

# An Overview of the Syntax and Semantics of the Adjectival Projection in English

Chris Kennedy, Northwestern University

Lectures on the Syntax and Semantics of Gradability and Comparison  
Kyushu University, August 2000

## 1 Gradable adjectives and comparatives

A defining characteristic of gradable adjectives like *all, old, abstract, fast, scary, dangerous*, etc. is that they may co-occur with degree morphemes such as *more/-er, less, as, too, enough, and so* in complex syntactic constructions which fall under the general label "comparatives":

- (1) Benny is taller than his sister.
- (2) Carmen is as old as Mike.
- (3) Your new proposals are less abstract than the previous ones.
- (4) The implications of the election were too scary to ignore.
- (5) This train is fast enough to get us to San Jose before noon.

### Overview

- Use comparatives as an empirical base for determining the structure and interpretation of constructions in which gradable adjectives appear.
- Explore an "extended projection" (EP) analysis of the syntax of comparatives (Abney 1987, Corver 1990, Grimshaw 1991).
- Provide a compositional semantics for this syntactic analysis.

### Criteria for evaluation

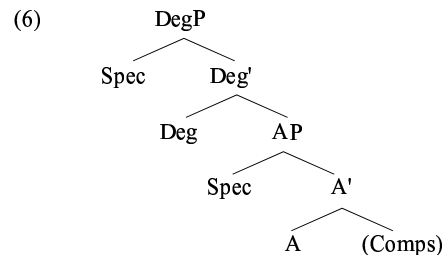
- A syntactic analysis should support a compositional semantics.
- A semantic analysis should be consistent with the syntactic distribution of meaningful elements.

## 2 Extended projection

### 2.1 Projecting the adjective

- Lexical heads project lexical and functional structure (Abney 1987, Grimshaw 1991).
- The extended projection of A is headed by a degree morpheme (Abney 1987, Corver 1990).

The extended projection of A

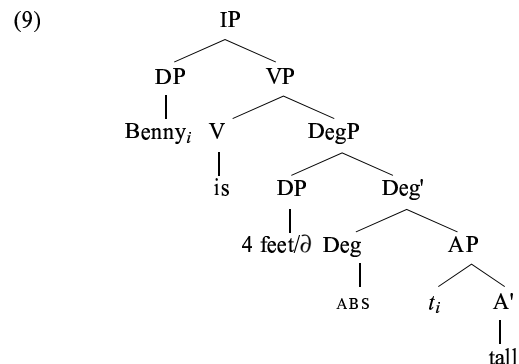


$\text{Deg} \in \{\text{ABS}, \text{er/more}, \text{less}, \text{as}, \text{too}, \text{enough}, \text{so}, \text{how}, \text{that}\}$

### 2.2 Absolutes

- DegP is headed by (null) ABS morpheme.
- Measure phrases are generated in SpecDegP.

- (7) Benny is tall.
- (8) Benny is 4 feet tall.

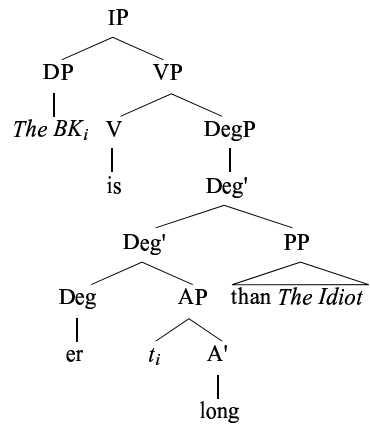


### 2.3 Comparatives

- DegP is headed by comparative morpheme (*more/-er, less, as*).
- The *than/as* constituent is a selected adjunct.

- (10) *The Brothers Karamazov* is longer than *The Idiot*.

(11)



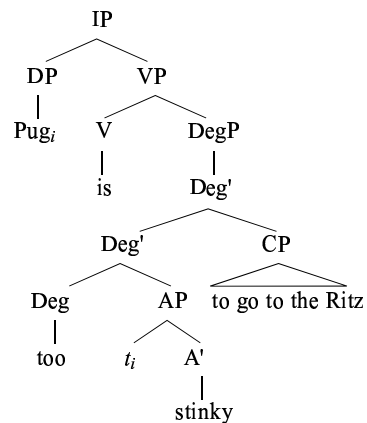
### 2.4 Too and enough

- DegP is headed by {too, enough}.
- The comparative clause is a selected adjunct.

