Alternative Comparison in Underspecified Degree Operators

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- Revisit the recurrent ambiguities between
  Comparison, Additivity, and Continuation

- Demonstrate an analysis based on a comparative meaning that compares structurally derived alternatives

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Cross linguistic ambiguities

The amount comparative in English, *more*, has an additive reading:

(1) John bought three apples. ... Mary bought more (apples).

a. ⇝ Mary bought more than three apples. (comparative reading)

b. ⇝ Mary bought apples, in addition to what John bought. (additive reading)

In German, this additive meaning can be expressed by *noch*, which also has a different, continuative reading:

(2) Otto had **noch** einen Schnapps getrunken.
Otto had *noch* one Schnapps drunk
"Otto had another Schnapps." (additive reading)

(3) Es regnet **noch**.
It raining *noch*
"It is still raining." (continuative reading)

Romanian *mai* has a *three-way* ambiguitiy:

(4) Ion e **mai** intelligent decat Petre.
John is *mai* intelligent than Petre.
"John is more intelligent than Petre." (comparative reading)

(5) Ion va **mai** citi un roman.
John AUX *mai* read a novel
"John will read another nove." (additive reading)

(6) Ion **mai** merge la biblioteca.
John *mai* goes at library.
"John still goes to the library." (continuative reading)

Empirical landscape (Thomas 2018):

- ▷ Ambiguitities between comparison, additivity, and continuation are attested in a diverse set of languages.
- ▷ None of these languages allows for ambiguity between comparison and continuation to the exclusion of additivity.

<table>
<tr><th></th><th>comparison</th><th>additivity</th><th>continuation</th></tr>
<tr><td>✓ (Vietnamese)</td><td>A</td><td>B</td><td>C</td></tr>
<tr><td>✓ (English, French)</td><td colspan="2">A</td><td>B</td></tr>
<tr><td>✓ (German, Hungarian)</td><td>A</td><td colspan="2">B</td></tr>
<tr><td>*(unattested)</td><td>A</td><td>B</td><td>A</td></tr>
<tr><td>✓ (Romanian)</td><td colspan="3">A</td></tr>
</table>

Brief review of the literature

For the majority of the linguistic literature, comparative constructions express a relation between two degrees:

John's maximal degree of tallness exceeds 5'8" (i.e. Mary's height)

John

is

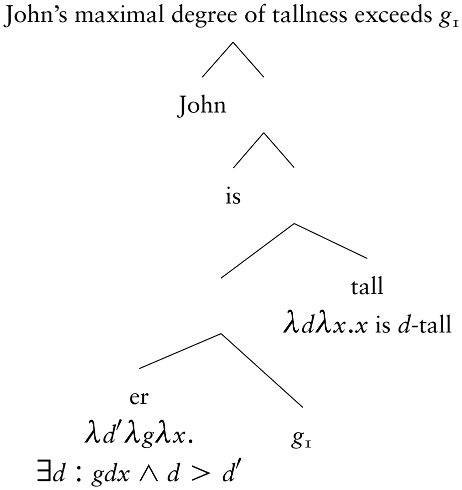
tall
$\lambda d \lambda x . x$ is d-tall

er
$\lambda d' \lambda g \lambda x .$
$\exists d : gdx \wedge d > d'$

than Mary is d-tall
$5'8''$

Implication on *incomplete comparatives*?

A fair hypothesis is the overt standard is replaced by a degree pro-form:



- additive *more* can be captured as a derived measure function of events: (cf. Greenberg 2010, Thomas 2010)

(7) $[\![\text{more}]\!]^{1}$:=
$$\lambda d\lambda Q\lambda P\lambda e.\exists x:[Qx \wedge P(x,e) \wedge \mu(h(e)) = d]\wedge$$
$$\partial(\exists e', P', d', y:[Qy \wedge P'(y,e') \wedge \mu(h(e')) = d'])\wedge$$
$$\exists e''\exists P''\exists z:[Qz \wedge P''(z,e'') \wedge z = x+y \wedge \mu(h(e'')) = d+d']$$

(8) $[\![\text{John bought two more apples}]\!] \rightsquigarrow$

- continuative operators like *still* are typically associated with a scale determined by its containing context:

(9) $[\![\text{noch/still}]\!] := \lambda S\lambda x'\lambda x\lambda P.\partial(x' \prec_S x \wedge Px') \wedge Px$

[1] In this talk I use the partiality operator ∂ (Beaver & Krahmer 2001) to indicate presupposition: $\partial(p) = 1$ iff $p = 1$, otherwise $\partial(p) = \#$.

The issue:
wildly different lexical entries (but see Feldscher 2017[2], hard to see how to establish any logical connection between the three meanings and explain the recurrent ambiguities.

[2] Feldscher (2017) proposes a way to derive the additive reading from the comparative reading, but didn't discuss the continuative readings.

Previous proposal: a re-analysis of the comparative couched in scale segment semantics (cf. Schwarzschild 2013)

- ▷ A scale segment is an abstract entity, which provides a structured representation for degree-related meanings:

(10) A scale segment σ is a quadruple $\langle u, v, >_\sigma, \mu_\sigma \rangle$

(11) $[\![$ *Mary is taller than John* $]\!]$:=
$\exists \sigma.\text{START}(\sigma, \mu_\sigma \text{j}) \wedge \nearrow \sigma \wedge \mu_\sigma = \text{HT} \wedge \text{END}(\sigma, \mu_\sigma \text{m})$

- ▷ We'll circle back to this proposal.
- ▷ It's still worthwhile to consider an apporach that does without scale segments.

