b. Ik ken meer taalkundigen dan jij *er* ontmoet hebt.
I know more linguists than you CL met have
'I know more linguists than you have met.'

This clitic displays the syntactic behavior characteristic of partitive, quantitative *er*, which pronominalizes part of a quantified noun phrase in (73). As illustrated by (74), partitive *er* can substitute plural count nouns like *boterhammen* ('sandwiches') but not mass nouns like *brood* ('bread'); it cannot replace NPs that are modified by low, ethnic adjectives ((75)); and it can stand in for parts of NPs to the exclusion of relative clauses ((76)):

(73) Dutch
Ik geloof dat Jan er toen [veel/drie ____] ontmoet heeft.
I believe that John CL then many/three ____ met has
'I believe John met many/three of those.'

(74) Dutch
a. Jan at gisteren weinig boterhammen. Vandaag eet hij er veel.
John ate yesterday few sandwiches. Today eats he CL many
'John ate few sandwiches yesterday. Today he eats many.'
b. Jan at gisteren weinig brood. *Vandaag eet hij er veel.
John ate yesterday little bread. Today eats he CL much
'John ate little bread yesterday. Today he eats a lot of bread.'

(75) Dutch
Context: 'Last week, John met five Dutch linguists.'
Jan ontmoette er gisteren [drie (*Japanese) ____].
John met CL yesterday [three (Japanese) ____]
'John met three (Japanese) linguists yesterday.'

(76) Dutch
Context: Last week, John met five Dutch linguists.
Jan ontmoette er gisteren drie die uit Japan kwamen.
John met CL yesterday three who from Japan came
'John met three linguists who came from Japan.'

(77)–(79) attest to the fact that *er* behaves alike in comparatives. The quantitative clitic typically replaces low positions inside the NP ('N'-deletion), leaving higher adjuncts and determiners unaffected.

(77) Dutch
a. Jan at gisteren meer boterhammen dan hij er vandaag
John ate yesterday more sandwiches than he CL today
heeft gegeten.
has eaten
'John ate more sandwiches yesterday than he has eaten today.'

b. *Jan at gisteren meer brood dan hij er vandaag
John ate yesterday more bread than he CL today
heeft gegeten.
has eaten
'John ate more bread yesterday than he has eaten today.'

(78) Dutch
Jan heeft meer Chinese taalkundigen ontmoet dan jij
John has more Chinese linguists met than you
er (*Japanese) ontmoet hebt.
CL (*Japanese) met have
'John met more Chinese linguists than you met Japanese linguists.'

(79) Dutch
Jan kent meer taalkundigen die uit China komen dan ik
John knows more linguists that from China come than I
er ken die uit Japan komen.
CL know who from Japan come.
'John knows more linguists who come from China than I know linguists who come from Japan.'

Whatever the correct analysis of partitive *er*, the parallelism between positive contexts and comparatives suggests that all of the *er*-comparatives are actually manifestations of subdeletion in which the common noun has been lexicalized by partitive *er* while CSD has removed *many*. On this conception, one is led to expect that *er*-subcomparatives contain a silent degree predicate *many* that must not be filled. The correctness of this prediction is vindicated by the observation that *er* is incompatible with numerals:

(80) Dutch
*Ik ken meer taalkundigen dan jij er drie ontmoet hebt.
I know more linguists than you CL three met have
'I know more linguists than you met (*three).'

French provides evidence for a gap roughly along the same lines as Dutch. As noted in Milner (1978) and Pinkham (1982), in French degree clauses the common noun embedding the degree variable is replaced under identity by the quantitative clitic *en* ('of-it'). Just like in Dutch, this partitive proform is in complementary distribution with cardinal numerals in comparatives, but not in positive contexts:

(81) French
J'ai plus de livres que Paul n'en a (*trois).
I.have more of books than Paul NEG.CL has three
'I have more books than Paul has (*three).'

(82) French
Paul en a beaucoup/trois.
Paul CL has many/three
'Paul has many/three (books).'

The clitic *en* in (81) arguably lexicalizes a meaning closely related to a partitive PP, whereas the gradable property *many* has been elided by CSD. Thus, (81) parallels Dutch *er*-comparatives in that its surface form has been shaped by subdeletion. Subsection 2.4.2 reports findings pointing to the same conclusion from another construction that fits the profile of partitives: *of*-comparatives.

2.4.2 Evidence from of-comparatives

Part of Bresnan's (1975; 1976a) argumentation in support of a gap in subcomparatives is based on strings in which the subdeletion site is followed by a lexical *of*-phrase, as in (83b):

(83) a. John met more linguists than I met biologists.
b. John met more of the linguists than I met *of* the biologists.

Bresnan claims that these *of*-comparatives also instantiate cases of subcomparatives, as made explicit in (84). A first indication that this might be the right analysis is supplied by the by-now-familiar observation that the hypothesized gap is in complementary distribution with overt numerals and measure expressions:

(84) … than I met (*d*-$\_\_\_\__{CSD}$ of the biologists) ($\_\_\_\__{CSD}$ = many)

(85) *John met more of the linguists than I met three/many of the biologists.

In addition, Bresnan notes that the presence of hidden *many* in subcomparatives is detectable by the effects it has on its local syntactic environment. As illustrated by (86), while *of* is not compatible with plural indefinites ((86a)), its presence is obligatory if followed by a definite plural NP ((86b)):

(86) a. many (*of) linguists, more (*of) linguists
b. many *(of) those linguists, more *(of) those linguists

The paradigm in (87) certifies that exactly the same pattern is characteristic of subcomparatives. This homology between partitives and *of*-comparatives is accounted for if *of*-comparatives contain an underlying, elided manifestation of *many*, as implied by the subdeletion analysis.

(87) a. We met more linguists than we met (*of) biologists.
b. We met more of the linguists than we met *(of) the biologists.

Grimshaw (1987) brings to attention evidence that suggests an alternative treatment of *of*-comparatives in terms of CD instead of CSD. Adapting Taraldsen's (1978) analysis to English, Grimshaw (1987) suggests that what is missing in (83b) is a larger constituent than just *many*, and that this node has been removed by CD subsequent to extraposition of the *of*-PP. On this view, *of*-comparatives can be derived by the same mechanisms that are already available for the analysis of regular comparatives.

A uniform account along these lines receives independent confirmation from an interesting contrast between CSD and *of*-comparatives. While NPs affected by subdeletion can be located clause internally ((89a) and (90a)), *of*-comparatives are restricted to peripheral positions ((89b) and (90b)):[19]

(88) *Final* of-*PP*
  a. I met more linguists than you met biologists.
  b. I met more of the linguists than you met of the biologists.

(89) *Internal* of-*PP*
  a. More linguists were dull than biologists were interesting.
  b. *More of the linguists were dull than of the biologists were interesting.

(90) *Internal* of-*PP*
  a. I found more linguists dull than I found biologists interesting.
  b. *I found more of the linguists dull than I found of the biologists interesting.

Grimshaw (1987), moreover, points out that the distribution of *of*-phrases mimics that of *of*-PPs in amount questions, which equally penalize PPs in sentence-internal location:

(91) a. *Final* of-*PP*
  How many did you meet of the linguists?
  b. *Internal* of-*PP*
  *How many do you think of the linguists were dull?
  c. *Internal* of-*PP*
  *How many do you find of the linguists dull?

The dichotomy between (88b) and (91a), on the one side, and the ill-formed examples (89b), (90b), and (91b)–(91c), on the other side, can now be explained by the assumption that extraposition feeds CD. Concretely, suppose that the partitives under consideration are assigned the parse (92a), in which *many* is followed by an empty nominal (Barker 1998).[20] Word order reveals that the PPs in (88b) and (91a) have been shifted to the right, as schematized in (92b), providing the context for CD and *wh*-movement to apply to the residual DP (see (92c)). In that setting, the gap in *of*-comparatives includes at least the empty head noun $\emptyset_{NP}$ and the PP-trace in addition to the scalar predicate *many*, and therefore must have been produced by CD.

(92) a. *Underlying structure of partitives*
  $[_{DP}$ many $[\emptyset_{NP}$ [of the linguists]]]
  b. *Step 1: PP extraposition*
  $[_{DP}$ many $[\emptyset_{NP}\ t_1]]$ … $[_{PP}$ of the linguists$]_1$
  c. *Step 2: CD/*wh*-movement target the residual NP*
  $[_{DP}\ d$-____$_{CD}]$ … $[_{PP}$ of the linguists$]_1$ (____$_{CD}$ = $[_{DP}$ many $\emptyset_{NP}\ t_1]$)
  $[_{DP}$ how many $[\emptyset_{NP}\ t_1]]$ $[_{PP}$ of the linguists$]_1$

Next, in all of the ill-formed cases, the *of*-PPs remain in their base position, indicating that they have not been extracted from their hosts by extraposition (see Extraposition). But, then, the sentences could not have been the result of CD, because CD would illegitimately have had to apply either to a non-constituent (*many*^$\emptyset_{NP}$ in (92a)) or to a node that CD is not defined for (the AP *many*, to the exclusion of NP). In view of the above, Grimshaw (1987) concludes that *of*-comparatives do not instantiate manifestations of subdeletion, but are regular comparatives generated by CD. For further arguments in support of the extraposition analysis, see Kennedy (2002).

3 Comparative deletion and comparative subdeletion

Turning to the central questions of this article, this section traces the roots of the operation that removes the gradable property from the surface representation of the degree clause (CD and CSD) (Bresnan 1973). The debate concerning the proper analysis of CD is also of historical significance, as it informed the controversy between Bresnan (Bresnan 1975; 1976a; 1976b; 1977) and Chomsky (Chomsky 1973; 1977) about the question of whether the grammar includes 'unbounded' syntactic relations (i.e. long-distance relations that are not broken up in local parts by successive cyclic movement). Specifically, Chomsky's (1977) analysis of comparatives was part of the research program, initiated in Chomsky (1973), which aimed at eliminating construction-specific transformations in favor of general conditions on derivations and representations. At the core of this program was the hypothesis that apparently different construction types (comparatives, topicalization, clefts, *wh*-questions, relatives, etc.) can be captured by a single general movement schema (Move α; Chomsky 1981) that is limited ('bounded') by Subjacency and other locality constraints. In current terminology, this amounts to the claim that no movement operation crosses phase boundaries without stopping in intermediate landing sites located at the phase edges. By contrast, Bresnan advocated the position that CD falls into the same group of operations as VP-ellipsis and other deletion rules, which are known to operate at a distance. Subdeletion (and attributive comparatives) were central to the debate because they appear to be subject to two conflicting sets of requirements: they display sensitivity to all known island effects, with the notable exception of the Left Branch Condition. This constellation lent itself to generalization into two different directions: either CD is analyzed as a local movement rule, a claim that comes with the commitment of finding an explanation for the exceptional behavior with respect to the Left Branch Condition (Chomsky 1977, 123), or CD applies unbounded, and the standard movement diagnostics have to be taken to be not causally linked to movement after all.

We will briefly summarize the main points of divergence between these two camps, proceeding from there to a discussion of recent trends in the analysis of CD and CSD.

3.1 Bounded movement (Chomsky) versus unbounded deletion (Bresnan)

As long as syntactic locality conditions are respected, CD can apply at an arbitrary distance:

(93) John met *more linguists* [than we thought [you said [(…) [Sue met ____]]]].
(____ = many linguists)

Bresnan (1975) interprets this to signal that CD instantiates an unbounded deletion rule, similar to VP-ellipsis, which is also known to be able to select its antecedent non-locally ((94) adapted from Kennedy 2002):

(94) John *liked* everyone Bill did and Bill *invited* everyone Sue did ____.
(____ = liked/invited)

On the other hand, movement analyses of CD maintain that CD consists in a local dislocation operation that is special in that the head of the movement chain is not pronounced (Chomsky 1977; see also Vergnaud 1974; Den Besten 1978). More precisely, in Chomsky (1977), it is assumed that a node which in current notation corresponds to DegP moves to SpecCP. If movement applies at a distance, as in (93), the chain is decomposed into a series of local, bounded movement steps by successive cyclic applications of CD:

(95) … *more linguists* than [OP_1 we thought [$\_\_\_\__1$ you said [($\_\_\_\__1$ …) [$\_\_\_\__1$ Sue met $\_\_\_\__1$]]]]

In the highest SpecCP, the content of the operator is then identified by a mechanism resembling the one that matches a relative clause operator with its head ((97)):

(96) John met more linguists than [$_{CP}$ OP_1 Sue met $\_\_\_\__1$]. (OP = many linguists)

(97) John met the linguists that [$_{CP}$ OP_1 Sue met t_1]. (OP = linguists)

Translated into current terminology, the operator in SpecCP contains a silent copy of the CD-site or the trace, respectively, which is deleted under identity with the head of the construction (Sauerland 2004; see Kennedy 2002 for comparatives). As already mentioned at an earlier point (see (50)), on the classical movement analysis of CD, there is no designated position for the degree variable but only a single gap created by operator movement of DegP. While this obscures the transparent mapping from syntax to semantics, this complication can be easily avoided by postulating two separate operations, one for CD proper and the other for binding of the degree variable, as made explicit in (50) from section 2.3.