(12) Pug is too stinky to go to the Ritz.

(13) Ubu is beautiful enough to win the prize.

(14)



Extraction facts support the analysis of the comparative clause as an adjunct:

(15) Who did Audrey leave to see?

(16) \*When did Audrey leave to see her boss?

(17) Who was Audrey angry enough to criticize?

(18) \*How obnoxiously was Audrey angry enough to criticize her boss?

(19) Which car was Tim too scared to drive?

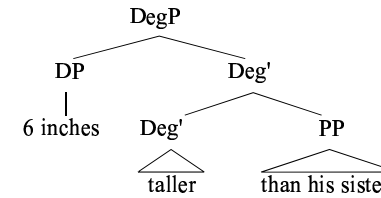
(20) \*How quickly was Tim too scared to drive the Fiat?

### 2.5 Differential comparatives

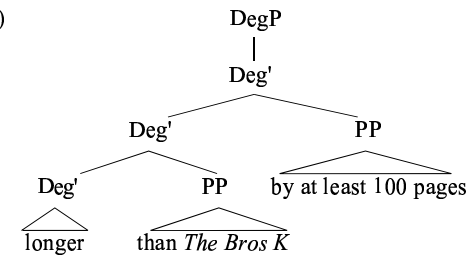
(21) Benny is at least six inches taller than his sister.

(22) *The Idiot* is shorter than *The Brothers Karamazov* by at least 100 pages.

(23)



(24)



- The difference phrase may be another DegP (Bresnan 1973, Jackendoff 1977):

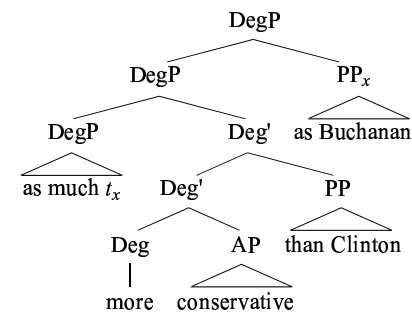
(25) Dole isn't as much more conservative than Clinton as Buchanan (is).

(26) This paper is too much shorter than the required length for it to be accepted.

(27) Maverick's is more too dangerous for a novice surfer than Steamer Lane (is).

(28) Arnold's dissertation is more less understandable than it should be than mine (is).

(29)



NB: The clausal constituent in complex comparatives like (25-28) must be extraposed.

## 2.6 Summary

The schema provided by extended projection generates structures which adequately characterize comparative constructions.

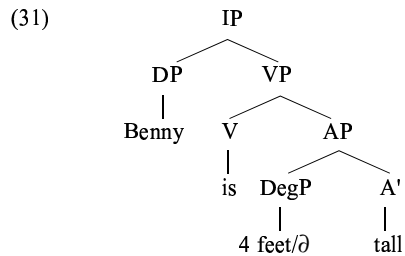
How does this approach compare to traditional analyses of the syntax of comparatives?

## 3 The specifier analysis of DegP

### 3.1 The specifier analysis

The syntactic position of the Degree Phrase is SpecAP (Chomsky 1965, Bresnan 1973, Emonds 1976, Hellan 1981, Heim 1985, McCawley 1988, Hazout 1995).

(30) Benny is 4 feet/∅ tall.

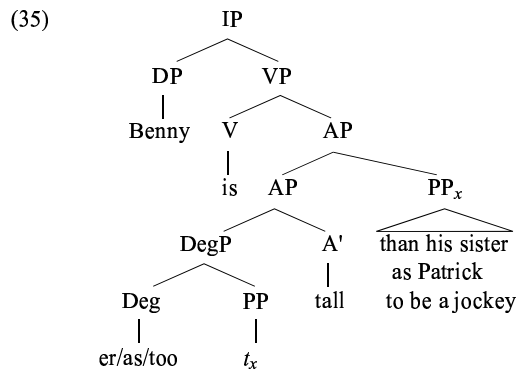


Comparative clauses are generated as complements of a Deg<sup>0</sup> and extraposed.

