'Most' in Subject Position

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ESSLLI Workshop
The Proper Use of Quantification in Ordinary Language

August 9, 2011

Outline

Section 1

Background

Object position

- Two readings of *most* in object position (Hackl 2009)
- Disambiguated by bare *most* vs. *the most* in English

(1) **Proportional**
   a. John climbed most of the mountains
   b. $\approx$ John climbed more than half of the mountains

(2) **Superlative**
   a. John climbed the most mountains
   b. $\approx$ John climbed more mountains than Bill or Mary

Subject position

▸ It is considered that *most* in subject position does not have a superlative reading (cf. Szabolcsi 1986, Farkas and Kiss 2000)

(3) Most of the circles are blue

    a. **Proportional**
       More than half of the circles are blue

    b. **Superlative**
       (*)There are more blue circles than red circles or yellow circles

(4) (*)The most circles are blue

Overview

- Observe
  1. Superlative readings of *most* in subject position are available for some speakers
  2. Amelioration effect by overt movement for all speakers
  3. Partitioning effect of superlative readings for some speakers

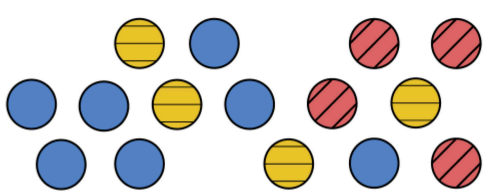- Propose an extension of Hackl's (2009) decompositional analysis of *most*

Section 2

Observations

Observation 1: Bare 'most' in subject position

▸ Kotek, Sudo, Howard and Hackl (in press) showed experimentally that bare *most* in subject position has a superlative reading for some speakers

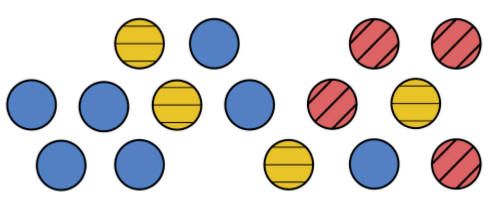(5)   Most of the circles are blue

▸ Three experiments
  ▸ Picture-sentence rating experiment
  ▸ Picture selection experiment ('covered box')
  ▸ Self-Paced Counting experiment

Observation 2: 'The most' in subject position

▸ We observe that some speakers in fact accept *the most* in subject position

▸ Unambiguously superlative

(6) (%)The most circles are blue

Observation 3: Amelioration effect by overt movement

▸ Overt movement makes *the most* in subject position grammatical for all speakers (cf. Farkas and Kiss 2000)

▸ Only the superlative is available

(7)   a.   (%)The most circles are touching the triangle

           b.   Which figure are the most circles touching?
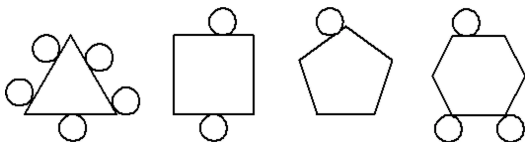
Observation 4: Partitioning effect

▸ Two kinds of superlative reading for both bare *most* and *the most*

▸ Some of the speakers who accept (8) in Fig 1 judge it infelicitous in Fig 2

(8)   Most of the circles/The most circles are touching the triangle

Fig 1

Fig 2
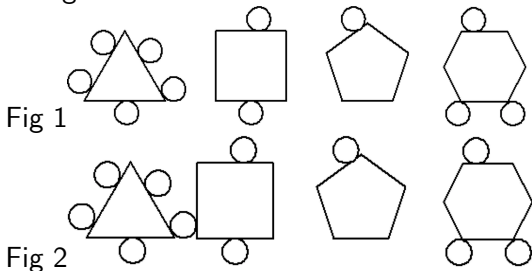
Observation 4: Partitioning effect (cont'd)

> **Partitioning effect**
>
> For some speakers, the denotation of NP (the circles) needs to be partitioned by the alternatives of VP (touching $\triangle$, touching $\square$, etc.)

