Lecture 7
Problem of Quantifiers in Object Position & Presupposition

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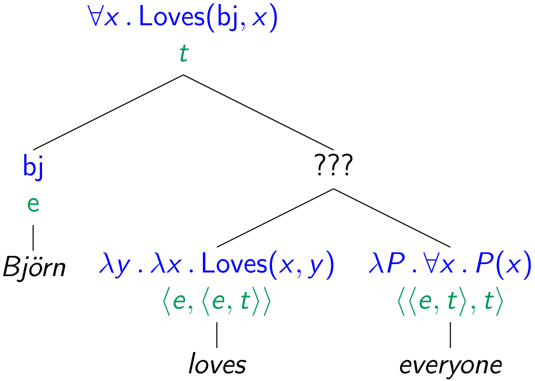
Introduction to Semantics · EGG 2019

Outline

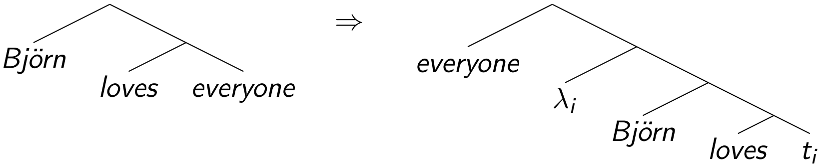
Quantifier in object position

Björn loves everyone $\rightsquigarrow \forall x \,.\, \mathrm{Loves}(\mathrm{bj}, x)$

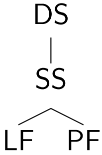
Problem of quantifiers in object position



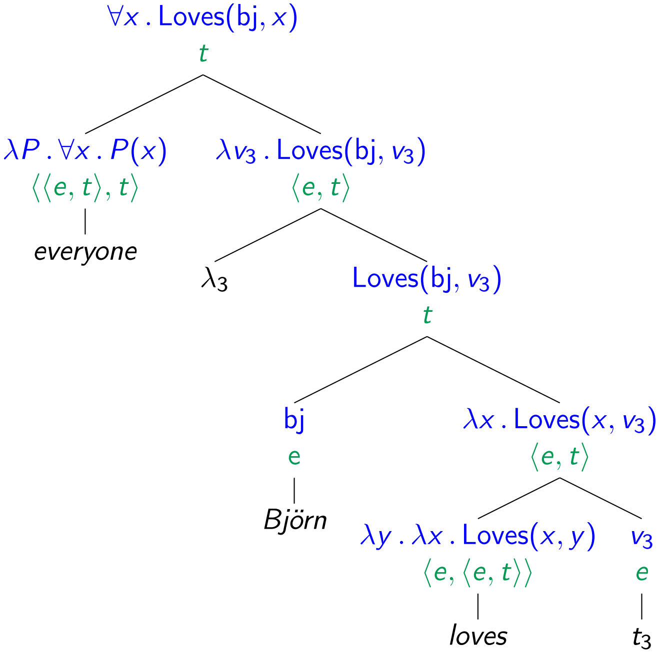
Quantifier Raising



The T-model (Government and Binding Theory)



Quantifier Raising



Outline

Direct compositionality

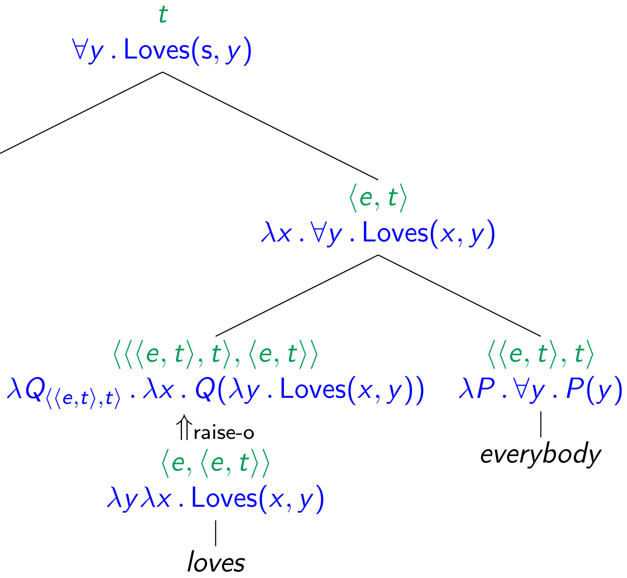
Direct compositionality (in slogan form)

The syntax and semantics work in tandem.