(32) Benny is taller than his sister.

(33) Benny is as tall as Patrick.

(34) Benny is too tall to be a jockey.



## 3.2 Comparison

The EP analysis and the Spec analysis differ in terms of:

- i) extraposition of the *than* constituent
- ii) constituent structure

### 3.2.1 Extraposition, extraction, and P-stranding

*Wh*-movement out of an extraposed PP cannot strand a preposition:

(36) I bought a picture of Mel Torme yesterday.

(37) I bought a picture yesterday of Mel Torme.

(38) Who did you buy a picture of yesterday?

(39) \*Who did you buy a picture yesterday of?

But *than* may be stranded (Hankamer 1973) unless obviously extraposed (Corver 1990):

(40) a. Who does Dan seem taller than to you?

b. \*Who does Dan seem taller to you than?

- These facts are unexpected on the traditional account, because comparatives *always* involve extraposition of the constituent headed by *than*.

If differential comparatives require extraposition of the *than/as* constituent, stranding of the head should be ungrammatical:

(41) a. Bush is as much more conservative than Clinton as Buchanan.

b. \*Who is Bush as much more conservative than Clinton as?

(42) a. Maverick's is more too dangerous for a novice surfer than Steamer Lane.

b. \*What is Maverick's more too dangerous for a novice surfer than?

### 3.2.2 Constituent structure 1: Coordination and differential comparatives

A difference phrase cannot be extracted:

(43) a. \*?How much is your van longer than your car?

b. How much longer than your van is your car?

(45) is an accurate (and grammatical) description of the situation represented by (44).

(44) line A: \_\_\_\_\_  
 line B: \_\_\_\_\_  
 line C: \_\_\_\_\_

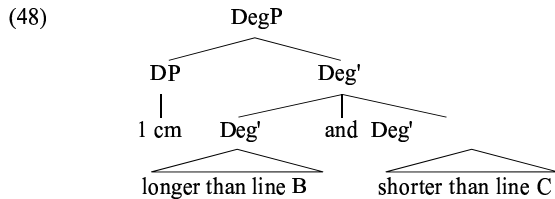
(45) Line A is 1 cm longer than line B and shorter than line C.

(46) The rug is a foot wider than the table and longer than the desk.

(47) Max is 6 inches too short to be an astronaut and too tall to be a jockey.

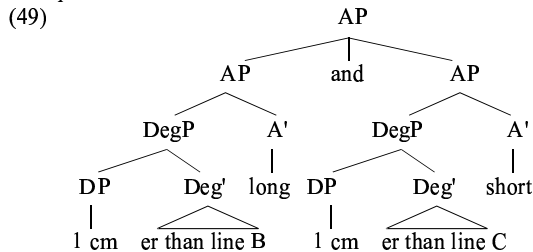
In the EP analysis, the sequence (**Deg A PP**) is a constituent.

The EP structure



In the Spec Analysis, the sequence (**Deg A PP**) is not a constituent exclusive of the differential phrase, because this phrase is generated in SpecDegP (Bresnan 1973).

The Spec structure



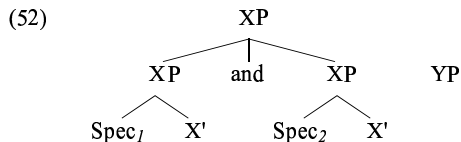
"Across the board" movement of the differential phrase could generate (45), but (43a) shows that such movement is disallowed.

### 3.2.3 Constituent structure 2: Right Node Raising

The postposed modifiers in (50-51) can be interpreted as modifying the subject of the first clause only with a RNR intonational pattern.

(50) In the January 12 issue of *The New York Review of Books*, two books were reviewed and an article appeared [which discussed the situation in Chechnya].

(51) A record will soon be released and a CD-ROM is in production [from MegaWatz Recordz new superstars Mötormouth]!