The dichotomy between the deletion and the movement account becomes visible mainly in subcomparatives. Just like CD, CSD can apply at a distance, suggesting that the rule is unbounded:

(98) John met more linguists than we thought you said you met [$\_\_\_\__{CSD}$ biologists].
($\_\_\_\__{CSD}$ = many)

However, unlike other known types of movement rules in English, CSD appears to be able to remove parts of a constituent that occupies a left branch, in apparent violation of the Left Branch Condition (Ross 1967; 1986; Corver 1990). In (98), for instance, the node that CSD operates on (*many*) resides inside a modifier left-adjoined to NP. But at least in English, extraction out of left branches leads to sharply degraded results in other contexts, irrespective of whether it is a full degree predicate ((99a)–(99b)) that is moved or just an expression binding a degree variable ((99c)):

(99) a. **How many*$_1$ did you meet [t_1 biologists]?
b. **How smart*$_1$ did you meet [t_1 biologists]?
c. **How (much)*$_1$ was the table [t_1 wide]?

Left-branch adjectival modifiers follow the same pattern, as witnessed by the fact that prenominal attributive APs can be removed by CSD, but not by regular movement:

(100) Maggie is as fine a doctor as her sister is [a $\_\_\_\__{CSD}$ lawyer]. ($\_\_\_\__{CSD}$ = fine)

(101) **So fine*$_1$ her sister is [a t_1 lawyer], that they call her Portia.

Moreover, left branch violations also afflict the analysis of regular attributive comparatives such as (102a), yet in a slightly different way. As detailed by (102b), the degree variable bound by the empty operator is located within a prenominal adjunct. Hence, (102) is – at least on orthodox assumptions about constituency – incorrectly excluded by the Left Branch Condition (Moltmann 1992). We will not pursue this issue here, but revisit the problem and a possible solution in section 3.3.

(102) a. John met more linguists than OP_1 Bill met [$_{DP}$ d_1-$\_\_\_\__{CD}$]. ($\_\_\_\__{CD}$ = many linguists)
b. OP_1 than Bill met [$_{DP}$ [$_{DegP}$ d_1-many] people].

Thus, CSD poses a puzzle for the movement hypothesis: although subdeletion can reach into a left branch, movement from the same position is impossible. Based on this observation, Bresnan concludes that CSD cannot be an exponent of a movement operation but is to be analyzed in terms of an unbounded deletion rule. More precisely, she argues that CSD and CD derive from a single unbounded deletion transformation that may vary with respect to the size of the constituent it targets, subject to the Relativized A-over-A Condition (see the Appendix to this chapter). In order to account for the island sensitivity of CSD and CD, Bresnan further assumes that locality also regiments deletion operations. It follows that the unbounded dependencies in (98) no longer need to be seen as the result of the iterative application of bounded movement operations, but can be derived by deletion at a distance. Naturally, opting for this choice also entails that island sensitivity can no longer be taken to be a symptom of movement. It is here where Bresnan's views depart most radically from Chomsky's.

In fact, there are a number of further arguments that cast doubt on the movement analysis of subdeletion. We will review three of these problems before addressing the limitations of Bresnan's own analysis of CSD. First, *that*-trace effects have much less of an effect on subcomparatives than on ordinary comparatives (Bresnan 1977; Grimshaw 1987):

(103) a. Even fewer books were published than we expected that [____ magazines] would be.
b. Even fewer books were published than we expected (*that) ____ would be.

Second, Taraldsen (1978) reports even more blatant cases of disregard to islands than those illustrated here. In Norwegian, gaps created by subdeletion can be found inside prenominal possessors ((104a)). Thus, CSD may target not only left branches but also left branches that themselves are trapped inside islands. An English equivalent of (104a) is given in (104b):[21]

(104) Dutch
a. Han er like mange studenters venn som han er [$_{NP}$ [$_{NP}$ ____ læreres] fiende].
'He is as many students' friend as he is teacher's enemy.'
b. John is as many women's lover as he is [$_{NP}$ [$_{NP}$ ____ men's] enemy].

A third apparently island-violating application of CSD, brought to attention in Corver (1993), comes from Dutch. In (105), the gap is located inside the nominal complement of the preposition *voor*. This is unexpected inasmuch as Dutch disallows preposition stranding (see (106a)) or subextraction from the complement of P (see (106b)), in which the *wh*-word *wat* is moved out of a *wat-voor* noun phrase that is the complement of P (Van Riemsdijk 1978; on prepositional CSD, see Kennedy (2002) for Czech and Merchant (2009) for Greek).

(105) Dutch
Jan heeft [$_{PP}$ voor [$_{NP}$ meer voetbalclubs]] gevoetbald dan hij [$_{PP}$ voor [$_{NP}$ – tennisclubs]] getennist heeft
John has for more soccer teams played soccer than he for tennis clubs played-tennis has

(106) Dutch
a. *Jan heeft [$_{PP}$ voor [$_{NP}$ meer clubs]] gevoetbald dan hij [$_{PP}$ voor -] getennist heeft
John has for more clubs played-soccer than he for played-tennis has
b. What$_1$ heeft Jan [$_{PP}$ met [$_{NP}$ t$_1$ voor meisje]] gedanst?
what has John with for girl danced
'What kind of girl did John dance with?'

Even though the movement analysis is, as was seen, hampered by various shortcomings, the alternative deletion account can, at least in Bresnan's original formulation, not be entirely correct, either. Notably, the deletion hypothesis encounters serious empirical complications in that it predicts an inaccurate taxonomy that groups CD together with other ellipsis phenomena. This leaves, for one, the

observation unaccounted for that many deletion processes are largely insensitive to islands, while those that are largely do not resemble the restrictions on CD. To exemplify, VP-ellipsis in non-antecedent contained environments can reach into *wh*-islands (see (107); Sag 1976), while sluicing generally seems to ignore locality constraints. Clearly, CD behaves differently in this respect.

(107) I knew that some students presented this article in my class, but I couldn't recall which of the students didn't.

(108) They want to hire someone who speaks a Balkan language, but I don't remember which.

(Merchant 2006, ex. 26a)

On the other hand, CD does not pattern along with other, more local deletion operations, either. Although one essential property of CD is that it targets APs, the prototypical exponent of a local deletion rule, gapping, is for some reason unable to do so ((109); example is from Johnson 2003, (65a)). Hence, CD cannot be assimilated to gapping, either.

(109) *Vivek made Nishi angry at Melissa, before he made Carrie ____.

(____= angry)

The observations above in particular raise doubts about whether it is possible to find a natural class of ellipsis phenomena that displays the same signature as CD. But they also point to another, more general shortcoming of Bresnan's deletion analysis: its failure to provide an explanation for why C(S)D reacts to syntactic islands constraints in the first place.

Apart from misclassifying CD as ellipsis and losing an account for locality effects, Bresnan's analysis is too permissive in two further domains. As first noted by Pinkham (1985), if CD were the result of an unbounded rule, all of the instances of attributive subdeletion in (110) should be impeccable (see Kennedy and Merchant 2000; (110c) is their ex. 7a):[22]

(110) a. *John has a longer desk than Sue has a wide table.
b. *John has a longer desk than Sue has a table.
c. *Pico wrote a more interesting novel than Brio wrote a play.

Finally, a fourth major problem for a deletion analysis, also due to Pinkham, concerns the placement of the comparative clause. Unlike CD, subdeletion is restricted to comparative complements in sentence-final position (Pinkham 1982; see also Huang 1977; Hendrick 1978).[23] Again, this property is not typically found with other cases of deletion.

(111) a. More men than the company was willing to hire ____ came for an interview.
b. *More women than the company was willing to hire [____men] came for an interview.

(112) a. How many more men than you had invited ____ decided to come?
b. ?*How many more men than you had invited [____women] decided to come?

In sum, there are good reasons for not assigning to CD and in particular CSD an analysis that subsumes comparatives under unbounded deletion phenomena. But, as was seen above, the movement account also leaves various criterial properties of CSD (Left Branch Condition, possessives, *that*-t effects, and peripherality condition) unaccounted for. At the moment, the issue of how to integrate CSD into the zoo of known dislocation operations remains largely unresolved (see sections 3.3, though, and section 5 for further discussion).

Section 3.2 presents three recent analyses of CD, while section 3.3 turns to two proposals that have been advanced for CSD.

3.2 Recent analyses of CD

On the 'classic' view (Chomsky 1977; Heim 2000; among others), CD consists in movement of an empty degree operator in combination with deletion of the gradable predicate (possibly including a head noun) by a construction specific ellipsis operation. In this section, we review three accounts that are representative of three additional strategies that have been pursued in the analysis of CD: null anaphora, semantic identification, and head raising.

Exploring the similarity between CD and *one*-anaphora exposed in (113), Lerner and Pinkal (1995) suggest that CD is a discourse mechanism that resembles the rule governing the distribution of silent and overt pronouns (Lerner and Pinkal 1995, 228):

(113) a. John owns a faster car than OP Bill owns ____. (____ = fast car)
b. John owns a fast car and Bill owns one ____, too. (____ = fast car)

The analysis also extends to predicative comparatives such as (114):

(114) Mary is younger than OP Peter is ____. (____ = young)

In essence, the account rests on the assumption that a context variable built into the denotation of the empty comparative operator takes up the denotation of the gradable property, and is λ-converted into the appropriate position within the comparative complement. The *than*-XP of (114) can informally be represented as in (115a). P_o is a context variable that is later instantiated by *young*, yielding (115b):

(115) a. than P_o(d)(Peter)
b. than young (d)(Peter)

While correct for structures such as (113) and (114), Kennedy (1997) notes that the analysis overgenerates in more complex environments as it fails to account for the fact that the content of the CD site is always determined locally. In (116), for instance, the missing adjective inside the comparative clause can only be interpreted as *d-long*:

(116) The table is wider than this rug is, but this rug is longer than the desk is ____.
(____ = d-long/*d-wide)
(Kennedy 1997, 154, ex. 167)

CD behaves unlike other types of ellipsis such as VP-deletion or N′-deletion in this respect, which can be recovered at a distance:

(117) Marcus read every book I did and I bought every book Charles did ____.
(____ = bought/read)
(Kennedy 1997, 154, ex. 166)

This difference poses a problem for the unrestricted anaphora approach (Lerner and Pinkal 1995), because it fails to exclude the unattested reading of (116). Kennedy's (1997; 2002) system avoids this shortcoming by building CD resolution into the compositional semantic procedure, instead of delegating it to discourse principles. More specifically, he proposes that the empty operator inside the *than*-XP binds a property denoting trace corresponding to DegP.

(118) Mary is younger than $[_{CP}$ OP λ_1 Peter is $[_{DegP}$ $T_{<e,t>}]]$.

This higher type variable T_1 serves as a placeholder into which the AP denotation of the antecedent inside the matrix clause (*young*) is λ-converted in the course of the semantic computation, ensuring that the silent gradable property chooses the closest possible antecedent. Locality of CD then falls out as a consequence of compositionality (for details, see Kennedy 2002).

Both Lerner and Pinkal (1995) and Kennedy (1997; 2002) develop analyses in which CD is recovered late in the derivation, by semantic mechanisms (semantic theories of CD can also be found in Klein 1980 and Larson 1988). There is evidence, however, that the missing gradable property in comparatives is already part of the syntactic representation, contradicting the tenets of semantic approaches. For instance, (119a) documents that names inside the CD site trigger Principle C effects. If possible coreference patterns are taken to be encoded in c-command relations at LF, this signals that the LF of (119a) ought to look as in (119b):

(119) a. *Mary is prouder of $John_1$ than he_1 is ____. (____ = d-proud of $John_1$)
b. Mary is prouder of $John_1$ than he_1 is [d-proud of $John_1$].