Alternative comparisons

Li (2021): Comparatives compare two things of the same type (i.e. two alternatives) on a locally derived measurement dimension

(cf. Heim 1985, Bhatt & Takahashi 2007)

John

$\text{er}_{d',y}$

$$\lambda f \lambda x.\, \partial(d' = \max(\{d \mid fdy\})) \wedge \max(\{d \mid fdx\}) > d'$$

λd

λx $\quad$ x is d-tall

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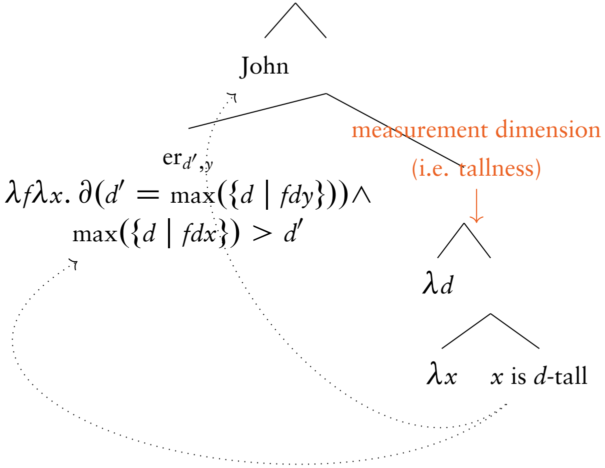

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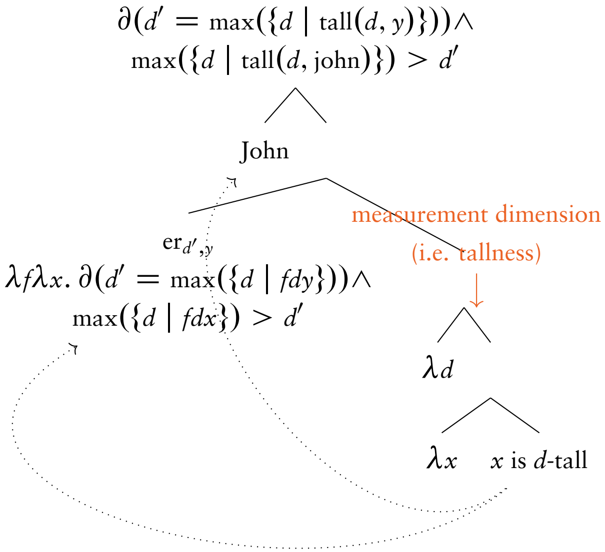


er may be licensed by any scope-takers in the sentence, generating a comparison about the variables they bind:

(12) Mary^{y} is 6 ft$^{d'}$ tall. ... Today I finally met a taller$_{d',y}$ woman. $\rightsquigarrow$
$[\,\text{a}\,[\,\text{er}_{d',y}\ \lambda x \lambda d\,[\,x[\,d\text{-tall woman}\,]\,]\,]$ determiner

(13) John criticized^{P} five$^{d'}$ books. ... He PRAISED more$_{d',P}$. $\rightsquigarrow$
$[\,\text{PRAISED}\ [\text{er}_{d',P}\ \lambda P \lambda d\,[\,d\text{-many books}\ \lambda z[\,\text{He}\ P\ z\,]\,]\,]$ predicate

(14) This boat is 20 ft$^{d'}$ long. ... I thought it was longer$_{d',w@}$. $\rightsquigarrow$
$[\,\text{I thought}_{w@}\ [\,\text{er}_{d',w@}\ \lambda w \lambda d\,[\,\text{it was}_{w}\ d\text{-long}\,]\,]$ intensional Op

(15) John^{y} criticized^{P} five$^{d'}$ books. ... Mary PRAISED more$_{d',P,y}$. $\rightsquigarrow$
$[\,\text{Mary}\ [\,\text{PRAISED}\,[\,\text{er}_{d',P,y}\ \lambda P\ \lambda x\ \lambda d\,[\,d\text{-many books}\ \lambda z[\,x\ P\ z\,]\,]\,]\,]$
multi licensors[3]

[3] Technically, for this we need to adjust the meaning of *er* to a more general one:
$\partial(d' = \max(\{d \mid f d y_{\circ} \ldots y_{n}\})) \wedge \lambda f \lambda x_{\circ} \ldots \lambda x_{n}.\max(\{d \mid f d x_{\circ} \ldots x_{n}\}) > d'$

Only restriction for possible comparisons: the standard degree must be the measurement of the standard alternative on the locally derived dimension.

Proposal for CAC ambiguities: we can compositionally derive the meaning of additive/continuative meaning from the comparative, because both meanings can be cashed out using alternative comparisons.

Deriving additivity by summing up the alternatives:

$$\partial(d' = \max\{d \mid y \text{ bought } d\text{-many apples}\}) \wedge \max\{d \mid \text{john bought } d\text{-many apples}\} > d'$$

$$\text{john}^{u} \qquad \lambda x.\partial(d' = \max\{d \mid y \text{ bought } d\text{-many apples}\}) \wedge \max\{d \mid x \text{ bought } d\text{-many apples}\} > d'$$

$$\text{er}_{d',y}$$

$$\lambda d \lambda x \qquad x \text{ bought } d\text{-many apples}$$

(Mary bought three apples. ...) John bought more apples.