(53-54) do not require a RNR intonational pattern:

(53) Your latest draft is more interesting and more refined than the earlier versions.

(54) Mel is too young and too inexperienced to be working in a place like this.

This is expected in the EP analysis because (**Deg AP**) is a constituent. In the Spec analysis, (53-54) are structurally parallel to (50-51), and so should require RNR intonation.

### 3.3 Summary

The EP analysis provides a more adequate explanation of the phrase structure of comparative constructions.

## 4 The interpretation of the adjectival projection

Does an EP syntax support a compositional semantics for comparatives?

Interpreting a sentence containing a gradable predicate involves evaluating an implicit or explicit relation between the measure of the subject's *adjectiveness* and some other value (Lewis 1970, Seuren 1973, Kamp 1975, Cresswell 1976, Klein 1980, Bierwisch 1989; see Klein 1991 for general discussion).

### Relations between measures and measures

(55) *Benny is tall* is true iff Benny's tallness is at least as great as *s*, where *s* is a contextually determined standard of tallness.

(56) *Benny is 4 feet tall* is true iff Benny's tallness is at least as great as *4 feet*.

(57) *Benny is taller than his sister* is true iff Benny's tallness exceeds that of his sister.

### Relations between measures and propositions

(58) *The implications of the election were too scary to ignore* is true iff the scariness of the implications of the election made it impossible to ignore them.

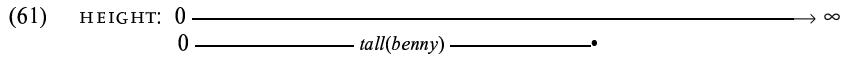
(59) *This train is fast enough to get us to San Jose before noon* is true iff the fastness of the train makes it possible to get us to San Jose before noon.

### 4.1 Adjectives are measure functions

PROPOSAL: Gradable adjectives denote functions from individuals to *degrees*.

(60)  $\|tall(benny)\|$  = the extent of Benny's tallness

- Every gradable adjective is associated with a *scale*.
- A degree is an *interval* of a scale (Seuren 1978, 1984, von Stechow 1984b, Löbner 1991, Kennedy 1997, 1999, to appear a).



This ontology, coupled with a sortal definition of adjectival polarity, supports an explanation of a number of semantic properties of gradable adjectives, including:

*Monotonicity properties* (Kennedy to appear b; cf. Seuren 1978, Ladusaw 1979, Sanchez-Valencia 1996)

- (62) It is dangerous/\*safe to broach that subject *at all*.
- (63) It's lame/\*cool that you *even* have to talk to *any* of these people *at all*.
- (64) It's crazy to own a car in San Francisco.  $\implies \leq \neq$   
 It's crazy to own a car built in the former Yugoslavia in San Francisco.
- (65) It's smart to own a car in Los Angeles.  $\neq \implies \leq$   
 It's smart to own a car built in the former Yugoslavia in Los Angeles.

*Cross-polar anomaly* (Kennedy 1997)

- (66) #Mike is taller than Carmen is short.
- (67) #Carmen is shorter than Mike is tall.
- (68) #San Francisco Bay is shallower than Monterey Bay is deep.
- (69) #Maureen is even less exciting than Maurice is dull.

#### 4.2 A semantics for degree morphology

The absolute and comparative morphemes denote relations between degrees (Russell 1905; cf. Postal 1974, Williams 1977, Cresswell 1976, Moltmann 1992).

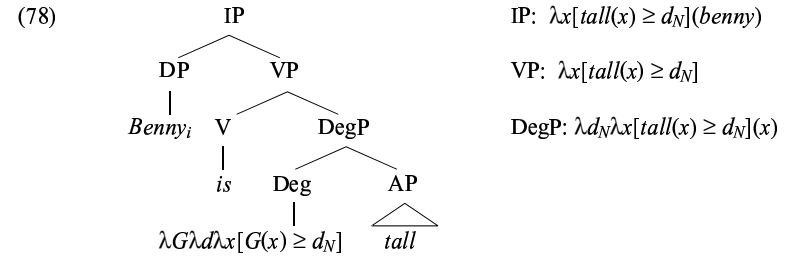
- (70)  $\|Deg^0\| = \lambda G \lambda d \lambda x [\mathbf{R}(G(x))(d)]$
- (71)  $\|_{ABS}\| = \lambda G \lambda d_N \lambda x [G(x) \geq d_N]$  (where  $d_N$  may be a contextually supplied "standard")
- (72)  $\|more/-er\| = \lambda G \lambda d \lambda x [G(x) > d]$
- (73)  $\|less\| = \lambda G \lambda d \lambda x [G(x) < d]$
- (74)  $\|as\| = \lambda G \lambda d \lambda x [G(x) \geq d]$