Comparatives are also sensitive to other constraints that arguably have a syntactic basis. As seen in (120), extraction out of comparatives observes the Coordinate Structure Constraint (CSC) (Ross 1967; 1986). Assuming that the CSC is operative at LF (Fox 2000), the contrast between (120a) and (120b)–(120c) falls out from the CSC if the CD site is already present in the LF representation. The paradigm (120) remains unaccounted for on a semantic analysis of CD, though.

(120) a. a person who_1 Mary is [more proud of t_1] than Peter is____
(____= d-proud of t_1)
b. *a person who_1 Mary is [more proud of t_1] than Peter is ____ of $Ralf_2$
(____= d-proud of t_2)
c. *a person who_1 Mary is [more proud of Millhouse] than Peter is ____
(____= d-proud of t_2)

Based on these and related observations, Lechner (1999; 2004) advocates a syntactic mechanism for CD that makes comparatives closely resemble head-raising relative

clauses.[24] Specifically, it is suggested that CD consists of a movement operation that raises the gradable property from inside the *than*-XP to its surface position, where it checks a selectional feature of the degree head. Embedded in the phrase structure (41a), repeated from earlier in this chapter, the derivation proceeds as schematized in (121).

(41a) $[_{DegP}$ AP $[_{Deg'}$ -er *than*-XP]]

(121) Mary is $[_{DegP}$ $[_{AP}$ *tall-er*] $[_{Deg'}$ Deg° $_{[+comp]}$ $[_{than\text{-}XP}$ than OP $[\lambda_1$ Bill is $[_{DegP}$ $[_{AP}$ ~~*tall*~~] $[_{Deg'}$ Deg° $d_1]]]]]$

In (121), the AP *tall* is base-generated in the lower SpecDegP, from where it is attracted by the [+comp] feature on the matrix Deg° into the higher SpecDegP. Checking is reflected by comparative morphology on the head of the AP. However, unlike in typical movement configurations, both copies are interpreted. This follows from semantic considerations: given that *-er* is lexically specified as in (34), the comparative head combines with a gradable adjective denotation as its second argument, mandating that the higher AP copy is retained at LF. The lower AP is interpreted in order to ensure that the degree variable created by operator movement can be compositionally integrated into the computation.

(34) **[more/-er]** $= \lambda D_{<d,t>}\lambda A_{<d,<e,t>>}\lambda x.\exists d[A(d)(x) \wedge d > max(D)]$

Thus, comparatives reveal an analytical option inherent in the theory of movement that has hitherto not been recognized: movement can proceed without chain formation.

Among others, the system accounts for the locality of CD and the fact that the CD site is present during the syntactic derivation. Moreover, it captures the observation in (122) that CD is attested in contexts that do not tolerate ellipsis, documenting that CD behaves like movement and unlike deletion ((122a) from Johnson 1996).

(122) a. *I consider Betsy pretty and you consider Sam.
b. I consider Betsy prettier than you consider Sam.

In prenominal attributive comparatives such as (123a), the constituent that moves includes both the nominal head and the AP modifier. Since the matrix degree head attracts a feature on AP, and this feature needs to be located on the topmost node that moves, the NP must be contained within the prenominal AP, as schematized in (123b). This analysis essentially treats all prenominal APs as subsective modifiers (Abney 1987):

(123) a. Sam read longer books than Mary read.
b. Sam read $[_{DegP}$ $[_{AP}$ longer $[_{NP}$ books]] than λ_1 Mary read $[_{DP}$ $[_{DegP}$ $[_{AP}$ ~~long~~ $[_{NP}$ ~~books~~]] $[_{Deg'}$ $t_1]]]]]$.

The assumption that AP embeds NP is corroborated by a number of generalizations. First, on the orthodox left-adjunction analysis of prenominal APs in (124),

the degree clause is merged in between AP and NP, from where it has to extrapose. This is problematic, as prenominal adjuncts are islands for extraposition (see (125)):

(124) $[_{NP}\ [_{DegP}\ AP\ [_{Deg'}$ -er *than*-XP]] NP]

(125) *eine $[_{NP}\ [_{NP}\ [_{AP/DegP}$ stolze $t_1]$ $[_{NP}$ Frau]] [auf ihren Hund]$_1$]
a proud woman of her dog

The subsective parse in (123b) avoids this complication by generating the *than*-XP in its surface position. As a result, the degree complement does not need to extrapose.

Second, if AP and its embedding DegP were adjoined to NP, operator movement would have to proceed out of a left branch (see (102)). Again, the alternative factorization in (123b), which locates the degree variable in the object position of Deg°, fares better as it offers a strategy to make the operator chain abide by standard locality conditions.

Finally, the specific phrase structure accounts for a number of interpretational contrasts between pre- and postnominal phrasal comparatives, including the one in (126), originally due to Bresnan (1973):

(126) a. #She met a $[_{AP}$ *younger* $[_{NP}$ *man*]] [than Sally $[_{AP}$ ~~young~~ $[_{NP}$ ~~man~~]]].
b. She met a $[_{NP}\ [_{NP}$ *man*] $[_{DegP}$ *younger* [than Sally $[_{AP}$ ~~young~~]]]].

Example (126) demonstrates that the size of the CD site correlates with the position of the *than*-XP relative to the head noun. In the prenominal comparative (126a), the missing constituent comprises both the AP and the NP, hence *young man* is infelicitously predicated of *Sally*, whereas in the postnominal construction, the CD site is small (*young*) and the sortal conflict disappears. The raising analysis offers a natural explanation of this asymmetry, because word order requires the subsective phrase structure, which in turn triggers movement of [AP NP], for the prenominal frame only. In postnominal comparatives, movement solely targets the AP *young*. Hence, the head noun (*man*) is necessarily part of the lower copy inside the comparative complement in (126a), but not (126b). Further aspects and consequences of the system are explored in Lechner (2004). Kennedy (2002) contains criticism of the raising analysis and presents a modern implementation of the classic movement and ellipsis account (see also 3.3).

Note in the end that while the AP-raising account can also be implemented in terms of a quantificational semantics of comparatives, it is incompatible with the Late Merge analysis of the comparative complement developed in Bhatt and Pancheva (2004). This is so because the *than*-XP needs to be already present at the point of the derivation at which AP raising applies. We have to leave a more thorough investigation of the benefits and disadvantages of head raising for another occasion, though.

3.3 Recent analyses of CSD

Two recent studies of subdeletion (Izvorski 1995; Kennedy 2002), advance the position that CD and CSD can be subsumed under a common analysis. We briefly summarize the main components and results of these analyses.

Izvorski (1995) argues that subdeletion, just like CD constructions, involves *wh*-movement. Importantly, though, she assumes that the term targeted by movement in subcomparatives is not a left-branch modifier, but a phonologically empty amount phrase roughly corresponding to *in what quantity/to what degree* (see also Grimshaw 1987). A sentence like (127a) is then assigned the underlying representation in (127b):

(127) a. John met more linguists than I met biologists.
b. John met more linguists than [in what quantity]$_1$ I met biologists t_1.

As Izvorski (1995) notes, these adverbials can be affected by *wh*-movement:

(128) a. [In what quantity] did Mary eat apples?
b. We know [in what quantities] Mary used to drink wine.

On the adjunct analysis, the left-branch extraction ceases to pose a problem simply because movement does not reach into an adjunct. At the same time, subdeletion is still expected to be sensitive to island conditions. To illustrate on the basis of the Complex NP Constraint, (129a) is ill-formed since the trace of the amount adjunct is, as shown in (129b), located inside an NP island:

(129) a. *John bought more oranges than we had discussed [a plan [to buy apples]].
b. John bought more oranges than [in what quantity]$_1$ we had discussed [a plan [to buy apples t_1]].

Izvorski (1995) further demonstrates that various other problems for a unified analysis of CD and subdeletion, among them the absence of a *that*-trace effect and multiple subcomparatives, can be accounted for under her *wh*-movement analysis. For instance, the absence of *that*-trace effects with subcomparatives falls out from the independent observation that overt complementizers do not intervene with adjunct extraction (Lasnik and Saito 1984).

While Kennedy (2002) also defends the position that CD and subdeletion can be reduced to a common syntactic analysis, he does not locate differences between the constructions in a structural source, but in the timing of movement. More concretely, Kennedy (2002) suggests that CD involves overt movement to SpecCP of the DegP (see (130)), followed by deletion under identity with the head of the comparative, while in subdeletion constructions, movement applies in the covert component (see (131)). Thus, the results of dislocation with CSD are detectable only at LF. A consequence of this proposal is that CD and subdeletion are given structurally identical LF-representations ((130b) and (131b)), yet differ in their phonological forms ((130a) and (131a)):

(130) a. John met more linguists than I ~~linguists~~$_1$ met t_1. (Overt syntax)
b. John met more linguists than [$_{CP}$ [$_{DegP}$ many linguists]$_1$]. (LF)

(131) a. John met more linguists than I met biologists. (Overt syntax)
b. John met more linguists than [$_{CP}$ [$_{DegP}$ many biologists]$_1$ I met t_1]. (LF)

Kennedy (2002) notes that the similarities between CD and subdeletion, such as sensitivity to islands and crossover effects, are all related to properties that are evaluated at LF. Thus, the shared characteristics of the two constructions can be reduced to the assumption that they have identical LF-representations. By contrast, differences between CD and CSD, including *that*-trace effects, preposition stranding, and contraction, typically result from conditions that restrict overt movement only. To exemplify, while preposition stranding is impossible in many languages, including Dutch ((132a)), prepositions can be separated from their complements by covert movement, as documented by the well-formedness of the *wh*-in-situ structure (132b):

(132) Dutch
a. *Wie$_1$ heeft Jan [$_{PP}$ op t_1] gerekend?
who has John on counted
b. Wie heeft er [$_{PP}$ op [wie]] gerekend?
who has there on whom counted
'Who counted on whom?'

Among others, Kennedy's analysis accounts for the contrasts in PP-island sensitivity between regular comparatives (133a) (= (106a)), and contexts of CSD (133b) (= (105)):

(133) Dutch
a. *Jan heeft [$_{PP}$ voor [$_{NP}$ meer clubs]] gevoetbald dan hij [$_{PP}$
John has for more clubs played.soccer than he
voor ____] getennist heeft.
for played.tennis has
b. Jan heeft [$_{PP}$ voor [$_{NP}$ meer voetbalclubs]] gevoetbald dan hij
John has for more soccer.teams played.soccer than he
[$_{PP}$ voor [$_{NP}$– tennisclubs]] getennist heeft.
for tennis.clubs played.tennis has

In (133a), overt A′-movement leads to ungrammaticality since overt extraction is sensitive to the condition that prohibits P-stranding in Dutch. By contrast, in the subdeletion construction (133b), movement applies at LF. Given that the relevant constraint is not operative at LF, the output is correctly predicted to be well-formed.

Izvorski's (1995) and Kennedy's (2002) proposals both treat CD and CSD alike. A reviewer brings to attention an interesting challenge, though, that any uniform analysis of CD and CSD has to meet. While CD is widely attested across languages (approximately half of all languages sampled in Bobaljik (2012) and Stassen (2013) are English-type comparatives), true subdeletion constructions, in which the degree clause contains an overt gradable AP (see (5)), seem to be exceedingly rare. Moreover, according to the reviewer, there is a generalization about the implicational typological relations between the two phenomena: if a language has CD, it may (English) or may not (Russian) have CSD. But there appears to be no language that has CSD but lacks CD. None of the extant theories of CSD and CD are in a position to capture these two puzzling asymmetries.[25] We have to delegate this important question to future research.

Section 4 turns to a brief overview of analytical opportunities that have been explored in the study of the relation between the matrix clause and the comparative complement. Particular attention will be given to the question of whether the nexus between the matrix clause and the comparative complement displays properties of coordinate structures.