- ▸ No such effect for proportional reading or superlative reading in object position

Summary of Observations

- Superlative reading in subject position exists
  - Bare *most*
    - Proportional only
    - Proportional or superlative
  - *The most*
    - Ungrammatical
    - Superlative only
- *The most* improves with overt movement (for all speakers)
- Partitioning superlative reading (for some speakers)

Section 3

Analysis

Goals

- Derive the three readings from the same ingredients
  - Proportional reading
  - Superlative reading without partitioning effect
  - Superlative reading with partitioning effect
- Extend Hackl's (2009) decompositional analysis of *most* as *est* + *many*
- Explain amelioration by overt movement
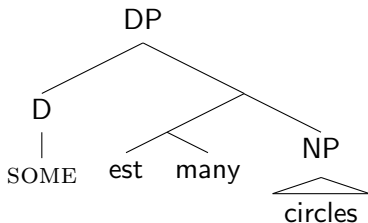- Will not discuss the difference between bare *most* and *the most* in this talk

Decomposition of 'most'

- *Most = est + many* (Hackl 2009)

  (9) $\llbracket\,\text{many}\,\rrbracket = \lambda d.\lambda x.|x| \geq d$

- Covert existential determiner SOME (Szabolcsi 1986, Heim 1999, Hackl 2009)

- (the) most circles:

```
              DP
           ___/_____
          /            \
         D          _____
         |         /    |      \
       SOME      est   many    NP
                               /\
                             circles
```

- *Est* undergoes covert movement leaving a trace of type *d*

Previous analyses of 'est'

- Heim's (1999) *est* for atomic individuals

  (10) $[\![\,\text{est}\,]\!](C)(P_{\langle d,et\rangle})(x_e) \Leftrightarrow$
        $\exists d[P(d)(x) \wedge \forall y \in C[x \neq y \Rightarrow \neg P(d)(y)]]$

- Hackl's (2009) *est* for atomic and plural individuals

  (11) $[\![\,\text{est}\,]\!](C)(P_{\langle d,et\rangle})(x_e) \Leftrightarrow$
        $\exists d[P(d)(x) \wedge \forall y \in C[x \text{ and } y \text{ do not overlap} \Rightarrow$
        $\neg P(d)(y)]]$

Cross-categorical 'est'

▸ Generalize *est* to non-individuals

(12) $[\![\text{est}]\!](C)(P_{\langle d, \sigma t \rangle})(x_\sigma) \Leftrightarrow$
$\exists d [P(d)(x) \wedge \forall y \in C [x \text{ \bf and } y \text{ \bf are distinct} \Rightarrow$
$\neg P(d)(y)]]$

▸ What is the appropriate notion of distinctness?

▸ We define a notion of distinctness that encompasses Hackl's 'non-overlapping' for individuals

Distinctness

Definition (Distinctness)

‣ Truth values: The two truth values are distinct
‣ Individuals:
  ‣ Atomic individuals x and y are distinct just in case there is a predicate $P_{\langle e,t \rangle}$ such that $P(x)$ and $P(y)$ are distinct
  ‣ Plural individuals X and Y are distinct just in case for each $x \sqsubseteq_a X$ and for each $y \sqsubseteq_a Y$, x and y are distinct ($\sqsubseteq_a = $ 'is an atomic part of')
‣ Functions: Functions f and g of the same type are distinct just in case there is some x such that $f(x)$ and $g(x)$ are distinct
‣ (Objects of different types are distinct)

Intuitions about distinctness

- Distinctness for plural individuals is *everywhere-distinctness*
  - The Americans and the semanticists are neither distinct nor identical
    ⇒ Overlapping matters for plural individuals
- Distinctness for functions is *anywhere-distinctness*
  - Being American and being a semanticist are distinct even though they have some common extensions
    ⇒ Overlapping does not matter for predicates/functions

Claim
- This notion of distinctness is intuitive
- The semantics of *est* is sensitive to it

Presuppositions of 'est'

(13) $[\![\,\text{est}\,]\!](C)(P_{\langle d, \sigma t \rangle})(x_\sigma)$

    a.   is defined when all of the following hold

        (i) $x \in C$

        (ii)   For any $y \in C$, $P(1)(y)$

        (iii) For any $y, z \in C$, y and z are distinct

    b.   whenever defined, denotes TRUE iff

       $\exists d[P(d)(x) \wedge \forall y \in C[x$ and y are distinct $\Rightarrow$ $\neg P(d)(y)]]$