*Too*, *enough*, and *so* denote modalized relations between extents and propositions (cf. von Stechow 1984a, Moltmann 1992).

- (75)  $\|too\| = \lambda G \lambda p \lambda x [\forall s [G_s(x) \geq G_{so}(x) \rightarrow \neg \diamond p_s]]$
- (76)  $\|enough\| = \lambda G \lambda p \lambda x [\forall s [G_s(x) \geq G_{so}(x) \rightarrow \diamond p_s]]$

#### 4.3 Absolute constructions

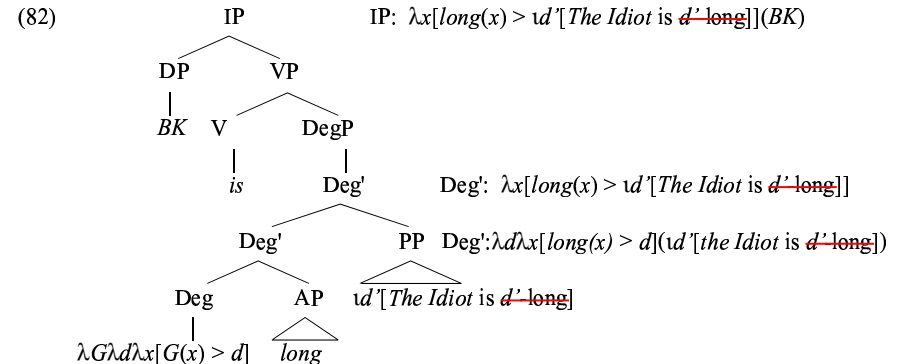
- (77) Benny is tall.



- (79) a.  $tall(benny) \geq d_N$   
 b. Benny's tallness is at least as great as a contextually determined standard of height.
- (80) a. Benny is 4 feet tall.  
 b.  $tall(benny) \geq 4\text{ feet}$   
 c. Benny's tallness is at least as great as 4 feet.

#### 4.4 Comparatives

- (81) a. *The Brothers Karamazov* is longer than *The Idiot* is.  
 b. *The Brothers Karamazov* is longer than [*Op<sub>i</sub>* *The Idiot* is  ~~$d'$~~ long]



- (83)  $long(BK) > \iota d' [The\ Idiot\ is\ d'long]$

We will discuss the syntax and interpretation of the comparative clause in more detail in the coming days.

#### 4.5 Summary

Given the assumption that adjectives denote measure functions, we can provide a straightforward compositional interpretation for the extended adjectival projection.

## 5 Comparison with previous semantic analyses

### 5.1 The relational analysis

Gradable adjectives have an extra "degree" argument whose function is to introduce the standard expression (Cresswell 1976).

- (84)  $\| \text{tall}(\text{benny}, 4 \text{ feet}) \| = 1$  iff  $\text{TALL}(\text{benny}) \geq 4 \text{ feet}$ , where  $\text{TALL}$  is a function from individuals to degrees.

Comparatives involve (existential) quantification over degrees (Seuren 1973, Hellan 1981, von Stechow 1984a, Heim 1985, Lerner & Pinkal 1992,1995, Gawron 1995, Hazout 1995, Rullmann 1995).