$\Rightarrow$ Each expression computed by the syntax can be interpreted; interpretation is not 'postponed' to a later stage (Jacobson 2012, i.a.).

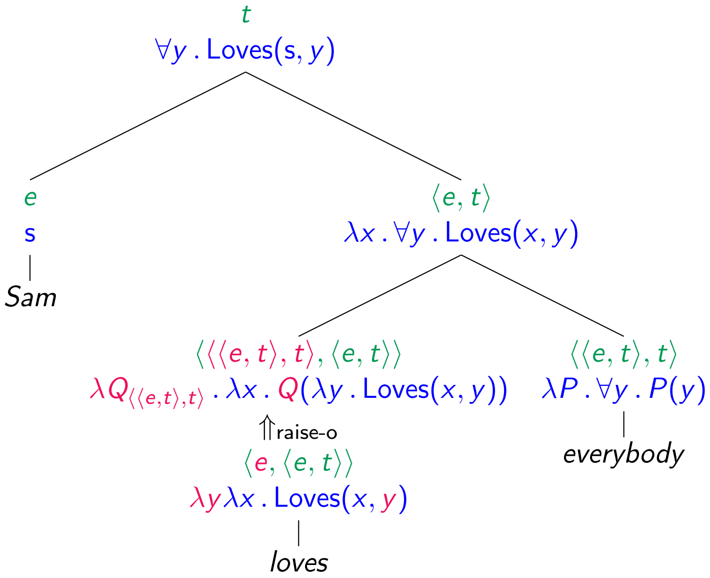
Does the problem of quantifiers in object position require a violation of direct compositionality?

A directly compositional approach: Type-shifting the verb



(Hendriks 1993)

A directly compositional approach: Type-shifting the verb



(Hendriks 1993)

Is QR empirically motivated?

Arguments by Heim & Kratzer in favor of QR against a (different) type-shifting analysis:

- Scope ambiguities
- Inverse linking
- Antecedent-contained deletion
- Quantifiers that bind pronouns
- Extraction-scope generalization

Scope ambiguities: the problem

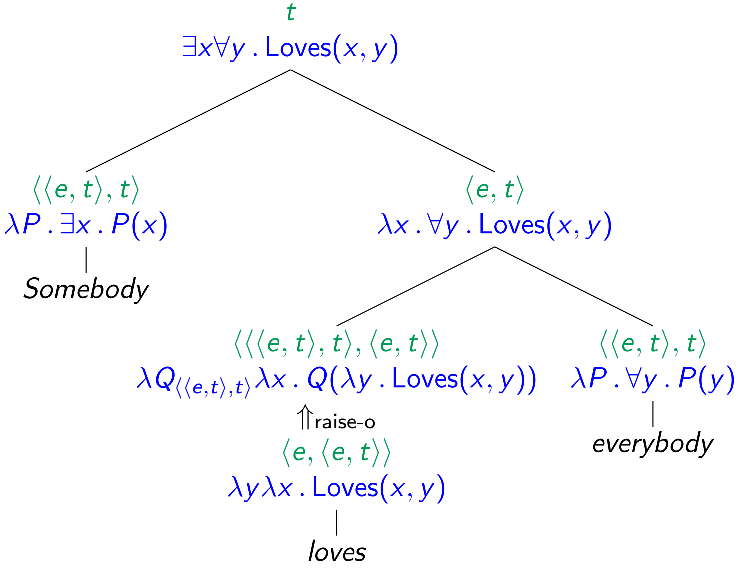
Scope ambiguities: the problem

(1) Somebody loves everybody.

- $\forall > \exists$:
  For every person y: there is a person x such that x loves y.
- $\exists > \forall$
  There is a person x such that for all y: x loves y.