▸ (13ai) and (13aii) are standard (Heim 1999, Hackl 2009, Gajewski 2010)

▸ (13aiii) is responsible for the partitioning effect

Focus Senstivity

‣ Explicit connection to focus

‣ Alternatives semantics for focus (Rooth 1992)

(14) $[\![\,P \quad \sim \quad C\,]\!]$ presupposes

    a. $C \subseteq [\![\,P\,]\!]^f$
    b. $[\![\,P\,]\!] \in C$
    c. $|C| > 1$

‣ *Est*'s argument C needs to be anaphoric to the argument of $\sim$
(Heim 1999)

Recap: ingredients

- *Most = est + many*
- Cross-categorical 'est'
- Presuppositions of 'est'

(15) $[\![\,\text{est}\,]\!](C)(P_{\langle d,\sigma t\rangle})(x_\sigma)$
- a.   is defined when all of the following hold
  - (i) $x \in C$
  - (ii)   For all $y \in C$, $P(1)(y)$
  - (iii)   For any $y, z \in C$, y and z are distinct
- b.   whenever defined, denotes TRUE iff
  $\exists d[P(d)(x) \wedge \forall y \in C[x \text{ and } y \text{ are distinct} \Rightarrow \neg P(d)(y)]]$
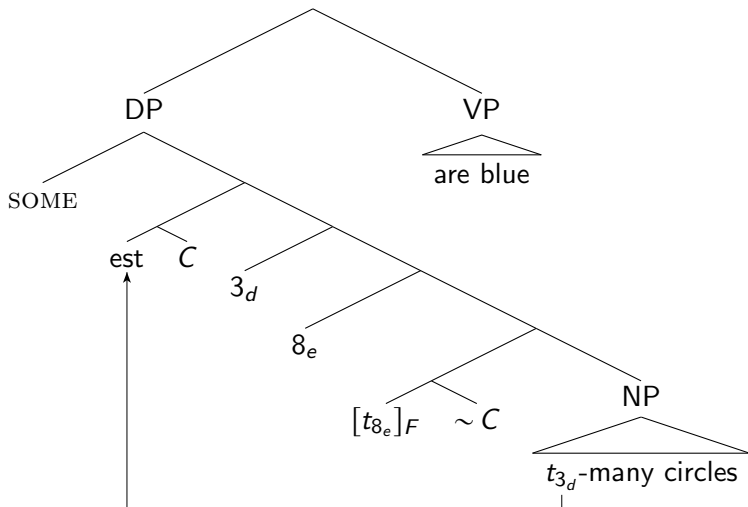
- Distinctness
- Focus sensitivity

Three readings to account for

- Proportional
  - *Est* stays in the local DP
  - Focus in DP
- Superlative without partitioning
  - *Est* moves out of the local DP
  - Focus in matrix clause
- Superlative with partitioning
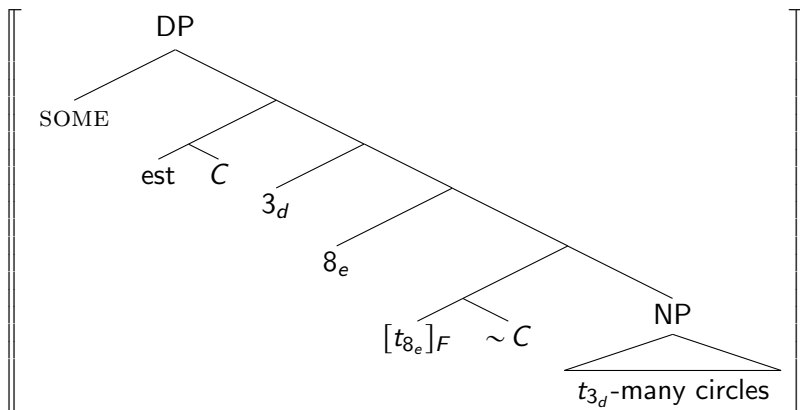 - *Est* stays in the local DP
  - Focus on VP