- (85) Benny is taller than his sister.  
 (86) Benny is [<sub>AP</sub> [<sub>DegP</sub> er than his sister] tall]  
 (87)  $\exists e[e > \max(\lambda e'. \text{tall}(\text{benny's sister}, e))][\text{tall}(\text{benny}, e)]$   
 (88) *Benny is taller than his sister* is true iff for some extent  $e$  such that  $e$  exceeds the (maximal) extent to which Benny's sister is tall, Benny is at least as tall as  $e$ .

### 5.2 Comparison

The semantic analysis I have proposed for an EP syntax and the relational account differ in the semantic type of the comparative construction:

- In the analysis developed here, DegP is interpreted as a *comparative predicate*.
- In the relational account, DegP is interpreted as a *comparative quantifier*.

Quantifiers/arguments show scope ambiguities; predicates do not.

#### 5.2.1 Universal quantification

An indefinite NP in the scope of a universal quantifier is ambiguous:

- (89) Every pug wants to meet an exiled member of the Royal Family.  
 (90) For every pug  $p$ , there is an exiled member of the Royal Family that  $p$  wants to meet.  
 (91) There is an exiled member of the Royal Family that every pug wants to meet.

A comparative is not:

- (92) Every dog is less beautiful than Pug.  
 (93) For every dog  $d$ , there is an extent of beauty which is exceed by the extent to which Pug is beautiful, and  $d$  is that beautiful.  
 (94) \*There is an extent of beauty less than the extent to which Pug is beautiful, and every dog is that beautiful.

(108) is false in the following situation, because it is not the case that Mort is  $e$  beautiful.

- (95) Domain: {Pug, Mort, Magus, Mole}  
 BEAUTY:  $\frac{\text{Mort}}{\text{Magus}} \frac{\text{Mole}}{\text{Pug}}$   
 $\frac{\text{Pug}}{e}$

The "comparative quantifier" interpretations

- (96)  $\text{every}_d[\text{dog}(d)][\exists y[y < \text{tz.beautiful}(\text{Pug}, z)][\text{beautiful}(d,y)]]$  (= 107)  
 (97)  $\exists y[y < \text{tz.beautiful}(\text{Pug}, z)][\text{every}_d[\text{dog}(d)][\text{beautiful}(d,y)]]$  (= 108)

The "comparative predicate" interpretation

- (98)  $\text{every}_d[\text{dog}(d)][\text{beautiful}(d) < \text{beautiful}(\text{Pug})]$   
 (99) For every dog  $d$ ,  $d$ 's beauty is exceeded by Pug's.

#### 5.2.2 Negation

An indefinite NP in the scope of negation is ambiguous:

- (100) Kim didn't see a friend of mine at the dog show.  
 (101) It's not the case that there is a friend of mine who Kim saw at the show.  
 (102) There is a friend of mine such that Kim didn't see him.

A comparative is not:

- (103) Kim's car isn't more powerful than a Fiat.  
 (104) It is not the case that there is an extent of power greater than the extent to which a Fiat is powerful, and Kim's car is that powerful.  
 (105) \*There is an extent of power greater than the extent to which a Fiat is powerful, and Kim's car is not that powerful.

(119) is true in the context in (120), because it is false that Kim's car is  $e$  powerful.

- (106) POWER:  $\frac{\text{a Fiat}}{\text{Kim's car}}$   
 $\frac{\text{Kim's car}}{e}$

The comparative quantifier interpretations

- (107)  $\neg \exists x[x > \text{ty.powerful}(a \text{ Fiat}, y)][\text{powerful}(\text{Kim's car}, x)]$  (= 104)  
 (108)  $\exists x[x > \text{ty.powerful}(a \text{ Fiat}, y)][\neg \text{powerful}(\text{Kim's car}, x)]$  (= 105)

The comparative predicate interpretation

- (109)  $\neg[\text{dangerous}(\text{Kim's car}) > \text{dangerous}(a \text{ Fiat})]$   
 (110) It's not the case that Kim's car's dangerousness exceeds a Fiat's.

### 5.2.3 Comparatives with less

Exchanges like (111) indicate the need for an *at least as* interpretation of the absolute, with the "maximality" effect explained as a scalar implicature.

- (111) A: You have to be at least 5 feet tall to be an astronaut.  
 B: I'm 5 feet tall; in fact, I'm over 5 feet tall.