4 Coordination versus subordination

This section briefly addresses the nature of the relationship between the comparative clause and the matrix clause. Following Bresnan (1972), it is generally assumed that the comparative clause serves as a syntactic argument of the degree head, and is therefore generated in a subordinate position ((134a)). Optional extraposition as in (134b) can shift the comparative complement to the right periphery, where it adjoins to the matrix clause:

(134) a. [More linguists [than I had ever met ____]] were present at the party.
b. [$_{TP}$ [$_{TP}$ [More linguists t_1] were present at the party] [than I had ever met ____]$_1$].

Interestingly, once extraposed, the degree clause displays certain coordinate-like properties. Thus, in these contexts, it looks as if the subordinating particle *than* all of a sudden functions as a coordinating particle (Hankamer 1973). In what follows, we review some arguments in support of the existence of a coordinate parse for comparatives. For limitations of space, the survey will focus on lesser known observations about subdeletion constructions, most of which carry over to regular comparatives, though. Comprehensive discussion of the coordinate-like properties of comparatives can be found in Hendriks (1995) and Lechner (2004).

4.1 Subdeletion

A first argument indicating that subcomparatives exhibit coordinate-like behavior comes from gapping. Gapping is an ellipsis operation that deletes strings minimally including a finite verb in non-initial conjuncts under identity with an antecedent in a preceding conjunct (Neijt 1979; Thiersch 1982; Corver 1990; Johnson 2003; 2014). As the contrast in (135) reveals, gapping exclusively applies to coordinate structures (Jackendoff 1971):

(135) a. John kissed Mary and Sue Bill.
b. *John kissed Mary when Sue Bill.

Gapping is also attested in subcomparatives, though, suggesting that at some level, the degree complement and the matrix clause enter into a coordinate-like relationship.[26]

(136) John kissed more girls than Mary boys.

Another characteristic property of gapping is that it cannot target embedded clauses (137a). Example (137b) demonstrates that the same restriction holds for gapping in subcomparatives (Huang 1977; for Dutch, see Hendriks 1995):

(137) a. John wore the top hat and (*I believe that) Mary ____ the suspenders.
b. Felix knows more Greek than (*I believe that) Max ____ Latin.

As noted by Bresnan (1975), the sequence *take advantage* behaves as a unit with respect to gapping in that deletion cannot remove just the verbal head *take*:

(138) John took advantage of Mary, and Mary ____ (*advantage) of John.

Again, verb deletion in subcomparatives matches the profile of coordinate gapping:

(139) John took more advantage of Mary than Mary ____ (*advantage) of John.

Finally, whenever gapping targets a complex predicate, it removes a contiguous string that obligatorily includes the highest finite verb (Ross 1970):

(140) I want to try to begin to write a novel, and
a. Mary ____ to try to begin to write a play.
b. Mary ____ to begin to write a play.
c. Mary ____ to write a play.
d. Mary ____ a play.
e. *Mary wants ____ a play.
f. *Mary wants ____ to begin ____ a play.

Exactly the same condition is also operative in subcomparatives (Huang 1977):

(141) I want to try to begin to grow more cauliflowers than
a. Mary ____ to try to begin to grow carrots.
b. Mary ____ to begin to grow carrots.
c. Mary ____ to grow carrots.
d. Mary ____ carrots.
e. *Mary wants ____ carrots.
f. *Mary wants ____ to begin ____ carrots.

In sum, the parallel behavior of gapping in coordinate structures and subcomparatives strongly suggests that the degree complement and the matrix clause can, at least at some point of the derivation, be assigned a coordinate parse.

Right Node Raising (RNR) supplies a qualitatively different, second argument for subcomparative coordination. In general, RNR is precluded from applying to subordinate contexts:

(142) a. Mary liked ____, but John hated [the man with the red beard].
b. *Mary liked ____, although John hated [the man with the red beard].

Still, the results of RNR can also be found with subdeletion constructions ((143); see also Corver 1993; Hendriks 1995), providing further evidence for the presence of a coordinate structure in subcomparatives:

(143) More women like than men hate [the man with the red beard].

Third, the pattern of subcomparatives parallels that of coordinate structures also with respect to subextraction, as seen from the way the latter reacts to the CSC (Huang 1977; Corver 1990; 1993). Asymmetric movement is blocked not only in conjunctions ((144)) but also in subcomparatives ((145)):

(144) a. *What kind of vegetable do women like t and men detest brussels sprouts?
b. What kind of vegetable do women like t and men detest t?

(145) a. *What kind of vegetable do more women like t than men detest brussels sprouts?
b. What kind of vegetable do more women like t than men detest t?

An intriguing property characteristic of across-the-board (ATB) movement is that the ATB-extracted constituents need to reside in isomorphic positions (Williams 1978):

(146) a. Tell me who t likes beer and t hates children.
b. Tell me what adults admire t and children hate t.
c. *Tell me who Jill admires t and t hates children.

Although the nature of this constraint is poorly understood, it is instructive to note that the isomorphism requirement treats *wh*-movement and CSD alike. George (1980) brings to attention the paradigm in (147), which signals that the nodes containing the CSD site and its antecedent need to occupy structurally identical positions:

(147) a. John killed more Englishmen than the Inquisition burned ____ Frenchmen.
b. *John killed more Englishmen than ____ Frenchmen fought the Inquisition.
c. More Frenchmen revered John than ____ Englishmen adored Sir Thomas.
d. *More Frenchmen revered John than Sir Thomas More converted ____ Englishmen.

Finally, (148) documents another curious fact about CSD: the degree complement of subcomparatives obligatorily has to extrapose, emulating once again the behavior of coordinate structures, where the conjuncts have to be properly arranged in a linear sequence.

(148) a. *John gave more books [than he had given ____ pencils to Sue] to his best friend Peter.
b. John gave more books to Sue [than he had given ____ pencils to his best friend Peter].

The central question arising at this point is what forces subcomparatives to enter into a coordinate parse. One approach, which has been pursued in Corver (1993), is based on the assumption that subdeletion constructions are not assembled by the same mechanisms implicated in regular comparative formation, but are derived by ATB-movement. On a slightly modified version of this analysis, schematized in (149b), *-er* asymmetrically moves out of the matrix DegP at LF and attaches to a position from where it ATB binds the degree variable both in the main clause and in the comparative complement:[27]

(149) a. John met more linguists than I met biologists.
b. [-er [λ_1 [John met d_1-many linguists] than [I met d_1-many biologists]]].

A suitable semantics for this syntactic analysis is provided by the A-not-A analysis (Seuren 1973; Klein 1980; for recent discussion, see Schwarzschild 2008; Alrenga and Kennedy 2014). In particular, suppose that the coordinating versions of *than* and *more* are assigned the lexical meaning rules in (150) and that *than*$_{coor}$ heads an asymmetric coordination, as detailed in (151a). Then, the ATB chain created by asymmetric movement of *-er*$_{coor}$ can be compositionally interpreted as follows. Coordinating *than*$_{coor}$ (150a) applies to the comparative complement and the matrix clause, in that order, yielding a conjunction of two propositions that differ in polarity ((151b)). Next, the movement index of *more* (λ_1 in (151a)) abstracts over the two degree variables. Finally, the degree head combines with the derived degree predicate ((151c)) and binds off the degree variable, resulting in the quasi-formalization (151d):[28]

(150) a. **[than$_{coor}$]** = $\lambda p \lambda q.p \wedge \neg q$
b. **[more/-er$_{coor}$]** = $\lambda D_{<d,t>}.\exists d[D(d)]$

(151) a. [-er$_{coor}$ [λ_1 [John met d_1-many linguists]
[*than*-XP than$_{coor}$ [I met d_1-many biologists]]]]
b. **[than]**(**[I met d_1-many biologists]**)(**[John met d_1-many linguists]**) =
= John met d_1-many linguists $\wedge$ ¬[I met d_1-many biologists]
c. [(151a)] =
= **[-er$_{coor}$]**(λ_1.John met d_1-many linguists $\wedge$ ¬[I met d_1-many biologists])
d. $\exists d$[John met d-many linguists $\wedge$ ¬[I met d-many biologists]]

Naturally, this sketch of an analysis does not provide an explanation for why comparatives and subcomparatives should differ in such fundamental ways. We have to delegate this issue to another occasion.

4.2 Regular comparatives

Turning at this point to the clausal architecture of regular comparatives, degree clauses shaped by CD mainly differ from subdeletion constructions in that they do not need to extrapose and can be parsed into genuinely subordinate structures:

(152) John gave more books than he had given ____ to Sue to his best friend Peter.

The degree complement and the matrix clause can enter into a coordinate-like relation subsequent to extraposition, though. To illustrate by means of three groups of phenomena, Bresnan (1977) reports that comparatives resemble coordinate structures in that they may be targeted by ATB movement (153a) (Napoli 1983). Napoli (1983) observes that comparatives can be reduced by RNR (153b). Third, Emonds (1985), among others, pointed out that gapping is also found in comparative complements (153c):

(153) a. a man who Mary called t an idiot as often as June called t a cretin
b. More people admire than love [this woman I met yesterday in the park].
c. Fred can read newspapers as quickly as Jim can ____ letters.

For limitations of space, it is not possible to present a more complete map of the parallelism between regular comparatives and coordinate structures. Systematic and detailed discussions can be found in Hendriks (1995) and Lechner (2004), though.

Finally, a particularly intriguing feature of comparatives manifests itself in hybrid constellations that simultaneously display the characteristics of coordination and subordination. In the Dutch example (154), for example, ATB extraction has removed *waar* from both clauses, suggesting a coordinate parse. At the same, the finite verb resides in the final position of the comparative clause, which is indicative of a subordinate structure. Thus, comparatives appear to be hybrids.

(154) Dutch
Waar *heeft* Jan [$_{NP}$ evenveel foto's [$_{PP}$ t van]] gezien als Marie [$_{NP}$ tekeningen [$_{PP}$ t van]] *heeft* gekocht.
what has John as.many pictures ____ of seen as Mary drawings ____ of has bought
'What did John see as many pictures of as Mary bought drawings of?'

For a set of strategies for resolving such paradoxes, which correlates the size of the two conjuncts with their internal syntactic organization, see Lechner (2001; 2004).

5 A residual issue and recent trends in the analysis of CD/CSD

5.1 Multiple CSD

Thus far, the discussion was restricted to comparatives with a single degree relation and a single comparative head. However, this limitation is not fully representative of the construction, as documented by the existence of multiply headed comparatives such as (155) (Von Stechow 1984; Corver 1990; 1993; Moltmann 1992; Meier 2003):

(155) More women ate more sandwiches than men ate bananas.

In the literature, the phenomenon of multiple CSD has received attention for a number of reasons. First, Von Stechow (1984) observed that the multiply headed

construction (155) does not involve a simple comparison of the number of sandwiches and the number of bananas with the number of women and men, respectively. Rather, (155) contains a hidden conjunction asserting that (i) the number of women who ate sandwiches exceeds the number of men who ate bananas and (ii) the number of sandwiches eaten by women exceeds the number of bananas eaten by men.[29] These truth conditions can be compositionally obtained without any ad hoc devices from an LF representation similar to (156) (Von Stechow 1984; Meier 2003):

(156) More women [than men ate bananas] ate more sandwiches [than men ate bananas]

What is less clear, however, is how the surface form (155) can be translated into (156) by standardly sanctioned syntactic principles. If the derivation is to be guided by interpretation, such that (156) provides the underlying source for (155), the degree complement *than men ate bananas* would have to undergo ATB movement to the right. But ATB extraposition is generally restricted to coordinate structures, as for instance seen by the fact that (157a) lacks the 'ATB-extraposed' reading (157b):

(157) a. The men liked the women we met.
b. The men we met liked the women we met.

It follows that multiply headed comparatives are inconsistent with analyses according to which the clause-final position of the *than*-clause is derived by extraposition.

Second, at least in overt syntax, the matrix clause and the comparative complement of (155) appear to be part of a coordinate structure, as witnessed by the ability of gapping to target the *than*-XP:

(158) More women ate more sandwiches than men bananas.

Thus, multiple comparatives require a coordinate parse for both syntactic and semantic reasons – yet the semantic conjunction groups together two sets of nodes (see paraphrase in (156)) that do not match those coordinated in syntax (matrix clause and *than*-XP).