Subsection 1

(DP-Internal) Proportional Reading

Proportional reading

‣ DP-internal trace of semantically vacuous PRO (cf. Heim and Kratzer 1998)

Proportional reading (cont'd)

$$= [\![\text{SOME}]\!](\lambda x.\exists d[d\text{-}\textbf{many-circles'}(x) \land \forall y \in$$
$$C[x \text{ and } y \text{ are distinct} \Rightarrow \neg d\text{-}\textbf{many-circles'}(y)]])$$

- $[\![[t_{8_e}]_F]\!]^f = D_e$
- The presuppositions of *est* require:
  $C \subseteq \{y : y \text{ is distinct from } x\} \cup \{x\}$

Pragmatics of C

▸ Gennerally C needs to contain all the relevant things

(16)   [There are three hundred red circles and three blue circles]
        Most of the circles are blue

    a.   True with $C = \{b_1 \oplus b_2 \oplus b_3, \ r_{35} \oplus r_{105}\}$
    b.   False with $C = \{b_1 \oplus b_2 \oplus b_3, \ r_1 \oplus \cdots \oplus r_{300}\}$

▸ Each member of C must be as big as possible

▸ $[\![\,\text{Most of the circles are blue}\,]\!]$
  $\Leftrightarrow$
  $[\![\,\text{SOME}\,]\!](\lambda x. \exists d [d\text{-}\textbf{many-circles'}(x) \wedge \forall y \in$
  $C [x \text{ and } y \text{ are distinct} \Rightarrow \neg d\text{-}\textbf{many-circles'}(y)]])([\![\,\text{blue}\,]\!])$
  $\Leftrightarrow$
  $\exists x \exists d [d\text{-}\textbf{many-circles'}(x) \wedge \textbf{blue'}(x) \wedge \neg d\text{-}\textbf{many-circles'}(x^c)]$
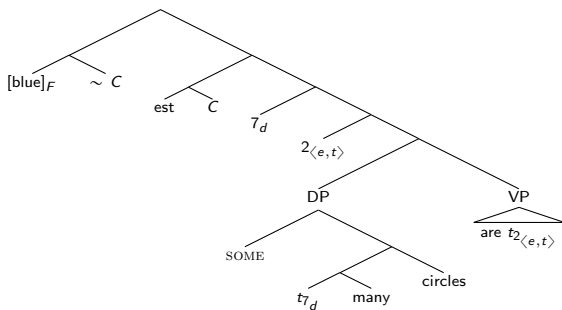
Subsection 2

DP-external Superlative Reading

DP-external superlative reading
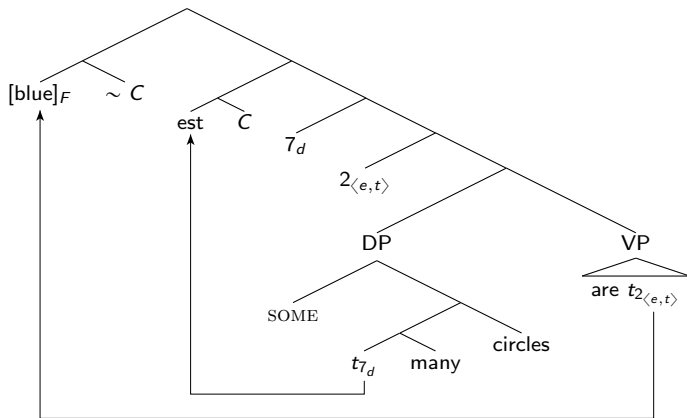
- ▸ Covert fronting
- ▸ Parasitic scope (Barker 2007)
- ▸ $C \subseteq \{\textbf{blue'}, \textbf{red'}, \textbf{yellow'}, \dots\}$
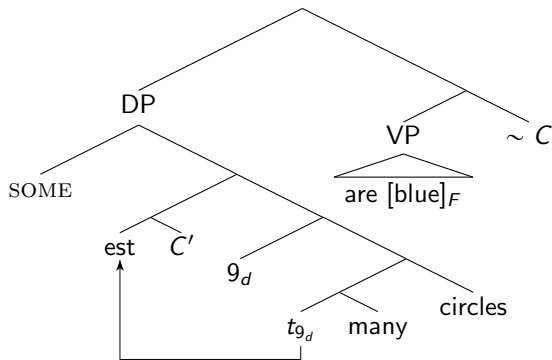
DP-external superlative reading (cont'd)