Scope ambiguities can be derived

For surface scope: Shift the object, then combine with the subject.



Scope ambiguities can be derived

For inverse scope: Shift the subject first, then the object.

$$t$$
$$\forall y \exists x \,.\, \mathrm{Loves}(x, y)$$

$$\langle\langle e, t\rangle, t\rangle$$
$$\lambda P \,.\, \exists x \,.\, P(x)$$

Somebody

$$\langle\langle\langle e, t\rangle, t\rangle, t\rangle$$
$$\lambda Q_{\langle\langle e,t\rangle,t\rangle} \,.\, \forall y \,.\, Q(\lambda x \,.\, \mathrm{Loves}(x, y))$$

$$\langle\langle\langle e, t\rangle, t\rangle, \langle\langle\langle e, t\rangle, t\rangle, t\rangle\rangle$$
$$\lambda Q'_{\langle\langle e,t\rangle,t\rangle} \lambda Q_{\langle\langle e,t\rangle,t\rangle} \,.\, Q'(\lambda y \,.\, Q(\lambda x \,.\, \mathrm{Loves}(x, y)))$$

$$\Uparrow_{\text{raise-o}}$$

$$\langle e, \langle\langle\langle e, t\rangle, t\rangle, t\rangle\rangle$$
$$\lambda y \lambda Q_{\langle\langle e,t\rangle,t\rangle} \,.\, Q(\lambda x \,.\, \mathrm{Loves}(x, y))$$

$$\Uparrow_{\text{raise-s}}$$

$$\langle e, \langle e, t\rangle\rangle$$
$$\lambda y \lambda x \,.\, \mathrm{Loves}(x, y)$$

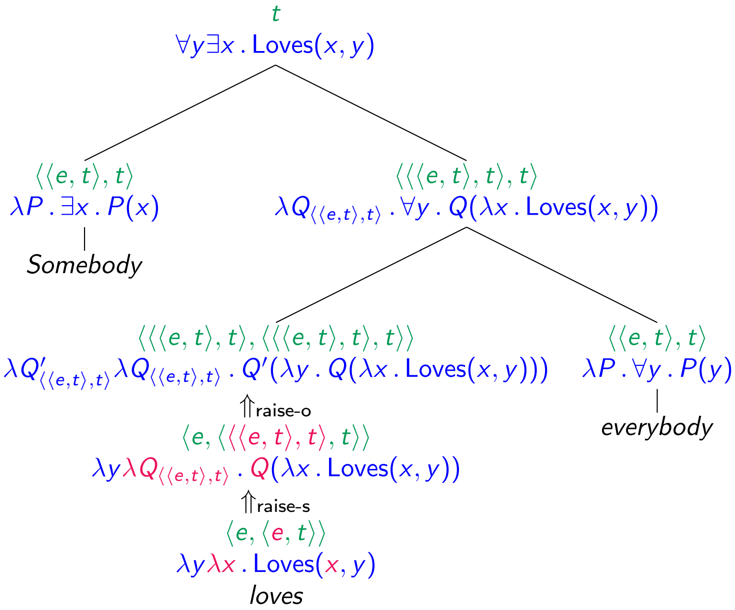
loves

$$\langle\langle e, t\rangle, t\rangle$$
$$\lambda P \,.\, \forall y \,.\, P(y)$$