Third, while multiply headed comparatives can be derived by subdeletion, corresponding examples with CD are ill-formed, illustrating a further difference between CD and CSD (Corver 1990; 1993; Ishii 1991):[30]

(159) a. More men sold more apples than [____$_{CSD}$ women] had bought [____$_{CSD}$ pears].
b. *More men sold more apples than ____$_{CD}$ had bought ____$_{CD}$.

Finally, as pointed out in Corver (1993), multiple subdeletion poses a potential problem for the classical *wh*-movement analysis of subdeletion (Chomsky 1977), because a single SpecCP would have to host more than one empty operator. Such configurations are not attested in other contexts, such as relative clauses.

In sum, multi-headed comparatives exhibit a variety of intriguing properties that so far have resisted a satisfactory, unified analysis.

5.2 Cross-linguistic variation

Comparatives and related gradable constructions display a great degree of cross-linguistic variation (Stassen 1985; 2013), a fact that has received a significant amount of attention in the recent literature. The present section collects some of these findings, focusing on three case studies that are at the same time representative for the probably most interesting current trends in syntactic research on comparatives: (i) the typology of *than* (Pancheva 2006; 2010; Alrenga, Kennedy, and Merchant 2012), (ii) different strategies of comparison (implicit vs. explicit) and language-specific constraints on degree abstraction (Beck, Oda, and Sugisaki 2004; Kennedy 2009), and (iii) cross-linguistic variation in the formation of phrasal comparatives and the selectional properties of degree heads (Bhatt and Takahashi 2011; Alrenga, Kennedy, and Merchant 2012).

5.2.1 The typology of than

The standard marker *than* has commonly been held to be either semantically vacuous (Heim 1985; 2000; Kennedy 1999; Schwarzschild and Wilkinson 2002) or the syntactic manifestation of the maximalization operator (Von Stechow 1984; Rullmann 1995). But this view has recently been challenged from two directions. What both of these alternative conceptions have in common is that they assign to *than* a more extensive semantic function.

Drawing on a wide array of contrastive data from Slavic and Germanic, Pancheva (2006) develops an analysis that treats *than* as the analog of a partitive preposition in the degree domain. Regular partitive *of* can combine with either individual terms ((160a)) or individual predicates ((160b)). In the former case, *of* denotes a relation between individuals (type <e,<e,t>>; (161a)), while predicative *of* effectively functions as a predicate modifier (type <<e,t>,<e,t>>; (161b)):

(160) a. some $of_{<e,<e,t>>}$ $[\text{the water}]_e$
b. a glass $of_{<<e,t>,<e,t>>}$ $[\text{water}]_{<e,t>}$

(161) a. $[\mathbf{of_1}] = \lambda x \lambda y.y \text{ is part of } x$
b. $[\mathbf{of_2}] = \lambda P_{<e,t>} \lambda y.y \text{ is part of } P$

Pancheva (2006) provides a range of arguments for the two claims that (i) the degree marker *than* is equally ambiguous between a relational, <d,<d,t>>-type meaning ((162a)) and a predicate modifier denotation ((162b); type <<d,t>,<d,t>>); and that (ii) the parallelism between *of* and *than* extends to the lexical semantics in that the core meaning of *than* consists in the part-of relation. Thus, *than* is a partitive degree preposition, establishing a mereology of intervals.

(162) a. $[\mathbf{than_1}] = \lambda d' \lambda d.d \text{ is part of } d'$
b. $[\mathbf{than_2}] = \lambda D_{<d,t>} \lambda d.d \text{ is part of } D$

These two manifestations of *than* can be distinguished by their distribution. Relational $than_1$, which selects for two degree descriptions, introduces clausal comparatives as well as phrasal comparatives derived from a clausal source. In both constructions, the degree complement can be taken to denote a degree description derived by maximization of a degree abstract. By contrast, predicative $than_2$ shows up in irreducibly phrasal comparatives and measure phrase comparatives (*He is taller than 2 m*) in languages like Russian, Bulgarian, and Polish. To provide the degree head with a suitable denotation, Pancheva (2006) moreover proposes that the *than*-XP is internally organized as a small clause, in which the degree variable can, if necessary, be abstracted over by *wh*-movement.

To illustrate, the measure phrase *2 m* in the Russian phrasal comparative (163a) serves as a small clause predicate (<d,t>) that can directly combine with predicative $than_2$. The ill-formedness of (163b) confirms that (163a) is not derived from a reduced clause, since clausal degree complements in Russian may in other contexts be construed with an overt *wh*-operator:

(163) Russian

a. Ivan rostom bol'še [$_{<d,t>}$ dvux metron].
Ivan in.height more two meters$_{GEN}$
'Ivan is taller than 2 m.'
(Pancheva 2006, ex. 12)

b. *Ivan rostom bol'še ____ *em* dva metra.
Ivan in.height more what two meters[31]

In (163), the object of prepositional *than* consists of a predicate only. But the small clause may also include a subject, an option that is employed by the English phrasal comparatives in (164). For these constellations, the analysis correctly predicts that the behavior of the constituent immediately following *than* mimics that of a small clause subject:[32] it can be exceptionally case marked ((164a)), it may host reflexives ((164b)), and it can be extracted ((164c)). Compositional interpretation is finally ensured by degree abstraction inside the small clause by short operator movement, as detailed in (165):

(164) a. She is taller than him (*is).
b. It is impossible that John is taller than himself (*is).
c. Who is he taller than t (*is).

(165) Who$_2$ is he taller than [$_{<d,t>}$ λ_1 [t_2 d_1-tall $_{<d,<e,t>>}$]]

To summarize, a new perspective on the semantic contribution of *than* offers novel insights into the typology of comparatives in Slavic, as well as some well-known yet hitherto recalcitrant properties of phrasal comparatives in English. For detailed analysis of the cross-linguistic typology of *than* in Slavic and further justification of small clause comparatives, see Pancheva (2006; 2010).

A different, more radical path has been pursued by Alrenga, Kennedy, and Merchant (2012), who relocate the place where the comparison relation is encoded from the degree head *-er* to the standard marker *than*. Apart from providing new

insights into correlations between comparative scope and scope of the degree clause (see section 2.2), this shift has the additional advantage of being able to express an important cross-linguistic generalization: in languages that morphologically differentiate between phrasal and clausal comparatives, exemplified by the Greek pair (166), the distinction manifests itself in the standard marker (*apo* vs. *ap'oti*), but not in different exponents for the degree head (*-ter-* serves as degree head for both the phrasal and the clausal construction):

(166) Greek

a. Thelo na ime psilo-*ter*-os *apo* aftin.
I want to be taller than her$_{ACC}$
'I want to be taller than her.'
(Alrenga, Kennedy, and Merchant 2012, ex. 23)

b. Thelo na ime psilo-*ter*-os *ap'oti* afti.
I want to be taller than her$_{NOM}$
'I want to be taller than she is.'

This comes as a surprise for the classic analysis, in which the standard marker is semantically inert and lexical variation is accordingly expected to be limited to the degree head. More specifically, assuming that the phrasal versus clausal distinction in (166) correlates with differences in the semantic composition (Merchant 2011; see section 5.2), the standard approaches have to postulate multiple lexical entries for the degree head, even though these differences are systematically neutralized. By contrast, the kind of variation exemplified by Greek receives a natural explanation on the assumption argued for by Alrenga, Kennedy, and Merchant (2012) that comparative semantics – and therefore the locus of potential variation – is associated with the standard marker (see also discussion in section 5.2).

An immediate question arising in this context is to what extent Pancheva's analysis of *than* as a partitive is compatible with the view that the standard marker expresses the comparative relation. Without pursuing this issue any further, it should be noted that parthood and the *greater-than* relation on ordered sets used in standard comparative semantics are closely related concepts, since the properties of (atomic) mereologies systematically correspond to the properties of sets (the *part-of* relation corresponds to the subset relation, etc.).

5.2.2 Japanese versus English I: subdeletion and negative islands

Parametric variation is also at the center of the discussion in Beck, Oda, and Sugisaki (2004), who consider three differences that set apart languages like Japanese and Chinese from English: (i) Japanese lacks subdeletion constructions ((167)); (ii) in Japanese, attributive comparatives are restricted to numerical amount constructions with *many* ((168); Ishii 1991); and (iii) Japanese comparatives are not sensitive to negative islands ((169)):

(167) Japanese

a. *Kono tana-wa [ano doa-ga hiroi yori (mo)].
this shelf-TOP [that door-NOM wide YORI (MO)]
(Beck, Oda, and Sugisaki 2004, ex. 5)

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

(168) Japanese

a. Taroo-wa [Hanako kata yori] takusan kasa-o katta.
Taroo-TOP Hanako bought YORI many umbrella-ACC bought
'Taroo bought more umbrellas than Hanako.'
(Beck, Oda, and Sugisaki 2004, ex. 3a)

b. ?*Taroo-wa [Hanako kata yori] nagai kasa-o katta.
Taroo-TOP Hanako bought YORI long umbrella-ACC bought
'Taroo bought a longer umbrella than Hanako did.'
(Beck, Oda, and Sugisaki 2004, ex. 4a)

(169) Japanese

a. John-wa [dare-mo kawa-naka-tta no yori] takai hon-o
John-TOP anyone buy-NEG-PAST NO YORI expensive book-ACC
katta.
bought
(Beck, Oda, and Sugisaki 2004, ex. 6)

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

Beck, Oda, and Sugisaki (2004) suggest to relate these points of variation to a parameter that regulates whether a language more generally admits binding of degree variables in the syntax. On the standard view, object language degree abstraction is an essential ingredient of the analyses of subdeletion, negative islands, and attributive degree structures, respectively. In all three contexts, a degree variable is bound by a movement index. The phenomena in (i) to (iii) can thus be made to follow from the assumption that binding of degree variables is parametrically absent in Japanese. Further support for this claim comes from the observation that Japanese lacks degree interrogatives.

A natural question arising at this point is how the ordering relation constitutive of comparatives can be obtained without degree abstraction. According to Beck et al., the answer involves two independent assumptions: (i) the *yori*-clause functions as a free relative and (ii) the ordering relation is not derived compositionally from the semantic contribution of the degree head (*explicit comparison*), but is the result of contextual, pragmatic strategies (*implicit comparison*). To exemplify, the analysis assigns to (168a) roughly the same meaning as to the implicit comparative *Compared to what Hanako bought, Taroo bought more umbrellas*, while the deviance of (168b) is related to the same factors responsible for the infelicity of *?Compared to what Hanako bought, Taroo bought a long umbrella*. In this way, the contrast between subdeletion in regular and amount comparatives is reduced to pragmatic factors.

Elaborating on the analysis of Beck et al., Kennedy (2009) argues for a more restricted version of the degree parameter, given in (170), which identifies the locus of cross-linguistic variation at the semantic type of the complement of *more/-er*, instead of the general availability of object language degree abstraction:

(170) a. Non-phrasal comparative complements ("complex standards") in Japanese are always of type e.

b. Non-phrasal comparative complements in English are potentially of type d.

(170) states that languages differ in whether their degree heads partake in *degree comparison*, *individual comparison*, or both. In Japanese, for instance, the standard of comparison is always an individual term, which serves as the first argument of the three-place relational degree head (171) (Heim 1985; on *more/-er*$_3$, see Bhatt and Takahashi (2011) and section 5.2.3):

(171) $[\textbf{more/-er}_3] = \lambda x \lambda A_{<d,<e,t>>} \lambda y.\max(\lambda d.A(d)(y)) > \max(\lambda d.A(d)(x))$

English, on the other hand, also admits degree expressions as standards.[33] On this analysis, the contrast between English and Japanese-type languages arises from the different types of semantic objects the degree head can combine with. English has a "richer" system of comparatives not because it has the privilege of binding degree variables, but for the reason that the lexicon of English includes a degree comparison version of the degree head *more*. Essentially, the same conclusion has been reached for independent reasons in Bhatt and Takahashi (2007; 2011; see below).