- $C \subseteq \{\mathbf{blue'}, \mathbf{red'}, \mathbf{yellow'}, \dots\}$
- $\exists d[\exists X[d\text{-}\mathbf{many\text{-}circles'}(X) \wedge \mathbf{blue'}(X) \wedge \forall P \in C[P \text{ and } \mathbf{blue'} \text{ are distinct} \Rightarrow \neg\exists Y[d\text{-}\mathbf{many\text{-}circles'}(Y) \wedge P(Y)]]]]$
- Blue is the color such that there are more circles of that color than there are circles of any other color
- Predicates are distinct unless they are completely identical $\Rightarrow$ No partitioning effect

Subsection 3

DP-Internal Superlative Reading

DP-internal superlative reading

- $C \subseteq [\![\text{VP}]\!]^f$ E.g. $C = \{\textbf{blue'}, \textbf{red'}, \textbf{yellow'}\}$
- Presuppositions of *est* not met with C
- Type-shift from $\langle e, t \rangle$ to e by σ (cf. Chierchia 1998)
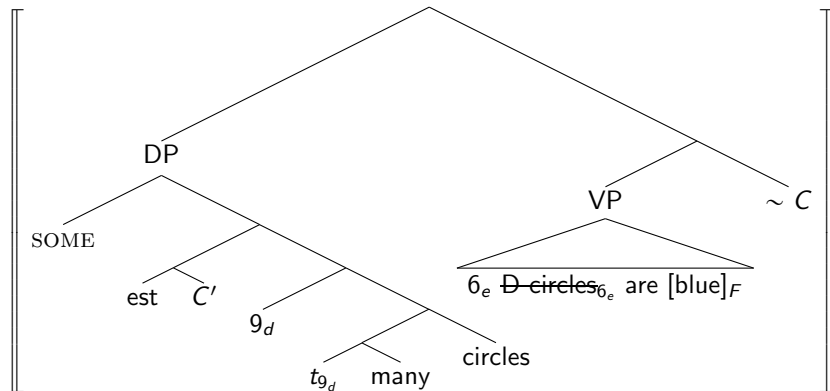- $C' = \{x : x = \sigma(P) \text{ for some } P \in C\}$

DP-internal superlative reading (cont'd)

- ▸ But not $C' = \{\sigma(\textbf{blue'}), \sigma(\textbf{red'}), \sigma(\textbf{yellow'})\}$
- ▸ VP internal copy of the subject (Fox 2002, Romoli 2009):

```
            VP
           /  \
          /    \
         6      \
              DP_6   [blue]_F
              /\
          ‾‾‾‾‾‾‾‾
          D circles
```
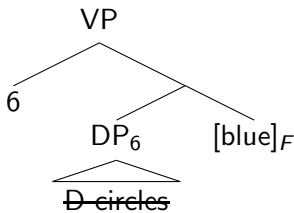
- ▸ Late Merge of *most* in [Spec,TP]
- ▸ Trace Conversion (Fox 2002)
  $[\text{D circles}]_6 \Rightarrow [\text{the [circles identical to } pro_6]]$
- ▸ $\llbracket \text{VP} \rrbracket = \lambda x.\textbf{blue'}(\iota y[\textbf{circles'}(y) \wedge y = x])$
  $\qquad\quad = \lambda x.\textbf{blue-circles'}(x)$
- ▸ $C' = \{\sigma(\textbf{blue-circles'}), \sigma(\textbf{red-circles'}), \sigma(\textbf{yellow-circles'})\}$

$$= \exists d \exists X [d\text{-}\mathbf{many\text{-}circles'}(X) \wedge \mathbf{blue'}(X) \wedge \forall Y \in$$
$$C'[X \text{ and } Y \text{ are distinct} \Rightarrow \neg d\text{-}\mathbf{many\text{-}circles'}(Y)]]$$

