Cumulative readings of *every* do not provide evidence for events and thematic roles

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Introduction

Contribution of this talk

What is the basic meaning of verbs?

Position	Verbal denotation	Example: Brutus stabbed Caesar
Traditional	$\lambda y \lambda x\ stab(x, y)$	$stab(b, c)$
Davidson '67	$\lambda y \lambda x \lambda e\ stab(e, x, y)$	$\exists e[stab(e, b, c)]$
Schein '93	$\lambda e\ stab(e)$	$\exists e[stab(e) \wedge agent(e, b) \wedge th(e, c)]$
Kratzer '00	$\lambda y \lambda e\ stab(e, y)$	$\exists e[agent(e, b) \wedge stab(e, c)]$

This talk: Against Schein (1993); Kratzer (2000)

- Their claim: cumulative readings of *every* can only be captured with events and thematic roles
- I will present equivalent representations without events
- Subject-object asymmetries which motivate Kratzer (2000) correlate with c-command rather than thematic roles

Cumulative readings of every

Why events and roles are supposedly necessary

Schein and Kratzer's argument:

- Eventless representations cannot capture cumulative readings of *every*
- But these readings can be expressed with events and thematic roles

- Therefore, events and thematic roles exist

Kratzer's reading does not require thematic roles

What I will argue for:

An alternative translation of *every*

- which is independently motivated
- and which allows us to represent cumulative readings without events

Cumulation without events: the standard account

Scha (1981)

Standard example

600 Dutch firms own 5000 American computers.

Paraphrase of the cumulative reading:

- There is a set/sum of 600 Dutch firms
- There is a set/sum of 5000 American computers
- Each firm owns at least one computer
- Each computer is owned by at least one firm

Representing cumulativity (Krifka, 1986; Sternefeld, 1998)

$\exists X\ 600\text{-}\mathit{firms}(X) \wedge \exists Y\ 5000\text{-}\mathit{computers}(Y) \wedge {}^{**}\mathit{own}(X, Y)$

Cumulation (**) closes two-place relations under pointwise sum

A cumulative reading with *every*

Kratzer's example

Three copy editors (between them) caught every mistake in the manuscript.

Paraphrase of the cumulative reading:

- There is a set/sum of three copy editors
- There is a set/sum containing all and only the mistakes
- Each copy editor caught at least one mistake
- Each mistake was caught by at least one copy editor

Naive attempt: Representing cumulativity as before

$\exists X\ \textit{3-copy-editors}(X) \wedge \exists Y\ \textit{the-mistakes}(Y) \wedge {}^{**}\textit{caught}(X, Y)$

Problem: $\lambda Y\ \textit{the-mistakes}(Y) \neq \lambda P\ \forall y[\textit{mistake}(y) \rightarrow P(y)]$

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The nature of the problem

- Cumulative readings relate witness sets.
- But $\lambda P.\forall y[mistake(y) \rightarrow P(y)]$ does not give us a handle on the witness set of *every mistake*. It also holds of sets that also contain non-mistakes.
- It only captures surface scope and inverse scope readings:

Example

- $\exists X[\text{3-}copy\text{-}eds(X) \wedge \forall y[mistake(y) \rightarrow {}^{**}caught(X, y)]]$
- $\forall y[mistake(y) \rightarrow \exists X[\text{3-}copy\text{-}eds(X) \wedge {}^{**}caught(X, y)]]$

These readings entail that each mistake was caught by all three copy editors. This is not what we want.

Schein and Kratzer's solution

Kratzer's example

Three copy editors caught every mistake in the manuscript.

Kratzer's representation

$\exists E\ \exists X\ [\textit{3-copy-editors}(X) \wedge\ ^{**}\textit{agent}(E, X)$
$\wedge \forall y\ [\textit{mistake}(y) \rightarrow \exists e\ [e \sqsubseteq E \wedge \textit{catch}(e, y)]]$
$\wedge \exists Y\ [^{*}\textit{mistake}(Y) \wedge\ ^{**}\textit{catch}(E, Y)]$

"There is a sum event E whose agents sum up to three copy editors. For every mistake there is a part of E where it is caught. E only contains mistake-catching events."