A strong empirical argument for Kennedy's assumption that degree abstraction is also implicated in the analysis of Japanese comparatives is supplied by the contrast between the well-formed attributive comparative (172a) and its synonymous yet unacceptable clausal variant (168b):

(172) Japanese

a. Taroo-wa [Hanako yori] nagai kasa-o katta.
Taroo-TOP Hanako YORI long umbrella-ACC bought
'Taroo bought a longer umbrella than Hanako.'
(Kennedy 2009, ex. 37)

b. [Taroo-wa$_1$ [[Hanako yori]$_2$ [$_{<d,<e,t>>}$ λ_2 λ_1 t_1 bought a $t_{1,d}$ -long$_{<d,<e,t>>}$ umbrella]]]

c. [(172b)]=
[more/-er$_3$]([Hanako])([λdλx.x bough a d-long umbrella])([Taroo])=
max(λd.Taroo bought a d-long umbrella) >
max(λd.Hanako bought a d-long umbrella)

For (172a) to be compositionally interpretable, *yori* as defined in (171) needs to combine, in that order, with the individual marking the standard of comparison (*Hanako*); a gradable property of type <d,<e,t>>; and the subject (*Taroo*). But the surface constituency (172a) fails to provide a suitable adjective meaning. It follows that both the *yori*-XP and the subject need to undergo covert movement in such a way as to produce the required relation, resulting in the LF representation (172b). As the LF fragment in (172b) reveals, the subject *Taroo-wa*$_1$ is separated from its λ-binder by the *yori*-phrase. This unorthodox representation is an instance of what Barker (2007) calls *parasitic scope*.

Returning to the debate about the source of cross-linguistic variation, Kennedy notes that movement of the *yori*-XP in (172b) involves degree abstraction, which in turn confirms that Japanese does not indiscriminately lack degree binding in the syntax. This finding is not consistent with the parameter formulated in Beck,

Oda, and Sugisaki (2004), yet is compatible with Kennedy's relativized version (170).

Two further sets of observations corroborate the assumption that Japanese has object language degree variable binding (*explicit comparison*). First, Kennedy notes that the distinction between explicit and implicit comparison correlates with a number of linguistic diagnostics. For instance, differential measure phrases are acceptable with explicit comparison constructions only:

(173) a. ??Compared to Lee, Kim is 10 cm tall.
(Kennedy 2009, ex. 58)
b. Kim is 10 cm taller than Lee.

But differential comparatives similar to (173) are also attested in Japanese. Hence, Japanese arguably has degree abstraction. Second, as will be illustrated in the final subsection, this conclusion receives further, indirect support from the behavior of phrasal comparatives.

5.2.3 Japanese versus English II: phrasal comparatives

The definition of *more/-er*$_3$ in (171) was originally intended by Heim (1985) to render phrasal comparatives such as (174) interpretable without having to stipulate elliptical nodes. Moreover, as was already seen in the discussion of (169), in the attributive construction (174b), the subject (*Sue*) and the unit *[-er than Ann]* need to end up in a configuration of parasitic scope, illustrated in (174c):

(174) a. Sam is taller than Bill.
b. Sue read a better poem than Ann.
c. Sue$_1$ [-er than Ann]$_2$ [$_{<d,<e,t>>}$ λ_2 λ_1 t_1 read a $t_{1,d}$ - good$_{<d,<e,t>>}$ poem]

Lechner (2004) demonstrates that this movement is not reflected in changes in c-command in German and English, indicating that these languages lack base-generated phrasal comparatives and the individual comparison three-place degree head *more/-er*$_3$. Specifically, contrasts such as (175) are unexpected on the direct analysis, because it generates LF representations (see (176)) that are undistinguishable with respect to the c-command relations between the two terms to be construed coreferentially ((175) is from Bhatt and Takahashi 2007):

(175) a. *More people introduced *him*$_3$ to Sally than to *Peter*$_3$'s sister.
b. More people introduced *Peter*$_3$ to Sally than to *his*$_3$ sister.

(176) a. Sally$_1$ [-er than *Peter*$_3$'s sister]$_2$ [λ_2 λ_1 d_2-many people introduced *him*$_3$ to t_1]
b. Sally$_1$ [-er than to *his*$_3$'s sister]$_2$ [λ_2 λ_1 d_2-many people introduced *Peter*$_3$ to t_1]

Conversely, the disjoint reference effect in (175a) falls squarely within the bounds of the ellipsis analysis of phrasal comparatives (Lechner 2004). As detailed below, the name is c-commanded by the coreferential pronoun inside the reconstructed *than*-XP only in (177a):

(177) a. *More people introduced him_3 to Sally than ~~introduced him~~$_3$ to $Peter_3$'s sister.
b. More people introduced $Peter_3$ to Sally than ~~introduced Peter~~$_3$ to his_3 sister.

Adopting a slightly modified version of the diagnostics used in Lechner (2004), Bhatt and Takahashi (2007; 2011) observe that not all languages behave like English. In Hindi-Urdu, Japanese, and Chinese, phrasal comparatives are derived by the individual comparison three-place degree head *more/-er*$_3$. Among others, this is reflected by the fact that Hindi-Urdu is more permissive than English in the coreference patterns it admits in phrasal comparatives analogous to (175a). For a string like (178), the ellipsis analysis would incorrectly rule out coreference between *Ravi* and *him*, because the name would c-command the pronoun in the reconstructed ellipsis site (*than Atif showed him*$_3$ *Ravi*$_3$*'s sister's picture*):

(178) Hindi-Urdu
Atif-ne [*Ravi-kii*$_3$ behen-kii foto]-se *us-ko*$_3$ Mohan-kii
Atif-ERG Ravi-GEN sister-GEN picture-than he-DAT Mohan-GEN
behen-kii foto zyaadaa baar dikhaa-ii.
sister-GEN picture more times show-PERF
'Atif showed Mohan's sister's picture to him_3 more times than $Ravi_3$'s sister's picture.'
(Bhatt and Takahashi 2011, ex. 35)

Bhatt and Takahashi's (2011) results have two important implications. First, languages differ in the way they treat the nominal complements of *than*. Languages like Hindi-Urdu and Japanese interpret the NP following *than* as the complement of relational *more/-er*$_3$ ((171)), while English and German reconstruct a clausal frame into which the remnant is fit inside the degree clause. Second, Bhatt and Takahashi's (2011) compelling arguments for the direct analysis in Hindi-Urdu and Japanese further strengthen the case for the kind of covert movement process resulting in degree abstraction that was seen to be required by the individual comparison analysis (see LF (172b) and (176)). From this, it can be concluded that binding of syntactically represented degree variables is also available in Japanese.

In sum, the source of typological variation in comparatives appears to be located in the lexicon, specifically in the different choices that different languages make for the degree head (*more/-er*) and the degree particle (*than*). Further discussion of universals and variation in the morphosyntax of comparatives, including references, can be found in Bobaljik (2012).

6 Conclusion

This chapter discussed selected aspects of the syntax of CD and subdeletion construction, giving special consideration to (i) the internal organization of the matrix clause and the comparative complement; (ii) the external distribution of the degree complement; (iii) the mapping from syntax to semantics (transparent LFs);

(iv) empirical differences between CD and CSD; (v) strategies that have been pursued in the analysis of CD and CSD; and (vi) cross-linguistic variation in comparative formation.

As has become apparent, the findings in the literature so far have made it possible to delineate the contours of a rich theory of CD: CD consists in movement of some type that eliminates the gradable property from inside the comparative complement. In addition, the *than*-XP embeds an empty operator chain abstracting over a degree variable. By contrast, no consensus has emerged yet concerning the correct analysis of subdeletion. Prominent remaining questions in this are: can CSD be subsumed under CD? Why do subdeletion constructions require a coordinate parse? Why is CSD so exceedingly rare cross-linguistically? Which conditions (morphological, syntactic, and semantic) govern the choice of the particular semantic mechanism (relational vs. A-not-A) used in deriving the comparative interpretation? Even though substantial progress has been made, more issues in these complex domains are open to debate than ever before. Finally, it should be noted that even though the results reported here might give the impression of unity, the field is more diversified and interesting than the limits of this survey might suggest.

Appendix: Bresnan CD/CSD transformation

Bresnan (1975) argues that only the maximal subphrase of the compared constituent identical to a corresponding subphrase of the head undergoes CD. This generalization on the deleted part follows from Bresnan's Relativized A-over-A Condition (RAOAC; Bresnan 1975; 1976a; 1976b). The RAOAC states that a phrase of type A (= the target predicate) affected by a transformation must be maximal with respect to the values assigned to the elements in the structural description of the transformational rules that are the context predicates (i.e. the constant factors not operated on by the rule). Maximalization is a function of the syntactic features (+/−N, +/−V) that are mentioned in the structural description.

Bresnan's (1975) rule of CD is given in (179):

(179)

$[_{Y''}$	X''	$W_1]$ $[_{S''}$	W_2 $[_{Y''}$	X''	$W_3]$	$W_4]$	$4 \leq 1$
	1	2	3	4	5	6	→
	1	2	3	Ø	5	6	

The Y'' and X''-constituents in the structural description represent (material inside) the compared elements; the X and Y "barred" variables are restricted to measure-phrase constituents: N'', A'', and Q''. W is a variable over labeled bracketings. The Y''-constituent contained within the comparative clause (S'') is the target predicate (i.e. the constant factor operated on by the deletion rule). Finally, the leftmost Y'', the head of the comparative construction, functions as the context predicate.

If W_1 and W_3 are null (which amounts to a situation in which X″ = Y″), the deletion rule removes the entire compared constituent within the comparative clause. This instantiates CD. When W1 and W3 are overt, the deletion removes only part of the compared constituent (viz. the left-branch modifier), resulting in subdeletion. In line with the maximalization requirement on the target predicate, that part of Y″ must be deleted that is maximally identical to the context predicate:

(180) a.

She has [$_{NP}$	[[$_{QP}$ as many] friends][$_{S'}$	as I had [$_{NP}$ [$_{QP}$	x-many]	friends]]]		
	1 2	3	4	5	6 = Ø	→
	1 2	3	Ø	5		

'She has as many friends as I had ____.'

b.

She has [$_{NP}$	[[$_{QP}$ as many] friends][$_{S'}$	as I had [$_{NP}$ [$_{QP}$	x-many]	enemies]]]		
	1 2	3	4	5	6 = Ø	→
	1 2	3	Ø	5		

'She has as many friends as I had ____ enemies.'

Thus, depending on the value of W_1 and W_2, the deletion rule in (179) yields a subdeletion construction ((180a)) or a regular comparative ((180b)).

SEE ALSO: Across-the-Board Phenomena; Bridge Phenomena; Discontinuous Quantifiers, Primarily in French; Gapping; Partitive Constructions; Quantified Expressions and Quantitative Clitics; Reconstruction, Binding, and Scope

Notes

1. Much of the terminology goes back to Ultan (1972).
2. Already, the earliest generative accounts of comparatives (Hankamer 1971; Bresnan 1972) suggest that comparative formation is analogous to relative clause formation and involves a movement rule.
3. The *than*-XP of (26) is mapped to a function that collects all degrees d such that d is a degree to which the door is wide. If the door is 3 feet wide, the set includes all rational numbers on the scale of length from 0 to including 3 feet.
4. LF movement may affect the interpretation of expressions *inside* the *than*-XP. It has, for instance, been suggested that QR is responsible for the ambiguity of Russell's yacht sentence *I thought that your yacht was larger than it is*. See, however, Hoeksema (1983) and Heim (1985) for problems with such a movement analysis that indicate that comparatives embedded under propositional attitude verbs are structurally ambiguous (Postal 1974; Hellan 1981; Von Stechow 1984; Heim 1985; Larson 1988):

   (1) I thought that your yacht was larger than it is.
      a. Sensible *de re* reading: 'The size that I thought your yacht was is greater than the size your yacht is.'
      b. Contradictory *de dicto*: 'I thought that the size of your yacht was greater than the size of your yacht.'

QR theories cannot explain consistent readings in which the comparative complement contains a variable bound from outside (Hoeksema 1984; Heim 1985; Rullmann 1995).

(2) a. We expect that *no boy*$_3$ thinks he$_3$ is brighter than *he*$_3$ is.
(Hoeksema 1984)

b. $\lambda s.\neg\exists x[boy(x)(s) \wedge \forall s'[R_{dox,\ x}(s)(s') \rightarrow \iota d.x \text{ is d-bright in } s' > \iota d.x \text{ is d-bright in } s]]$
c. LF1: [*than*-XP than he$_3$ is] [λ_1 [no boy thinks he$_3$ is brighter t_1]]
d. LF2: [no boy λ_3 [*than*-XP than he$_3$ is] [λ_1 t_3 thinks he$_3$ is brighter t_1]]

(3) [-er] = $\lambda d\lambda AP\lambda x\lambda s.\iota d[AP(s)(x)(d) > d]$
(Von Stechow 1984)

Heim's (1985) example makes the same point, but avoids a potential complication with the argument based on (2) regarding intermediate landing sites:

(4) We believed that *every problem*$_3$ was harder than *it*$_3$ was.