⇝ John bought more apples than Mary.

Deriving additivity by summing up the alternatives:

$$\lambda x.\partial(d' = \max\{d \mid y \text{ bought } d\text{-many apples}\}) \wedge \max\{d \mid x \oplus y \text{ bought } d\text{-many apples}\} > d'$$

john^u

$$\lambda x.\partial(d' = \max\{d \mid y \text{ bought } d\text{-many apples}\}) \wedge \max\{d \mid x \oplus y \text{ bought } d\text{-many apples}\} > d'$$

ADD$_y$

$\lambda f \lambda x.f(x \oplus y)$

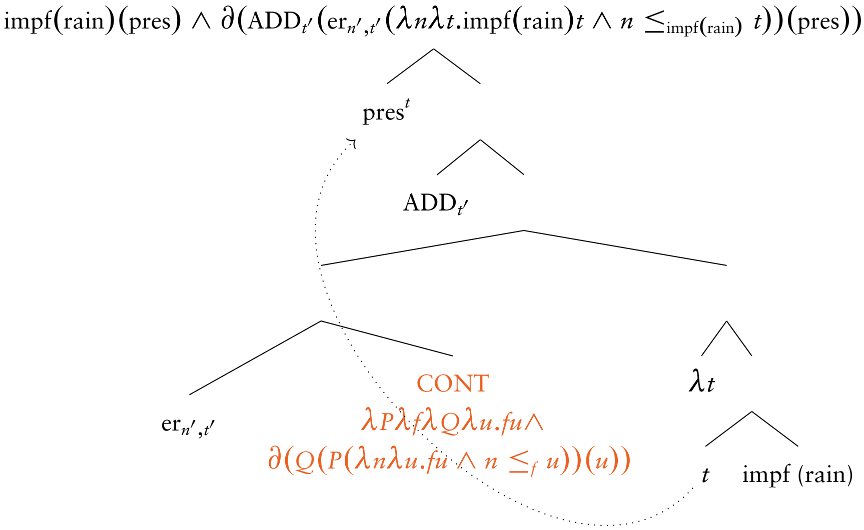
$$\lambda x.\partial(d' = \max\{d \mid y \text{ bought } d\text{-many apples}\}) \wedge \max\{d \mid x \text{ bought } d\text{-many apples}\} > d'$$

er$_{d',y}$ ...

(Mary bought three apples. ...) John bought more apples.

$\rightsquigarrow$ John and Mary bought more apples than Mary alone.

Deriving continuation as a presupposed additive comparison:



$$\mathrm{ADD}_{t'}(\mathrm{er}_{n',t'}(\lambda n\lambda t.\mathrm{impf}(\mathrm{rain})t \wedge n \leq_{\mathrm{impf}(\mathrm{rain})} t))(\mathrm{pres})$$[4]

$$= \partial(n' = \max\left\{n|\mathrm{impf}(\mathrm{rain})t' \wedge n \leq_{\mathrm{impf}(\mathrm{rain})} t'\right\}) \wedge$$
$$\max\left\{n|\mathrm{impf}(\mathrm{rain})(\mathrm{pres} \oplus t') \wedge n \leq_{\mathrm{impf}(\mathrm{rain})} (\mathrm{pres} \oplus t')\right\} > n'$$

[4] $n \leq_f u := fu \models_c fn$; for any two propositions p, q, $p \models_c q$ iff $\forall w \in c : pw \rightarrow qw$.

$\lambda t.\exists e : \mathrm{rain}e \wedge t \subseteq \tau(e)$

$\mathrm{ADD}_{t'}(\mathrm{er}_{n',t'}(\lambda n \lambda t.\mathrm{impf}(\mathrm{rain})t \wedge n \leq_{\mathrm{impf}(\mathrm{rain})} t))(\mathrm{pres})$[4]
$= \partial(n' = \max\{n | \mathrm{impf}(\mathrm{rain})t' \wedge n \leq_{\mathrm{impf}(\mathrm{rain})} t'\}) \wedge$
$\max\{n | \mathrm{impf}(\mathrm{rain})(\mathrm{pres} \oplus t') \wedge n \leq_{\mathrm{impf}(\mathrm{rain})} (\mathrm{pres} \oplus t')\} > n'$
$= \partial(n' = \max\{n | \exists e : \mathrm{rain}e \wedge t' \subseteq \tau(e) \wedge n \text{ is a subinterval of } t'\}) \wedge \max$
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[4] $n \leq_f u := fu \models_c fn$; for any two propositions p, q, $p \models_c q$ iff $\forall w \in c : pw \to qw$.