- Cumulation is crucially applied to the agent role
- Each argument modifies a different event variable. This is impossible without events. So, they say, events exist.

An overlooked choice point

Problem: $\lambda Y\ \textit{the-mistakes}(Y) \quad \neq \quad \lambda P\ \forall y[\textit{mistake}(y) \rightarrow P(y)]$

- We need events in order to keep the standard assumption that *every mistake* means $\lambda P\ \forall y[\textit{mistake}(y) \rightarrow P(y)]$
- But what if this assumption is wrong?

I will argue that $\lambda Y\ \textit{the-mistakes}(Y)$ is in fact on the right track.

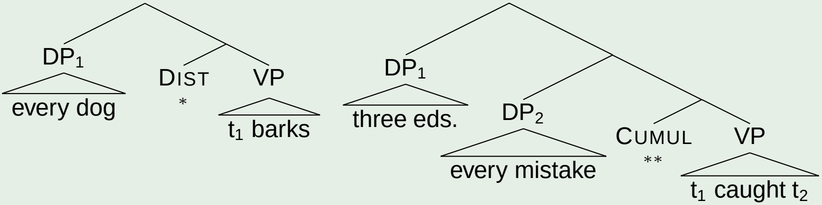
Rethinking the meaning of *every*

Beghelli and Stowell (1997); Szabolcsi (1997); Lin (1998); Landman (2000)

Proposal: $[\![\textit{every N}]\!] = \sigma([\![N]\!])$

- holds of **the sum of all Ns**
- outscopes distributivity (*) and cumulation (**) operators

Example LFs



But more is needed to get us off the ground!
After all, *every mistake* $\neq$ *the mistakes*.

Enforcing distributivity via scope-splitting

(Chomsky, 1993; Sauerland, 2004, etc.)

Example

a. The soldiers surrounded the castle. *(distributive or collective)*
b. # Every soldier surrounded the castle. *(only distributive)*

Proposal:

- The restrictor of *every* is interpreted **twice**:
  1. in moved position, where it is the input to sum formation
  2. in situ, where it restricts the values of its argument position
- For *soldiers*, this will be vacuous
- For *soldier*, this will restrict the VP to individual soldiers

Implementation

Interpreting the restrictor in situ

Fox (1999) proposes a new interpretation rule for LFs generated by the copy theory of Chomsky (1993):

Trace conversion rule

If [Det N]$_i$ is the lower copy of a quantifier, it is interpreted as $\iota y.[[\![\text{N}]\!]^g(y) \ \wedge \ y = g(i)]$

Example

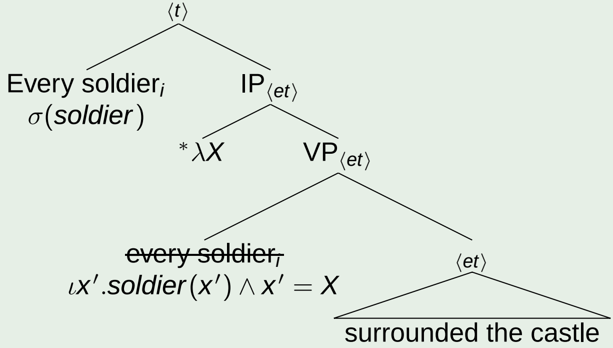
$$[\![\text{every soldier}_i]\!]^g \ = \ \iota y.[\textit{soldier}(y) \ \wedge \ y = g(i)]$$
$$\approx \text{“the soldier which is identical to i”}$$

- Not the only possible implementation – cf. multidominance (Johnson, 2007), choice functions (Sauerland, 2004), dynamics (Brasoveanu tomorrow)
- But arguably easiest to grasp in connection with * and **

Trace conversion example

Every soldier surrounded the castle.

$$\sigma(soldier) \in {}^*\lambda X[surr.the.cas.(\iota x'.soldier(x') \wedge x' = X)]$$



"The sum of all soldiers can be divided into parts, such that each part is a soldier who surrounded the castle."

Independent evidence

Evidence for interpreting restrictors in situ

I have suggested that the restrictor of *every N* is also interpreted in situ.

Evidence comes from **obligatory reconstruction effects**: a constituent behaves as if it was taking scope in two different places at once.