5. Again, there is a parallelism to be drawn with free relatives, where the quantificational force is usually attributed to a relative external head.
6. Syntactically, DegGQ corresponds to the Deg'-node. If one wishes to avoid dislocation of X'-nodes, the AP *long* can also be relocated into a functional projection above DegP (Corver 1997a) prior to QR. Then, it will be DegP that moves.
7. In fact, Kennedy (1999) adopts a semantics in which *-er* and the *than*-XP are interpreted in situ. Detailed discussion of issues related to the scope of the comparison relation encoded by *-er* can be found in Beck (2011) and Alrenga and Kennedy (2014).
8. Unlike Bhatt and Pancheva's (2004) version, in which *-er* combines with the degree complement first, this lexical entry for *-er* is conservative. See Bhatt and Pancheva (2004; 2007) for discussion.
9. We are grateful to a reviewer for pointing out a mistake in a previous draft and clarifying comments on the relation between structure and scope.
10. The AP might, in analogy to NP, be further embedded in functional structure. For the nominal domain, this might yield (iia) (see e.g. Abney 1987; Ritter 1991) and for APs a structure like (iib) (see Abney 1987; Corver 1991; 1997a; 1997b; 2013):

(ii) a. $[_{DP}\ D\ [_{QP}\ Q\ [_{NP}\ N]]]$
b. $[_{DegP}\ Deg\ [_{QP}\ Q\ [_{AP}\ A]]]$

11. The maximality analysis is syntactically just as promiscuous as the quantificational one in that a suitable version of *-er* is compatible with all three parses in (41). What these observations demonstrate is that semantic considerations provide only an incomplete guide in deciding among different phrase structure analyses of the DegP.
12. See Kennedy (1999) for a surface compositional analysis based on (41c).
13. The ambiguity was first discussed in Gawron (1995) and Stateva (2000). For analysis of scope interactions with modals and individual quantifiers, see Heim (2000), Schwarzschild and Wilkinson (2002), Schwarzschild (2008), Beck (2010; 2011), and Alrenga and Kennedy (2014).

14. See also Sag (1976), Gawron (1995), and Alrenga, Kennedy, and Merchant (2012). The correlation is also known as the *Ellipsis-Scope Generalization* or *Extraposition-Scope Generalization*:

    (i) When a degree clause β is extraposed from a degree head α, the scope of α is exactly as high as the merger site of β.

    (Bhatt and Pancheva 2004, ex. 39)

15. The same observation has been made for phrasal comparatives in Lechner (1999; 2004, 199).
16. This is a simplification. In fact, Alrenga et al. (2012) assume that the comparison relation is encoded in three positions: the overt degree head, the standard marker *than*, and the covert degree head inside the *than*-X.
17. Chomsky (1977) suggests that languages that do not admit *wh*-phrases in the comparative clause differ from those that do only in the application of a local deletion rule targeting the *wh*-phrase in SpecCP.
18. It should be noted that many Dutch speakers find (58a) acceptable.
19. Another test distinguishing between the two analyses of *of*-comparatives (subdeletion vs. CD) is based on the parallelism constraint on subdeletion (George 1980; see discussion of (147)). If *of*-comparatives are instances of subdeletion, mixing the grammatical functions for the comparative NP and the subdeletion site should lead to ungrammaticality. This expectation seems to be borne out:

    (i) *More of the linguists were invited by Sam than I invited of the biologists.

20. This updated rendering follows not the letter but the spirit of Grimshaw (1987).
21. Note that the CD counterpart of (104b) is ungrammatical, attesting to another difference between CD and CSD:

    (i) *John is as many women's lover as he is [$_{NP}$ [$_{NP}$ ____] enemy].

    On attributive CSD, see Kennedy and Merchant (2000).

22. Kennedy and Merchant (2000) establish two cross-linguistic generalizations: (i) there is a direct correlation between left-branch extractions in interrogatives and the acceptability of attributive CD constructions, and (ii) languages in which left-branch extractions are impossible can bypass this constraint by eliding a constituent that includes the extraction site.
23. As Bresnan (1976b) observes, there are examples involving subdeletion in a sentence-internal comparative clause that are quite acceptable:

    (i) a. I can tell you that fewer women than there are fingers on my right hand, passed.
        b. He has as many women as he has horses, in his stable.

    She further remarks that certain examples featuring CD in sentence-internal position sound awkward:

    (ii) a. More women than ____ flunked, passed.
         b. I gave as many women as I had ____ in my courses, A's.

24. Donati (1997) devises an analysis that subsumes comparatives under free relatives. See also Izvorski (1995).
25. An exception is Alrenga and Kennedy (2014, 43f.), who design an interesting strategy for explaining the rarity of CSD.
26. Similar examples have been observed for French in Kayne (1981):

    (i) Marie a écrit autant d'articles que Jean de livres.
    Mary has written as.many of.articles as John of books
    'Mary has written as many articles as John has written books.'

27. Ruys (1992) showed that such asymmetric extractions are licit, if the moved operator ATB-binds a variable in both conjuncts.
28. For limitations of the A-not-A analysis, see Schwarzschild (2008), among others.
29. Hendriks (1992) notes that Von Stechow's (1984) semantics for multiple subdeletion constructions fails for cases like (i), for which it wrongly predicts the interpretation in (ii):

    (i) More doors are higher than windows are wide.
    (ii) The number of high doors exceeds the number of wide windows, and the height of the doors exceeds the width of the windows.

    See Meier (2003) for discussion.

30. Kennedy (2002) notes that it is also possible to find mixed multiply headed comparatives (i.e. comparatives involving both CD and subdeletion):

    (i) a. Christmas makes as many people as happy as it makes ____$_{CD}$ [____$_{CSD}$ unhappy].
    b. Max persuaded more people to buy more cars than you persuaded ____$_{CD}$ to buy [____$_{CSD}$ trucks].

    Moreover, multiple CD becomes licit if the second application of CD targets an adverbial:

    (ii) We fly to more destinations more often than we ever have.
    (adapted from a British Airways commercial)

31. In Russian, *than* is phonetically empty.
32. The small clause analysis was, for essentially the same reasons, first formulated in Lechner (2004, 181).
33. Whether English also has individual comparison depends on whether phrasal comparatives are analyzed as base-generated or as reduced clausal comparatives. The emerging consensus is that for English, the latter option is correct. See also section 5.3.2.

References

Abney, Steven. 1987. "The English Noun Phrase in Its Sentential Aspect." PhD diss., MIT.
Alrenga, Peter, Christopher Kennedy, and Jason Merchant. 2012. "A New Standard of Comparison." In *Proceedings of the 30th West Coast Conference on Formal Linguistics*, edited by Nathan Arnett and Ryan Bennet, 32–42.

Alrenga, Peter, and Christopher Kennedy. 2014. "No More Shall We Part: Quantifiers in English Comparatives." *Natural Language Semantics*, 22: 1–53.

Barker, Chris. 1998. "Partitives, Double Genitives and Anti-Uniqueness." *Natural Language and Linguistic Theory*, 16: 679–717.

Barker, Chris. 2007. "Parasitic Scope." *Linguistics and Philosophy*, 30: 407–444.

Beck, Sigrid. 1996. "Wh-Constructions and Transparent Logical Form." PhD diss., Universität Tübingen.

Beck, Sigrid. 2010. "Quantifiers in *Than*-Clauses." *Semantics and Pragmatics*, 3: 1–72.

Beck, Sigrid. 2011. "Comparison Constructions." In *Semantics: An International Handbook of Natural Language Meaning*, edited by C. Maienborn, K. von Heusinger, and P. Portner, 1341–1389. Berlin: Mouton de Gruyter.

Beck, Sigrid, Toshiko Oda, and Koji Sugisaki. 2004. "Parametric Variation in the Semantics of Comparison: Japanese vs. English." *Journal of East Asian Linguistics*, 13: 289–344.

Bennis, Hans. 1977. "Het kwantitatieve *er* in komparatiefkonstrukties." *Spectator*, 6: 384–387.

Bennis, Hans. 1978. "Comparative Deletion is Subdeletion." MS, University of Amsterdam.

Besten, Hans den. 1978. "On the Presence and Absence of Wh-Elements in Dutch Comparatives." *Linguistic Inquiry*, 9: 641–671.

Bhatt, Rajesh, and Roumyana Pancheva. 2004. "Late Merger of Degree Clauses." *Linguistic Inquiry*, 35: 1–46.

Bhatt, Rajesh, and Roumyama Pancheva. 2007. "Degree Quantifiers, Position of Merger Effects with Their Restrictors, and Conservativity." In *Direct Compositionality*, edited by Chris Barker and Pauline Jacobson. Cambridge, MA: MIT Press.

Bhatt, Rajesh, and Shoichi Takahashi. 2007. "Direct Comparisons: Resurrecting the Direct Analysis of Phrasal Comparatives." In *Proceedings of SALT XVII*, edited by Masayuki Gibson and Tova Friedman, 19–36.

Bhatt, Rajesh, and Shoichi Takahashi. 2011. "Reduced and Unreduced Phrasal Comparatives." *Natural Language & Linguistic Theory*, 29: 581–620.

Bobaljik, Jonathan. 2012. *Universals in Comparative Morphology*. Cambridge, MA: MIT Press.

Bresnan, Joan. 1971. "Contraction and the Transformational Cycle in English." MS, Bloomington, Indiana University Linguistics Club.

Bresnan, Joan. 1972. "Theory of Complementation in English Syntax." PhD diss., MIT.

Bresnan, Joan. 1973. "Syntax of the Comparative Clause Construction in English." *Linguistic Inquiry*, 4: 275–343.

Bresnan, Joan. 1975. "Comparative Deletion and Constraints on Transformations." *Linguistic Analysis*, 1: 25–74.

Bresnan, Joan. 1976a. "Evidence for a Theory of Unbounded Transformations." *Linguistic Analysis*, 2: 353–393.

Bresnan, Joan. 1976b. "On the Form and Functioning of Transformations." *Linguistic Inquiry*, 7: 3–40.

Bresnan, Joan. 1977. "Variables in the Theory of Transformations." In *Formal Syntax*, edited by Peter Culicover, Thomas Wasow, and Adrian Akmajian, 157–196. New York, NY: Academic Press.

Chomsky, Noam. 1965. *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.

Chomsky, Noam. 1973. "Conditions on Transformations." In *A Festschrift for Morris Halle*, edited by Stephen Anderson and Paul Kiparsky, 232–286. New York, NY: Holt, Rinehart, and Winston.

Chomsky, Noam. 1977. "On *Wh*-Movement." In *Formal Syntax*, edited by Peter Culicover, Thomas Wasow, and Adrian Akmajian, 71–132. New York, NY: Academic Press.

Chomsky, Noam. 1981. *Lectures on Government and Binding*. Dordrecht: Foris.

Corver, Norbert. 1990. "The Syntax of Left Branch Extractions." PhD diss., Tilburg University.