$n \leq_{\lambda t.\exists e:\text{rain}e \wedge t \subseteq \tau(e)} t$

$\text{ADD}_{t'}(\text{er}_{n',t'}(\lambda n \lambda t.\text{impf}(\text{rain})t \wedge n \leq_{\text{impf}(\text{rain})} t))(\text{pres})$[4]
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$= \partial(\exists e : \text{rain}e \wedge t' \subseteq \tau(e) \wedge n' = t') \wedge \exists e : \text{rain}e \wedge (\text{pres} \oplus t') \subseteq$
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$\exists e : \text{rain}e \wedge t \in \tau(e) \models_c \exists e : \text{rain}e \wedge n \subseteq \tau(e)$

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n is a sub-interval of t

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$= \partial(n' = \max\{n | \mathrm{impf(rain)}t' \wedge n \leq_{\mathrm{impf(rain)}} t'\}) \wedge$
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$= \partial(\exists e : \mathrm{rain}e \wedge t' \subseteq \tau(e)) \wedge \exists e : \mathrm{rain}e \wedge (\mathrm{pres} \oplus t') \subseteq \tau(e) \wedge t' \prec \mathrm{pres}$

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$= \partial(n' = \max\{n|\exists e : \text{rain}e \wedge t' \subseteq \tau(e) \wedge n \text{ is a subinterval of } t'\}) \wedge \max$ $n' = t'$

$\{n|\exists e : \text{rain}e \wedge (\text{pres} \oplus t') \subseteq \tau(e) \wedge n \text{ is a subinterval of } (\text{pres} \oplus t')\} > n'$

$= \partial(\exists e : \text{rain}e \wedge t' \subseteq \tau(e) \wedge n' = t')\wedge \exists e : \text{rain}e \wedge (\text{pres} \oplus t') \subseteq$

$\tau(e) \wedge \max\{n|n \text{ is a subinterval of } (\text{pres} \oplus t')\} > n'$

$= \partial(\exists e : \text{rain}e \wedge t' \subseteq \tau(e))\wedge$

$\exists e : \text{rain}e \wedge (\text{pres} \oplus t') \subseteq \tau(e) \wedge (\text{pres} \oplus t') > t'$

$= \partial(\exists e : \text{rain}e \wedge t' \subseteq \tau(e)) \wedge \exists e : \text{rain}e \wedge (\text{pres} \oplus t') \subseteq \tau(e) \wedge t' \prec \text{pres}$

[4] $n \leq_f u := fu \models_c fn$; for any two propositions p, q, $p \models_c q$ iff $\forall w \in c : pw \rightarrow qw$.

$$\text{impf}(\text{rain})(\text{pres}) \wedge \partial(\text{ADD}_{t'}(\text{er}_{n',t'}(\lambda n \lambda t.\text{impf}(\text{rain})t \wedge n \leq_{\text{impf}(\text{rain})} t))(\text{pres}))$$

$\text{impf}(\text{rain})(\text{pres}) \wedge \partial(\text{ADD}_{t'}(\text{er}_{n',t'}(\lambda n \lambda t.\text{impf}(\text{rain})t \wedge n \leq_{\text{impf}(\text{rain})}$
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- Assertion: it is raining now.
- Presupposition: the raining has continued from an earlier time t'.
- Implicature: the speaker can't assert that the rain will continue to a time later than now.

Deriving the typology

Distributed Morphology (Halle & Marantz 1993):

- The terminals of syntactic structures are **morphemes**: sets of features without phonological content.
- **Subset Principle**: a morpheme, i.e. a set of features, is spelt out by the lexical item that matches its greatest subset of features (Halle 2000).

CAC operators (e.g. *more*, *noch*, *still*)

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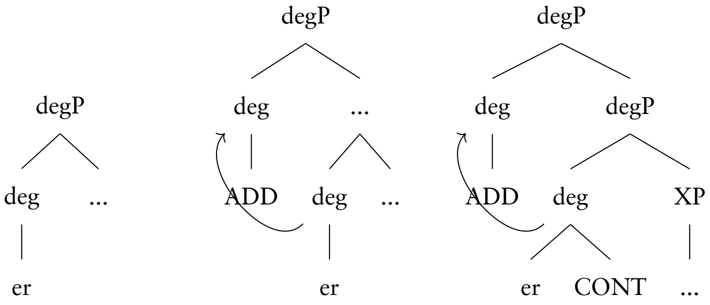

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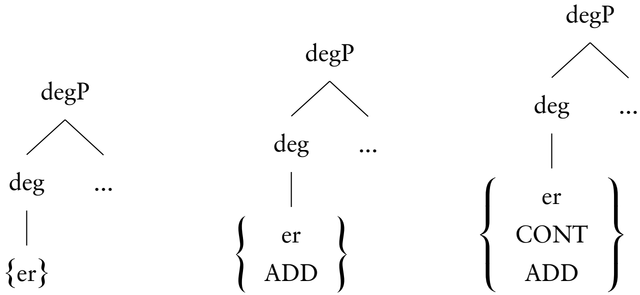


(a) comparison (b) additivity (c) continuation

Generating the typological distribution:

Comp./Add. | Cont.	English: $\{er\} \leftrightarrow$ er, $\{er, CONT, ADD\} \leftrightarrow$ still
Comp. | Add./Cont.	German: $\{er\} \leftrightarrow$ mehr, $\{er, ADD\} \leftrightarrow$ noch
Comp. /Add. /Cont.	Romanian: $\{er\} \leftrightarrow$ mai
Comp. | Add. | Cont.	Vietnamese: $\{er\} \leftrightarrow$ hon, $\{er, ADD\} \leftrightarrow$ nūa, $\{er, CONT, ADD\} \leftrightarrow$ van

Explaining the implicational universal:

- α is the phonological realization of both $\{er\}$ and $\{er, CONT, ADD\}$
  $\rightarrow \alpha$ is the item matching the biggest subset of $\{er, ADD\}$
- i.e. Comparison/Continuation $\rightarrow$ Comparison/Additivity/Continuation