Reconstruction effects attested specifically with *every*:

- Condition C (Fox, 1999)
- Antecedent-contained deletion (Sauerland, 1998, 2004)

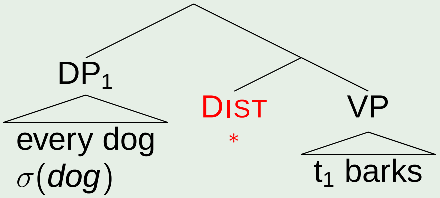
Cf. the copy theory of movement: Chomsky (1993)

Evidence for severing distributivity from *every*

Beghelli and Stowell (1997); Szabolcsi (1997)

I have suggested that the higher copy of *every* does not itself contain a distributivity operator, but requires one in its scope.

Example LF



Prediction: In languages where DIST is overt, sentences with distributive universal quantifiers require its presence.

Chinese confirms this prediction

Lin (1998)

In Chinese, DIST is always overtly realized:

(1) Tamen mai-le yi-bu chezi
they buy-Asp one-Cl car
'They bought a car.' – *only collective*

(2) Tamen dou mai-le yi-bu chezi
they DIST buy-Asp one-Cl car
'They bought a car.' – *distributive*

The universal quantifier requires DIST, conforming to prediction:

(3) Meige ren *(dou) mai-le shu
∀ man DIST buy-Asp book
'Everyone bought a book.'

Kratzer's and Schein's examples revisited

Modeling Kratzer's example without events

Kratzer's example

Three copy editors caught every mistake.

Eventless representation

$\exists X$ [three-copy-editors$(X) \wedge$
$\langle X, \underline{\sigma(mistake)}\rangle \in$
$^{**}\lambda X' \lambda Y$ [$catch(X', \underline{\iota y'.\text{mistake}(y') \ \wedge \ y' = Y})$]].

Provably equivalent to Kratzer's representation provided that:

- $\forall x, y \in \text{IND} \ \ [catch(x, y) \leftrightarrow \exists e\ [agent(e, x) \wedge catch(e, y)]]$
- $\forall x\ mistake(x) \rightarrow x$ is atomic
- $\forall a\ \forall y\ catch(a, y) \rightarrow y$ is atomic

Cumulativity and distributivity in the same sentence

Schein's original example

cumulative

[Three video games] taught [every quarterback] [two new plays].

distributive

Eventless representation – same ingredients as before

$$\exists X \text{ [three-video-games}(X)$$
$$\wedge \langle X, \underline{\sigma(\textit{quarterback})}\rangle \in {}^{**}\lambda X' \lambda Y \text{ [}\exists Z \text{ two-new-plays}(Z)$$
$$\wedge {}^{***}\text{taught}(X', \underline{\iota y'.\text{quarterback}(y') \wedge y' = Y}, Z)]]$$

Improvements on Schein (1993):

- Compositional derivation possible.
- No intrasentential anaphoric links between events.

Subject/object asymmetries

Kratzer: Cumulative *every* has limited distribution

In the examples Kratzer discusses, *every* gives rise to cumulative readings as a theme, but not as an agent:

Kratzer's examples

a. Three editors caught every $\text{mistake}_{\textit{theme}}$. CUMULATIVE: ✓
b. Every $\text{editor}_{\textit{agent}}$ caught 500 mistakes. CUMULATIVE: *
c. 500 mistakes were caught by every $\text{editor}_{\textit{agent}}$. CUMULATIVE: *

Kratzer captures this asymmetry by representing themes as a part of the verb but agents as a separate relation:

$$[\![\text{catch}]\!] = \lambda y \lambda e[{}^{**}\textit{catch}(e, y)]$$
$$[\![\text{agent}]\!] = \lambda x \lambda e[{}^{**}\textit{agent}(e, x)]$$

Kratzer's prediction: Cumulation impossible if *every* is agent!

A counterexample: cumulative *every* as an agent

Examples from Bayer (1997)

a. *Gone with the Wind* was written by [every screenwriter in Hollywood]$_{agent}$.
b. #[Every screenwriter in Hollywood]$_{agent}$ wrote *Gone with the Wind*.