Corver, Norbert. 1991. "Evidence for DegP." In *Proceedings of the North Eastern Linguistic Society*, edited by Tim Sherer, 33–47.
Corver, Norbert. 1993. "A Note on Subcomparatives." *Linguistic Inquiry*, 24: 773–781.
Corver, Norbert. 1997a. "The Internal Syntax of the Dutch Extended Adjectival Projection." *Natural Language and Linguistic Theory*, 15: 289–368.
Corver, Norbert. 1997b. "*Much*-Support as a Last Resort." *Linguistic Inquiry*, 28: 119–164.
Corver, Norbert. 2013. "Lexical Categories and (Extended) Projection." In *The Cambridge Handbook of Generative Syntax*, edited by Marcel den Dikken, 353–424. Cambridge: Cambridge University Press.
Cresswell, Max J. 1976. "The Semantics of Degree." In *Montague Grammar*, edited by Barbara Partee, 261–292. New York, NY: Academic Press.
Donati, Catherina. 1997. "Comparative Clauses as Free Relatives: A Raising Analysis." *Probus*, 9: 145–166.
Dresher, Bezalel Elan. 1977. "Logical Representations and Linguistic Theory." *Linguistic Inquiry*, 8: 351–378.
Embick, David. 2007. "Blocking Effects and Analytic/Synthetic Alternations." *Natural Language and Linguistic Theory*, 25: 1–37.
Emonds, Joseph. 1985. *A Unified Theory of Syntactic Categories*. Dordrecht: Foris.
Fox, Danny. 2000. *Economy and Semantic Interpretation*. Cambridge, MA: MIT Press.
Gawron, Jean Mark. 1995. "Comparatives, Superlatives, and Resolution." *Linguistics and Philosophy*, 18: 333–380.
George, Leland. 1980. "Analogical Generalization in Natural Language Syntax." PhD diss., MIT.
Grimshaw, Jane. 1987. "Subdeletion." *Linguistic Inquiry*, 18: 659–669.
Hackl, Martin. 2000. "Comparative Quantifiers." PhD diss., MIT.
Hale, Austin. 1970. "Conditions on English Comparative Clause Pairings." In *Readings in English Transformational Grammar*, edited by Roderick Jacobs and Peter Rosenbaum. Boston: Ginn.
Hankamer, Jorge. 1971. "Constraints on Deletion in Syntax." PhD diss., Yale University.
Hankamer, Jorge. 1973. "Why There are Two *Than*'s in English." In *Papers from the Ninth Regional Meeting of the Chicago Linguistic Society*, edited by Claudia Corum, T. Cedric Smith-Stark, and Ann Weiser, 179–191. Chicago: Chicago Linguistic Society.
Heim, Irene. 1985. "Notes on Comparatives and Related Matters." MS, University of Texas, Austin.
Heim, Irene. 2000. "Degree Operators and Scope." In *Proceedings of SALT X*, edited by B. Jackson and T. Matthews, 40–64.
Heim, Irene, and Angelika Kratzer. 1998. *Semantics in Generative Grammar*. Oxford: Blackwell.
Hellan, Lars. 1981. *Towards an Integrated Theory of Comparatives*. Tübingen: Gunter Narr.
Hendrick, Randall. 1978. "The Phrase Structure of Adjectives and Comparatives." *Linguistic Analysis*, 4: 255–298.
Hendriks, Petra. 1992. "Multiple Comparison." In *Language and Cognition 2*, edited by D. Gilbers and S. Looyenga, 107–118. Groningen: Groningen University.
Hendriks, Petra. 1995. "Comparatives and Categorial Grammar." PhD diss., Groningen University.
Hoeksema, Jacob. 1983. "Negative Polarity and the Comparative." *Natural Language and Linguistic Theory*, 1: 403–434.
Huang, Phoebe. 1977. "Wh-Fronting and Related Processes." PhD diss., University of Connecticut.
Ishii, Yasuo. 1991. "Operators and Empty Categories in Japanese." PhD diss., University of Connecticut.
Izvorski, Roumyana. 1995. "A Solution to the Subcomparative Paradox." In *Proceedings of the Fourteenth West Coast Conference on Formal Linguistics*, edited by José Camacho, Lina Choueiri, and Maki Watanabe, 203–219.

Jackendoff, Ray. 1971. "Gapping and Related Rules." *Linguistic Inquiry*, 2: 21–35.
Jacobson, Pauline. 1995. "On the Quantification Force of English Free Relatives." In *Quantification in Natural Languages*, edited by E. Bach, E. Jelinek, A. Kratzer, and B. H. Partee, 451–486. Dordrecht: Kluwer.
Jespersen, Otto. 1954–1958. *A Modern English Grammar on Historical Principles*, 7 vols. London: Allen & Unwin.
Johnson, Kyle. 1996. "When Verb Phrases Go Missing." *Glot International*, 2: 3–9.
Johnson, Kyle. 2003. "In Search of the English Middle Field." MS, University of Massachusetts, Amherst.
Johnson, Kyle. 2014. "Gapping." MS, University of Massachusetts, Amherst.
Kayne, Richard. 1981. "ECP Extensions." *Linguistic Inquiry*, 12: 93–133.
Kayne, Richard, and Jean-Yves Pollock. 1978. "Stylistic Inversion, Successive Cyclicity and Move NP in French." *Linguistic Inquiry*, 9: 595–621.
Kennedy, Christopher. 1997. "Projecting the Adjective: The Syntax and Semantics of Gradability and Comparison." PhD diss., University of California, Santa Cruz.
Kennedy, Christopher. 1999. *Projecting the Adjective: The Syntax and Semantics of Gradability and Comparison*. New York, NY: Garland Press.
Kennedy, Christopher. 2002. "Comparative Deletion and Optimality in Syntax." *Natural Language and Linguistic Theory*, 20: 553–621.
Kennedy, Christopher. 2009. "Modes of Comparison." *Proceedings of CLS*, 43: 141–165.
Kennedy, Christopher, and Jason Merchant. 2000. "Attributive Comparative Deletion." *Natural Language and Linguistic Theory*, 18: 89–146.
King, Harold V. 1970. "On Blocking the Rules for Contraction in English." *Linguistic Inquiry*, 1: 134–136.
Klein, Ewan. 1980. "A Semantics for Positive and Comparative Adjectives." *Linguistics and Philosophy*, 4: 1–45.
Larson, Richard. 1988. "Scope and Comparatives." *Linguistics and Philosophy*, 11: 1–26.
Lasnik, Howard, and Mamoru Saito. 1984. "On the Nature of Proper Government." *Linguistic Inquiry*, 15: 235–289.
Lassiter, Daniel. 2011. "Measurement and Modality. The Scalar Basis of Modal Semantics." PhD thesis, New York University.
Lechner, Winfried. 1999. "Comparatives and DP-Structure." PhD diss., University of Massachusetts, Amherst.
Lechner, Winfried. 2001. "Reduced and Phrasal Comparatives." *Natural Language and Linguistic Theory*, 19: 683–735.
Lechner, Winfried. 2004. *Ellipsis in Comparatives*. Berlin: Mouton de Gruyter.
Lees, Robert B. 1961. "Grammatical Analysis of the English Comparative Construction." *Word*, 17: 171–185.
Lerner, Jean-Yves, and Manfred Pinkal. 1995. "Comparative Ellipsis and Variable Binding." In *Proceedings of Semantics and Linguistic Theory*, edited by M. Simons and T. Galloway, 222–236.
Meier, Cecile. 2003. "The Meaning of *Too*, *Enough* and *So…That*." *Natural Language Semantics*, 11: 69–107.
Merchant, Jason. 2006. "Sluicing." In *The Blackwell Companion to Syntax*, edited by Martin Everaert and Henk van Riemsdijk, 269–289. London: Blackwell.
Merchant, Jason. 2009. "Phrasal and Clausal Comparatives in Greek and the Abstractness of Syntax." *Journal of Greek Linguistics*, 9: 134–164
Merchant, Jason. 2011. "Genitives of Comparison in Greek." MS, University of Chicago.
Milner, Jean-Claude. 1978. "Cyclicité Successive, Comparatives et Cross-Over en Français." *Linguistic Inquiry*, 9: 673–693.
Moltmann, Friederike. 1992. "Coordination and Comparatives." PhD diss., MIT.

Morzycki, Marcin. 2015. *Modification*. Cambridge: Cambridge University Press.
Napoli, Donna-Jo. 1983. "Comparative Ellipsis: A Phrase Structure Analysis." *Linguistic Inquiry*, 14: 675–694.
Neijt, Anneke. 1979. *Gapping: A Contribution to Sentence Grammar*. Dordrecht: Foris.
Pancheva, Roumyana. 2006. "Phrasal and Clausal Comparatives in Slavic." In *Formal Approaches to Slavic Linguistics 14: The Princeton Meeting*, edited by J. Lavine, S. Franks, M. Tasseva-Kurktchieva, and H. Filip, 236–257.
Pancheva, Roumyana. 2010. "More Students Attended FASL than CONSOLE." In *Formal Approaches to Slavic Linguistics 18: The Cornell Meeting, 2009*, edited by W. Browne, A. Cooper, A. Fisher, E. Kesici, N. Predolac, and D. Zec, 383–400.
Pancheva, Roumyana. 2012. "Syntax and Semantics of Comparatives and Superlatives." Class handouts, EGG 2012 summer school, July 30–August 3, 2012.
Pinkham, Jessie. 1982. *The Formation of Comparative Clauses in French and English*. Bloomington: Indiana University Linguistics Club.
Pinkham, Jessie. 1985. *The Formation of Comparative Clauses in French and English*. New York, NY: Garland.
Postal, Paul. 1974. "On Certain Ambiguities." *Linguistic Inquiry*, 5: 367–425.
Quine, Willard V. O. 1960. *Word and Object*. Cambridge, MA: MIT Press.
Riemsdijk, Henk van. 1978. *A Case Study in Syntactic Markedness: The Binding Nature of Prepositional Phrases*. Dordrecht: Foris.
Ritter, Elizabeth. 1991. "Two Functional Categories in Noun Phrases: Evidence from Modern Hebrew." In *Perspectives on Phrase Structure: Heads and Licensing*, edited by Susan Rothstein, 37–62. San Diego, CA: Academic Press.
Ross, John Robert. 1967. "Constraints on Variables in Syntax." PhD diss., MIT.
Ross, John Robert. 1970. "Gapping and the Order of Constituents." In *Progress in Linguistics*, edited by Manfred Bierwisch and Karl Heidolph, 249–259. The Hague: Mouton.
Ross, John Robert. 1986. *Infinite Syntax!* Norwood, NJ: Ablex.
Rullmann, Hotze. 1995. "Maximality in the Semantics of Wh-Constructions." PhD diss., University of Massachusetts, Amherst.
Russell, Bertrand. 1905. "On Denoting." *Mind*, 14: 479–493.
Ruys, Eddy. 1992. "The Scope of Indefinites." PhD diss., Utrecht University.
Sag, Ivan. 1976. "Deletion and Logical Form." PhD diss., MIT.
Sauerland, Uli. 2004. "The Interpretation of Traces." *Natural Language Semantics*, 12 (1): 63–128.
Schwarzschild, Roger. 2008. "The Semantics of Comparatives and Other Degree Constructions." *Language and Linguistics Compass*, 2: 308–331.
Schwarzschild, Roger, and Karina Wilkinson. 2002. "Quantifiers in Comparatives: A Semantics of Degree Based on Intervals." *Natural Language Semantics*, 10: 1–41.
Selkirk, Elisabeth. 1970. "On the Determiner Systems of Noun Phrases and Adjective Phrases." MS, MIT.
Seuren, Pieter. 1973. "The Comparative." In *Generative Grammar in Europe*, edited by F. Kiefer and N. Ruwet, 528–564. Dordrecht: Reidel.
Stassen, Leon. 1985. *Comparison and Universal Grammar*. Oxford: Basil Blackwell.
Stassen, Leon. 2013. "Comparative Constructions." In *The World Atlas of Language Structures Online*, edited by Matthew S. Dryer and Martin Haspelmath. Leipzig: Max Planck Institute for Evolutionary Anthropology. Accessed August 18, 2016. http://wals.info/chapter/121.
Stateva, Penka. 2000. "In Defense of the Movement Theory of Superlatives." In *Proceedings of ESCOL 1999*, edited by R. Daly and A. Riehl, 219–226.
Stechow, Arnim von. 1984. "Comparing Semantic Theories of Comparison." *Journal of Semantics*, 3: 1–79.
Taraldsen, Knut Tarald. 1978. "The Scope of *Wh*-Movement in Norwegian." *Linguistic Inquiry*, 9: 623–640.

Thiersch, Craig. 1982. "The Harder They Come …: A Note on the Double Comparative Construction in English." In *Sprachtheorie und angewandte Linguistik*, edited by Werner Welte, 47–66. Tübingen: Narr.

Ultan, Russell. 1972. "Some Features of Basic Comparative Constructions." *Working Papers in Language Universals*, 9: 117–162.

Vergnaud, Jean Roger. 1974. "French Relative Clauses." PhD diss., MIT.

Williams, Edwin. 1974. "Rule Ordering in Grammar." PhD diss., MIT.

Williams, Edwin. 1978. "Across-the-Board Rule Application." *Linguistic Inquiry*, 9: 31–43.