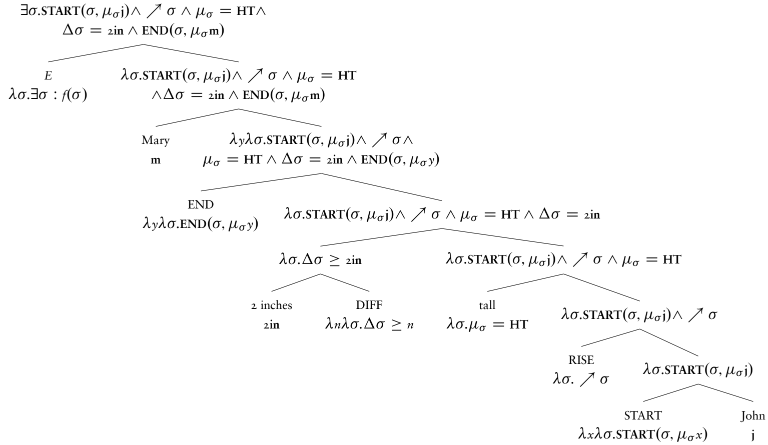
Comparing to scale segments

In scale segment semantics:

- Instead of denoting a relation between degrees and individuals, adjectives denote a predicate of scale segments.

  (16) $[\![\text{tall}]\!] := \lambda\sigma.\mu_\sigma = \text{HEIGHT}$

- Components of the comparison (i.e. the target and the standard of the comparison, the differential) are treated as modifiers of the scale segment.



$\exists\sigma.\mathbf{START}(\sigma, \mu_\sigma \mathbf{j}) \wedge \nearrow \sigma \wedge \mu_\sigma = \mathbf{HT} \wedge$
$\Delta\sigma = \mathbf{2in} \wedge \mathbf{END}(\sigma, \mu_\sigma \mathbf{m})$
E
$\lambda\sigma.\exists\sigma : f(\sigma)$
$\lambda\sigma.\mathbf{START}(\sigma, \mu_\sigma \mathbf{j}) \wedge \nearrow \sigma \wedge \mu_\sigma = \mathbf{HT}$
$\wedge \Delta\sigma = \mathbf{2in} \wedge \mathbf{END}(\sigma, \mu_\sigma \mathbf{m})$
Mary
$\mathbf{m}$
$\lambda y \lambda\sigma.\mathbf{START}(\sigma, \mu_\sigma \mathbf{j}) \wedge \nearrow \sigma \wedge$
$\mu_\sigma = \mathbf{HT} \wedge \Delta\sigma = \mathbf{2in} \wedge \mathbf{END}(\sigma, \mu_\sigma y)$
END
$\lambda y \lambda\sigma.\mathbf{END}(\sigma, \mu_\sigma y)$
$\lambda\sigma.\mathbf{START}(\sigma, \mu_\sigma \mathbf{j}) \wedge \nearrow \sigma \wedge \mu_\sigma = \mathbf{HT} \wedge \Delta\sigma = \mathbf{2in}$
$\lambda\sigma.\Delta\sigma \geq \mathbf{2in}$
$\lambda\sigma.\mathbf{START}(\sigma, \mu_\sigma \mathbf{j}) \wedge \nearrow \sigma \wedge \mu_\sigma = \mathbf{HT}$
2 inches
$\mathbf{2in}$
DIFF
$\lambda n \lambda\sigma.\Delta\sigma \geq n$
tall
$\lambda\sigma.\mu_\sigma = \mathbf{HT}$
$\lambda\sigma.\mathbf{START}(\sigma, \mu_\sigma \mathbf{j}) \wedge \nearrow \sigma$
RISE
$\lambda\sigma. \nearrow \sigma$
$\lambda\sigma.\mathbf{START}(\sigma, \mu_\sigma \mathbf{j})$
START
$\lambda x \lambda\sigma.\mathbf{START}(\sigma, \mu_\sigma x)$
John
$\mathbf{j}$

(17) $[\![$Mary is two inches taller than John$]\!]$

$$:= \exists\sigma.\mathbf{START}(\sigma, \mu_\sigma \mathbf{j}) \wedge \nearrow \sigma \wedge \mu_\sigma = \mathbf{HT} \wedge$$
$$\Delta\sigma = \mathbf{2in} \wedge \mathbf{END}(\sigma, \mu_\sigma \mathbf{m})$$

$\rightsquigarrow$ There is a rising scale segment of height that starts from John's measurement and ends at Mary's measurement.

$$\exists\sigma.\nearrow\sigma \wedge \mu_\sigma = \text{COUNT} \wedge \text{START}(\sigma, \mu_\sigma g_1)\wedge$$
$$\text{END}(\sigma, \mu_\sigma(\oplus(\{x \mid \text{apples}x \wedge \text{john bought } x\})))$$

E

$$\lambda f.\exists\sigma : f(\sigma)$$

$$\lambda\sigma.\nearrow\sigma \wedge \mu_\sigma = \text{COUNT} \wedge \text{START}(\sigma, \mu_\sigma g_1)\wedge$$
$$\text{END}(\sigma, \mu_\sigma(\oplus(\{x \mid \text{apples}x \wedge \text{john bought } x\})))$$

$$\lambda x.\text{john bought } x$$

apples

AMT

$$\lambda\Sigma\lambda P\lambda Q\lambda\sigma.\Sigma(\oplus(P \cap Q))(\sigma)$$

$$\lambda x\lambda\sigma.\nearrow\sigma \wedge \mu_\sigma = \text{COUNT}\wedge$$
$$\text{START}(\sigma, \mu_\sigma g_1) \wedge \text{END}(\sigma, \mu_\sigma x)$$