- (a) has a cumulative reading: every screenwriter wrote a part of the script and each part was written by a screenwriter.
- (b) only has an odd distributive reading where every screenwriter wrote the whole script.

I conclude:

- *every* can cumulate in agent position, contra Kratzer
- *every* cannot cumulate out of a c-commanding position

Additional support for the c-command constraint

Every cannot cumulate with anything it c-commands:

Examples from Zweig (2008)

a. The Fijians and the Peruvians won every game.
b. # Every game was won by the Fijians and the Peruvians.

- (a) has a cumulative reading: either team won games and every game was won by one of the teams.
- (b) only has an odd distributive reading: every game was won by both teams at once.

Conclusion and Outlook

The cumulative outcome of this talk

- Cumulative readings of *every* do not pose a special problem for eventless representations, contra Schein (1993) and Kratzer (2000).
- Their distribution is restricted by c-command rather than thematic roles, contra Kratzer (2000).

Outlook:

- What causes the c-command restriction?
- What do we learn about the distribution of the cumulation (**) operator? (Winter, 2000; Beck and Sauerland, 2000; Kratzer, 2007)
- Does the proposed semantics give us a lead on the difference between *every* and *each*?

The End

Thank you!

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Backup slides

Cumulation is closure of relations under sum

Krifka (1986); Sternefeld (1998); Beck and Sauerland (2000)

Definition

Given a complete join semilattice $\langle S, \sqsubseteq \rangle$ and a two-place relation $R \subseteq S \times S$, the *closure of R under sum* (written $^{**}R$) is defined as the smallest relation such that

1. if $R(X, Y)$ then $^{**}R(X, Y)$
2. if $^{**}R(X_1, Y_1)$ and $^{**}R(X_2, Y_2)$ then $^{**}R(X_1 \oplus X_2, Y_1 \oplus Y_2)$

$^{**}R(X, Y)$ holds just in case X is a sum of elements that stand in relation R to a set of elements whose sum is Y .

Example

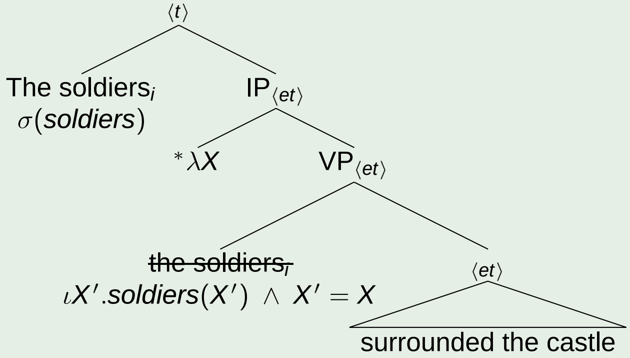
$^{**}agent(E, ed_1 \oplus ed_2 \oplus ed_3)$ holds just in case E is a sum of events whose agents sum up to ed_1, ed_2, and ed_3.

Trace conversion is vacuous for plural restrictors

(at least in basic cases like this one)

The soldiers surrounded the castle.

$$\sigma(soldiers) \in {}^*\lambda X[surr.the.cas.(\iota X'.soldiers(x') \wedge X' = X)]$$



Evidence: Binding theory Condition C
Fox (2000, 2002)

Background: Condition C applies at LF in Minimalism (Chomsky, 1993)

Problematic example

a. Someone introduced her$_k$ to every friend of John$_i$'s.
b. *Someone introduced him$_i$ to every friend of John$_i$'s.

If QR leaves only a trace behind:

- **Unexpected** because no coindexed item c-commands *John* at LF.

If QR leaves a copy of the restrictor behind:

- **Expected** because *him* c-commands the lower copy of *John* at LF in (b).

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Evidence: Antecedent-contained deletion

Kennedy (1994); Sauerland (2004)

VP ellipsis is licensed when a suitable antecedent is available.

Problematic example

a. Polly visited every town near the one Erik did Δ.
b. *Polly visited every town near the lake Erik did Δ.

If QR leaves only a trace behind:

- **Unexpected** because "*visited t*" is a suitable antecedent.

If QR leaves a copy of the restrictor behind:

- **Expected** because "*visited <town>*" is not a suitable antecedent in (b).

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