This presents a problem for a quantificational analysis of *less* comparatives.

- (112) Huey is less beautiful than Pug.  
 (113)  $\exists y[y < \iota z.beautiful(Pug, z)][beautiful(Huey,y)]$

In the context in (114), (113) is true, because  $e < \iota z.beautiful(Pug, z)$  and  $beautiful(Huey,e)$ !

- (114) BEAUTY:  $\frac{\text{Pug}}{e} > \frac{\text{Huey}}{e}$

The maximality of *less* comparatives is not due to scalar implicature: (115) is a contradiction (cf. (116)).

- (115) #Huey is less beautiful than Pug, but it would be more accurate to say that he's more beautiful than Pug.  
 (116) Some dogs left, but it would be more accurate to say that every dog left.

#### The comparative predicate interpretation

- (117)  $beautiful(Huey) < beautiful(Pug)$   
 (118) The extent to which Huey is beautiful is exceeded by the extent to which Pug is beautiful.

### 5.4 Summary

- A quantificational analysis of comparatives must stipulate that the comparative operator always takes narrow scope; the semantic analysis of EP structures builds the comparison into the semantics of the predicate, and so entails "narrow scope".
- A quantificational account must assume an *exactly* interpretation of the absolute for comparatives with *less* (cf. Rullmann 1995) to derive maximality; maximality is derived in the EP analysis by analyzing adjectives as functions from individuals to degrees.

## 6 Conclusion

The syntactic characteristics of comparatives support the position that adjectives, like other lexical projections, project extended functional structure (Abney 1987, Corver 1990, Grimshaw 1991).

Gradable adjectives are measure functions: they denote functions from objects to degrees.

### 6.1 Results

An extended projection analysis of AP/DegP can be provided with a straightforward compositional semantic interpretation which:

- reflects our intuitions about the meaning of gradable adjectives,
- satisfies the criterion of a coherent syntax-semantics interface, and
- derives the restricted scopal behavior of comparatives.

### 6.2 Questions

- What are the consequences of the EP analysis for the structure and interpretation of the comparative clause?
  - subdeletion
  - comparative deletion
  - scope
- Does the EP analysis provide insights on cross-linguistic variation in comparatives (see e.g. Greenberg's (1963) observation about the correlation between headedness and the order of adjective, degree morpheme, and "standard marker")?
- How does the analysis of adjectives as measure functions interact with the lexical semantic analysis of deadjectival nouns and verbs?
  - *the width of the table/the table's width, Benny's tallness, ....*
  - *dry, cool, widen, narrow, soften, solidify, beautify, ....*

## References

- Abney, S. 1987. *The English Noun Phrase in its Sentential Aspect*. Doctoral dissertation, Massachusetts Institute of Technology, Cambridge, Mass.
- Bierwisch, M. 1989. The semantics of gradation. In Bierwisch, M. and E. Lang (eds.), *Dimensional Adjectives*. Berlin: Springer-Verlag.
- Bresnan, J. 1973. Syntax of the comparative clause construction in English. *Linguistic Inquiry* 4.3:275-343.
- Chomsky, N. 1965. *Aspects of the Theory of Syntax*. Cambridge: MIT Press.
- Corver, N. 1990. *The Syntax of Left Branch Constructions*. Doctoral dissertation, Tilburg University.

Cresswell, M. J. 1976. The semantics of degree. In B. Partee (ed.), *Montague Grammar*. New York: Academic Press.

Emonds, J. 1976. *A Transformational Approach to English Syntax*. New York: Academic Press.

Gawron, M. 1995. Comparatives, superlatives, and resolution. *Linguistics & Philosophy* 18:333-380.

Greenberg, J. 1963. Some universals of grammar with particular reference to the order of meaningful elements. In J. Greenberg (ed.), *Universals of Language*. Cambridge: MIT Press. 58-90.

Grimshaw, J. 1991. Extended projection. Ms., Brandeis University.

Hankamer, J. 1973. Why there are two *than*'s in English. *CLS* 9.