END

$$\lambda x\lambda\sigma.\text{END}(\sigma, \mu_\sigma x)$$

$$\lambda\sigma.\nearrow\sigma \wedge \mu_\sigma = \text{COUNT} \wedge \text{START}(\sigma, \mu_\sigma g_1)$$

COUNT

$$\lambda\sigma, \mu_\sigma = \text{COUNT}$$

$$\lambda\sigma.\nearrow\sigma \wedge \text{START}(\sigma, \mu_\sigma g_1)$$

RISE

$$\lambda\sigma.\nearrow\sigma$$

$$\lambda\sigma.\text{START}(\sigma, \mu_\sigma g_1)$$

START

$$\lambda x\lambda\sigma.\mathbf{START}(\sigma, \mu_\sigma x)$$

g_1

(18) $[\![\text{John bought more apples}]\!]$ (comparative reading)

$$:= \exists\sigma.\ \nearrow \sigma \wedge \mu_\sigma = \text{COUNT} \wedge \text{START}(\sigma, \mu_\sigma g_1) \wedge$$
$$\text{END}(\sigma, \mu_\sigma(\bigoplus(\{x \mid \text{apples}x \wedge \text{john bought } x\})))$$

$\rightsquigarrow$ There is a rising scale segment of quantity that starts from the measurement of the apples John bought and ends at the measurement of some antecedent apples.

(19) $\text{ADD} := \lambda\Sigma\lambda\Sigma'\lambda x\lambda\sigma.\Sigma(\sigma)(g_1) \wedge \Sigma'(\sigma)(x \oplus g_1)$

$\exists\sigma. \nearrow \sigma \wedge \mu_\sigma = \text{COUNT} \wedge \text{START}(\sigma, \mu_\sigma(g_1))\wedge$
$\text{END}(\sigma, \mu_\sigma(\oplus(\{x \mid \text{apples}x \wedge \text{john bought } x\})) \oplus g_1)$

E
$\lambda f.\exists\sigma : f(\sigma)$

$\lambda\sigma. \nearrow \sigma \wedge \mu_\sigma = \text{COUNT} \wedge \text{START}(\sigma, \mu_\sigma(g_1))\wedge$
$\text{END}(\sigma, \mu_\sigma(\oplus(\{x \mid \text{apples}x \wedge \text{john bought } x\})) \oplus g_1)$

$\lambda x.\text{john bought } x$

apples

AMT
$\lambda\Sigma\lambda P\lambda Q\lambda\sigma.\Sigma(\oplus(P \cap Q))(\sigma)$

$\lambda x\lambda\sigma. \nearrow \sigma \wedge \mu_\sigma = \text{COUNT}\wedge$
$\text{START}(\sigma, \mu_\sigma(g_1)) \wedge \text{END}(\sigma, \mu_\sigma(x \oplus g_1)$

END
$\lambda x\lambda\sigma.\text{END}(\sigma, \mu_\sigma x)$

$\lambda\Sigma'\lambda x\lambda\sigma. \nearrow \sigma \wedge \mu_\sigma = \text{COUNT}\wedge$
$\text{START}(\sigma, \mu_\sigma(g_1)) \wedge \Sigma'(\sigma)(x \oplus g_1)$

ADD
$\lambda\Sigma_{e\to lt}\lambda\Sigma'_{e\to lt}\lambda x\lambda\sigma.\Sigma(\sigma)(g_1) \wedge \Sigma'(\sigma)(x \oplus g_1)$

COUNT [RISE [START]]
$\lambda x\lambda\sigma. \nearrow \sigma \wedge \mu_\sigma = \text{COUNT} \wedge \text{START}(\sigma, \mu_\sigma x)$

(20) $[\![\text{John bought more apples}]\!]$ (additive reading)

$$:= \exists\sigma.\ \nearrow \sigma \wedge \mu_\sigma = \text{COUNT} \wedge \text{START}(\sigma, \mu_\sigma(g_1)) \wedge$$
$$\text{END}(\sigma, \mu_\sigma(\bigoplus(\{x \mid \text{apples}x \wedge \text{john bought } x\})) \oplus g_1)$$

$\rightsquigarrow$ There is a rising scale segment of quantity that starts from the measurement of some antecedent apples and ends with the measurement of the antecedent apples and the apples John bought.

(21) $[\![\text{it is still raining}]\!] :=$
$$\exists e.\mathbf{rain}(e) \wedge t_e \subseteq \tau(e) \wedge$$
$$\partial(\exists\sigma\exists\epsilon\exists t'[\mathbf{rain}(\epsilon) \wedge t' \subseteq \tau(\epsilon) \wedge \neg\mathbf{INIT}(e,\epsilon) \wedge \mu_\sigma =$$
$$\mathbf{STAGE}_\epsilon \wedge \nearrow \sigma \wedge \mu_\sigma = \mathbf{COUNT} \wedge \mathbf{START}(\sigma, \mu_\sigma(g_1))$$
$$\wedge \mathbf{END}(\sigma, \mu_\sigma(e \oplus g_1))])$$

- ▷ Assertion: now is within the duration of a raining event.
- ▷ Presupposition: there is a rising scale segment of event development that starts from the measurement of some antecedent event and ends with the sum of this antecedent event and the current event.