- $C' = \{\sigma(\mathbf{blue\text{-}circles'}), \sigma(\mathbf{red\text{-}circles'}), \sigma(\mathbf{yellow\text{-}circles'})\}$

Partitioning effect

- Unlike the DP-external superlative reading, the DP-internal superlative reading exhibits a partitioning effect
  - DP-external:
    $C = \{\textbf{blue'}, \textbf{red'}, \textbf{yellow'}\}$
  - DP-internal:
    $C' = \{\sigma(\textbf{blue-circles'}), \sigma(\textbf{red-circles'}), \sigma(\textbf{yellow-circles'})\}$
- *Est* presupposes that all the members of C are distinct
  - Distinctness for functions is anywhere-distinctness
    $\Rightarrow$ No partitioning effect for DP-external
  - Distinctness for plural individuals is everywhere-distinctness
    $\Rightarrow$ Partitioning effect for DP-internal
- Color terms are inherently partitioning, but for

  (17)   Most of the circles/The most circles are touching the triangle

  $C' = \{\sigma(\triangle\text{-}\textbf{touching-circles'}), \sigma(\square\text{-}\textbf{touching-circles'}), \dots\}$

Pragmatics of C again

- Why σ rather than other functions of type $\langle et, e \rangle$?
- σ returns the biggest plural individual
- The members of the comparison set C needs to be as big as possible

Recap

- Ingredients
  1. *Most = est + many*
  2. Cross-categorical *est* with the notion of distinctness
  3. Presuppositions of *est*
  4. Focus sensitivity

- Three readings of *most* in subject position
  1. DP-internal *est* + Focus on trace of PRO
     ⇒ Proportional
  2. DP-external *est* + Covert movement
     ⇒ Superlative without partitioning
  3. DP-internal *est* + Type shifting by σ
     ⇒ Superlative with partitioning

Markedness

(18)   a.   Most of the circles are touching the triangle
           b. %The most circles are touching the triangle

(19)   The triangle is touching the most circles

- ‣ Superlative reading in subject position requires either
    - ‣ Covert fronting (DP-external, without partitioning)
    - ‣ Type shifting by σ (DP-internal, with partitioning)
- ‣ These extra operations are marked
- ‣ Superlative reading in object position requires neither
- ‣ Proportional reading requires no extra operation either

Amelioration with overt movement

(20)   a. $[John]_F$ wants the most circles to be blue
              (John wants 5 circles to be blue, Bill wants 2 to be blue,
              Mary wants 3 to be blue)
        b.   %John wants the most circles to be $[blue]_F$
              (John wants 5 circles to be blue, 2 to be red, 3 to be
              yellow)

(21)   a. $[Which\ shape]_F$ are the most circles touching?
        b.   %The most circles are touching $[the\ triangle]_F$

- ‣ Covert fronting is not required in (a)-examples; Overt
  movement does the job
- ‣ DP-external reading is facilitated by overt movement
  ⇒ No partitioning effect

Conclusions

- Observations
    - Superlative reading marked but available in subject position
    - Overt movement makes it grammatical for all speakers
    - Partitioning effect for some speakers
- Proposal
    - Decompositional analysis: *most = est + many*
    - Cross-categorical *est* with distinctness
    - Presuppositions of *est*
    - Focus sensitivity

Selected References

▸ Farkas, D. & K. É Kiss (2000) On the comparative and absolute readings of superlatives. *Natural Language and Linguistic Theory*, 18: 417–455.

▸ Hackl, M. (2009) On the grammar and processing of proportional quantifiers: *most* versus *more than half*. *Natural Language Semantics*, 17: 63–98.

▸ Heim, I. (1999) Notes on superlatives. Ms., MIT.

▸ Kotek, H., Y. Sudo, E. Howard & M. Hackl (in press) *Most* meanings are superlative. In press in *Syntax and Semantics 43: Experiments at the Interface.* NY: Academic Press.

▸ Szabolcsi, A. (1986) Comparative superlatives. In *Papers in Theoretical Linguistics*. pp. 245–266. Cambridge, MA: MITWPL.