Hankamer, J. and I. Sag. 1976. Deep and surface anaphora. *Linguistic Inquiry*, 7.3:391-426.

Hazout, I. 1995. Comparative ellipsis and Logical Form. *Natural Language and Linguistic Theory* 13:1-37.

Heim, I. 1985. Notes on comparatives and related matters. Ms., University of Texas, Austin.

Hellan, L. 1981. *Towards an Integrated Analysis of Comparatives*. Tübingen: Narr.

Hendrick, Randall. 1978. The Phrase Structure of Adjectives and Comparatives. *Linguistic Analysis* 4.3:255-299.

Hoeksema, J. 1984. Negative polarity and the comparative. *Natural Language and Linguistic Theory* 1:403-434.

Izvorski, R. 1994. A DP-shell for comparatives. *Proceedings of CONSOLE 3*, University of Venice.

Jackendoff, R. 1977. *X' Syntax*. Cambridge: MIT Press.

Kennedy, C. 1999. *Projecting the Adjective: The Syntax and Semantics of Gradability and Comparison*. New York: Garland.

Kennedy, C. 1997. Comparison and polar opposition. *Proceedings of SALT 7*, CLC Publications.

Kennedy, C. To appear a. Polar opposition and the ontology of 'degrees'. *Linguistics and Philosophy*.

Kennedy, C. To appear b. On the monotonicity of polar adjectives. In *Perspectives on Negation and Polarity*, Amsterdam: Benjamins.

Klein, E. 1991. Comparatives. In von Stechow, A. & D. Wunderlich (eds.) *Semantik: Ein internationales Handbuch der zeitgenössischen Forschung*. Berlin: Walter de Gruyter.

Klein, E. 1982. The interpretation of adjectival comparatives. *Journal of Linguistics* 18:113-136.

Klein, E. 1980. A semantics for positive and comparative adjectives. *Linguistics & Philosophy* 4.1:1-45.

Ladusaw, W. 1979. *Polarity as Inherent Scope Relations*. Ph.D. dissertation, University of Texas, Austin.

Larson, R. 1988. Scope and comparatives. *Linguistics & Philosophy* 11:1-26.

Lewis, D. 1970. General semantics. *Synthese* 22:18-27.

Löbner, S. 1990. *Wahr neben Falsch: Duale Operatoren als die Quantoren natürlicher Sprache*. Tübingen: Niemeyer.

McCawley, J. 1988. *The syntactic phenomena of English*. Chicago: University of Chicago Press.

Moltmann, F. 1992. *Coordination and Comparatives*. Ph.D. dissertation, MIT.

Napoli, Donna Jo. 1983. Comparative Ellipsis: A Phrase Structure Analysis. *Linguistic Inquiry* 14.4:675-694.

Postal, P. 1974. On certain ambiguities. *Linguistic Inquiry* 5:367-425.

Rullmann, H. 1995a. *Maximality in the Semantics of WH-Constructions*. Ph.D. dissertation, UMass., Amherst.

Russell, B. 1905. On denoting. *Mind* 14:479-493.

Sánchez-Valencia, V. 1996. Polarity, predicates, and monotonicity. Ms., University of

Groningen.

Seuren, P.A.M. 1984. The comparative revisited. *Journal of Semantics* 3:109-141.

Seuren, P.A.M. 1978. The structure and selection of positive and negative gradable adjectives. In Farkas, D., W. Jacobson & K. Todrys (eds.), *Papers from the Parasession on the Lexicon, CLS 14*, University of Chicago. 336-346.

Seuren, P.A.M. 1973. The comparative. In F. Kiefer & N. Ruwet (eds.), *Generative Grammar in Europe*. Dordrecht: Riedel.

von Stechow, A. 1984a. Comparing semantic theories of comparison. *Journal of Semantics* 3:1-77.

von Stechow, A. 1984b. My reaction to Cresswell's, Hellan's, Hoeksema's, and Seuren's comments. *Journal of Semantics* 3:183-199.

### Contact Information

Department of Linguistics  
Northwestern University  
2016 Sheridan Road  
Evanston, IL 60208

kennedy@northwestern.edu