(22) CON :=

$$\lambda\Sigma\lambda R\lambda e\lambda t.R(e)(t) \wedge \partial(\exists\sigma\exists\epsilon\exists t'[R(\epsilon)(t') \wedge \neg\mathbf{INIT}(e,\epsilon)\wedge \mu_\sigma = \mathbf{STAGE}_\epsilon \wedge \Sigma(e)(\sigma)])$$

$\exists e.\mathbf{rain}(e) \wedge t_e \subseteq \tau(e)\wedge$
$\partial(\exists\sigma\exists\epsilon\exists t'[\mathbf{rain}(\epsilon) \wedge t' \subseteq \tau(\epsilon) \wedge \neg\mathbf{INIT}(e,\epsilon) \wedge \mu_\sigma = \mathbf{STAGE}_\epsilon\wedge$
$\nearrow \sigma \wedge \mu\sigma = \mathbf{COUNT} \wedge \mathbf{START}(\sigma, \mu_\sigma(g_1)) \wedge \mathbf{END}(\sigma, \mu_\sigma(e \oplus g_1)])$

PRES

$\exists_e$

$\lambda e\lambda t.\mathbf{rain}(e) \wedge t \subseteq \tau(e)\wedge$
$\partial(\exists\sigma\exists\epsilon\exists t'[\mathbf{rain}(\epsilon) \wedge t' \subseteq \tau(\epsilon) \wedge \neg\mathbf{INIT}(e,\epsilon) \wedge \mu_\sigma = \mathbf{STAGE}_\epsilon\wedge$
$\nearrow \sigma \wedge \mu\sigma = \mathbf{COUNT} \wedge \mathbf{START}(\sigma, \mu_\sigma(g_1)) \wedge \mathbf{END}(\sigma, \mu_\sigma(e \oplus g_1)])$

$\lambda R\lambda e\lambda t.R(e)(t)\wedge$
$\partial(\exists\sigma\exists\epsilon\exists t'[R(\epsilon)(t') \wedge \neg\mathbf{INIT}(e,\epsilon) \wedge \mu_\sigma = \mathbf{STAGE}_\epsilon\wedge$
$\nearrow \sigma \wedge \mu\sigma = \mathbf{COUNT} \wedge \mathbf{START}(\sigma, \mu_\sigma(g_1)) \wedge \mathbf{END}(\sigma, \mu_\sigma(e \oplus g_1)])$

$\lambda e\lambda t.\mathbf{rain}e \wedge t \subseteq \tau(e)$

CON
$\lambda\Sigma\lambda R_{v\to i\to t}\lambda e_v\lambda t_i.R(e)(t)\wedge$
$\partial(\exists\sigma\exists\epsilon\exists t'[R(\epsilon)(t') \wedge \neg\mathbf{INIT}(e,\epsilon)\wedge$
$\mu_\sigma = \mathbf{STAGE}_\epsilon \wedge \Sigma(e)(\sigma)])$

END[ADD[COUNT [RISE [START]]]]
$\lambda x\lambda\sigma.\ \nearrow \sigma \wedge \mu\sigma = \mathbf{COUNT}\wedge$
$\mathbf{START}(\sigma, \mu_\sigma(g_1)) \wedge \mathbf{END}(\sigma, \mu_\sigma(x \oplus g_1))$

PROG
$\lambda e\lambda t.\tau(e) \subseteq t$

rain
$\lambda e.\mathbf{rain}x$

Similarities with my proposal:

- ▷ The comparison meaning is captured as a comparison between two correlates.
- ▷ The logical connection between CAC meanings is derived by incrementally adding covert operators manipulating the correlates and the measurement dimension.

Difference: whether or not the measurement dimension is structurally derived.

Difference in prediction 1: infelicitous anaphoricity in amount comparatives.

Context: Mary bought three apples. $[\![$John bought more apples$]\!]$:=

(23) $\exists\sigma. \nearrow \sigma \wedge \mu_\sigma = \text{COUNT} \wedge \text{START}(\sigma, \mu_\sigma(g_1)) \wedge \text{END}$
$(\sigma, \mu_\sigma(\bigoplus(\{x \mid \text{apples}x \wedge \text{john bought}\, x\})) \oplus g_1)$ (Thomas 2018)
$\rightsquigarrow$ comparing the first-mentioned three apples $\oplus$ the apples John bought and the three apples.

(24) $\partial(d' = \max\{d \mid g_1 \text{ bought } d\text{-many apples}\}) \wedge$
$\max\{d \mid \text{john} \oplus g_1 \text{ bought } d\text{-many apples}\} > d'$ (my proposal)
$\rightsquigarrow$ comparing Mary $\oplus$ John and Mary in the apples they bought, presupposing the first mentioned quantity *three* is the number of apples Mary bought.

Only (24) makes the correct prediction in a context with added negation:

(25) Mary didn't buy those three apples. .... ?? John bought more apples.

- *More* in (25) doesn't have an additive (or comparative) reading.
- (23) still generates the same felicitous meaning.
- (24) doesn't: the presupposition can't be satisfied in this context!

Difference in prediction 2: varieties of the continuative reading

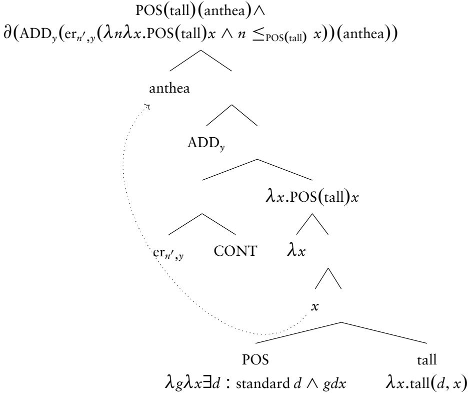
(26) Anthea is still tall.

a. $\rightsquigarrow$ Anthea was tall at some earlier time. (temporal reading)

b. $\rightsquigarrow$ Anthea is only marginally tall. (marginal reading)

- ▷ Continuative operators like *still* across languages are systematically ambiguous between a variety of flavors.
- ▷ The scale segment approach in Thomas (2018): unclear how to derive these different flavors of non-temporal continuation, as the measurement dimension (event development) is hard-wired into the meaning of CON.

▷ My proposal can derive the marginal reading of (26): change the scale of the presupposed comparison by changing the scope property of CONT.



(27) $\mathrm{POS}(\mathrm{tall})(\mathrm{anthea}) \wedge \partial(\mathrm{ADD}_y(\mathrm{er}_{n',y}(\lambda n \lambda x.\mathrm{POS}(\mathrm{tall})x \wedge n \leq_{\mathrm{POS}(\mathrm{tall})} x))(\mathrm{anthea}))$
$\rightsquigarrow \exists d : \text{standard } d \wedge \mathrm{tall}(d, \mathrm{anthea}) \wedge$
$\partial(\max\{n \mid \mathrm{POS}(\mathrm{tall})(\mathrm{a} \oplus y) \wedge n \leq_{\mathrm{POS}(\mathrm{tall})} (\mathrm{a} \oplus y)\} >$
$\max\{n \mid \mathrm{POS}(\mathrm{tall})y \wedge n \leq_{\mathrm{POS}(\mathrm{tall})} y\})$
$= \exists d : \text{standard } d \wedge \mathrm{tall}(d, \mathrm{anthea}) \wedge$
$\partial(\exists d : \text{standard } d \wedge \mathrm{tall}(d, \mathrm{anthea} \oplus y) \wedge y \text{ is taller than anthea})$

a. Assertion: Anthea is tall.

b. Presupposition: An alternative individual y is tall and taller than Anthea.

c. Implicature: People shorter than Anthea are not tall (i.e. Anthea is only marginally tall).

▷ We can generate different readings of the same sentence by having different scope configurations, explaining the ambiguity of (28).

(28) can still explain Exercise two to Peter. ?

a. Focusing *Peter* $\rightsquigarrow$ Paul is beyond my help.

b. Focusing *two* $\rightsquigarrow$ Exercise three is too hard.

(29) $[\,\text{PETER}\,[\,\text{ADD}_y\,[\,[\,\text{er}_{n',y}\ \text{CONT}\,]\lambda x\,[\,\text{I can explain ex. two to } x\,]\,]\,]\,]$

a. presupposed additive comparison:
$\max\{n \mid \text{I can explain ex. 2 to p} \oplus y \wedge n \leq_{\text{I can explain ex. 2 to}} (\text{p} \oplus y)\}$
$> \max\{n \mid \text{I can explain ex. 2 to } y \wedge n \leq_{\text{I can explain ex. 2 to}} y\}$

b.
- ▷ Assertion: I can explain ex. 2 to Peter.
- ▷ Presupposition: I can also explain ex. 2 to an alternative individual *y*, and it is easier to do so than to Peter.
- ▷ Implicature: for people who are ranked even lower on the scale (i.e. harder to teach than Peter), I may not be able to explain ex. 2 to them.

(30) $[\,\mathrm{TWO}\,[\,\mathrm{ADD}_y\,[\,[\,\mathrm{er}_{n',y}\ \mathrm{CONT}\,]\lambda x\,[\,\text{I can explain ex.}x\text{ to Peter}\,]\,]\,]\,]$

a. presupposed additive comparison:
$\max\{n \mid \text{I can explain ex. } 2 \oplus y \text{ to p} \wedge n \leq_{\lambda x.\text{I can explain ex. } x \text{ to p}} (2 \oplus y)\}$
$> \max\{n \mid \text{I can explain ex. } y \text{ to p} \wedge n \leq_{\lambda x.\text{I can explain ex. } x \text{ to p}} y\}$

b.
- ▷ Assertion: I can explain ex. 2 to Peter.
- ▷ Presupposition: I can also explain ex. 2 to an alternative individual y, and it is easier to do so than to Peter.
- ▷ Implicature: for people who are ranked even lower on the scale (i.e. harder to teach than Peter), I may not be able to explain ex. 2 to them.

Conclusions

Cross linguistically, we have degree operators ambiguous between comparison, additivity, and continuation.

A comparative meaning that compares correlates on a structurally alternatives, combined with the subset principle in Distributed Morphology, can explain the these ambiguities and their cross-linguistic distributions.

The proposal crucially differs from the previous analysis (Thomas 2018) in how the correlates and the measurement dimension is determined, and I have shown a structural approach makes better predictions.

Thank you!

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