everybody

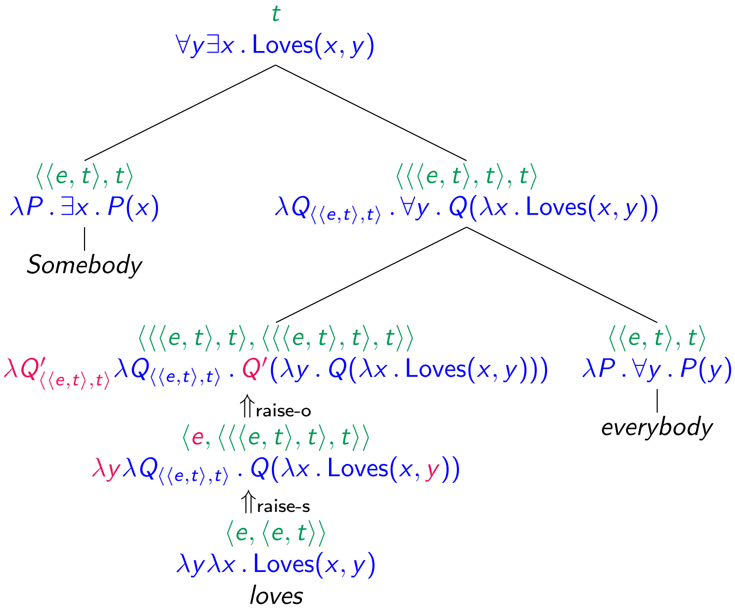
Scope ambiguities can be derived

For inverse scope: Shift the subject first, then the object.



Scope ambiguities can be derived

For inverse scope: Shift the subject first, then the object.

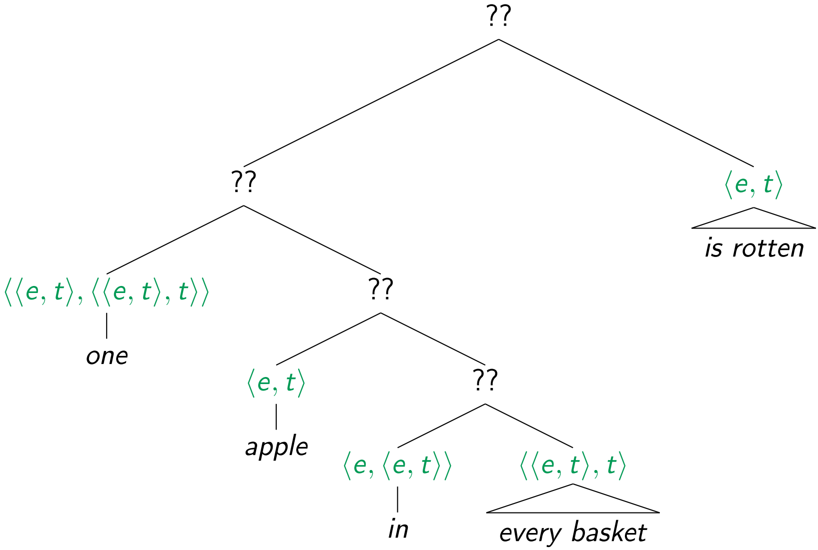


Inverse linking: the problem

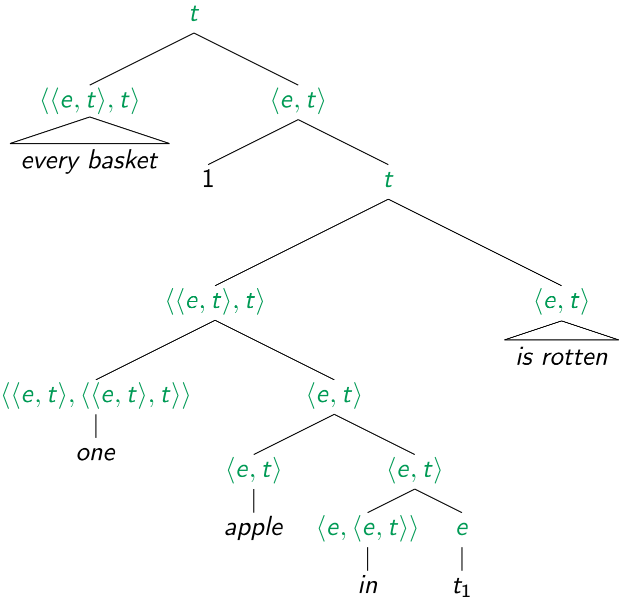
(2) One apple in every basket is rotten.

- $\forall > \exists$:
  For every basket y: there is an apple x in y that is rotten.
- $\exists > \forall$ (unavailable)
  There is an apple that is in every basket and also rotten.

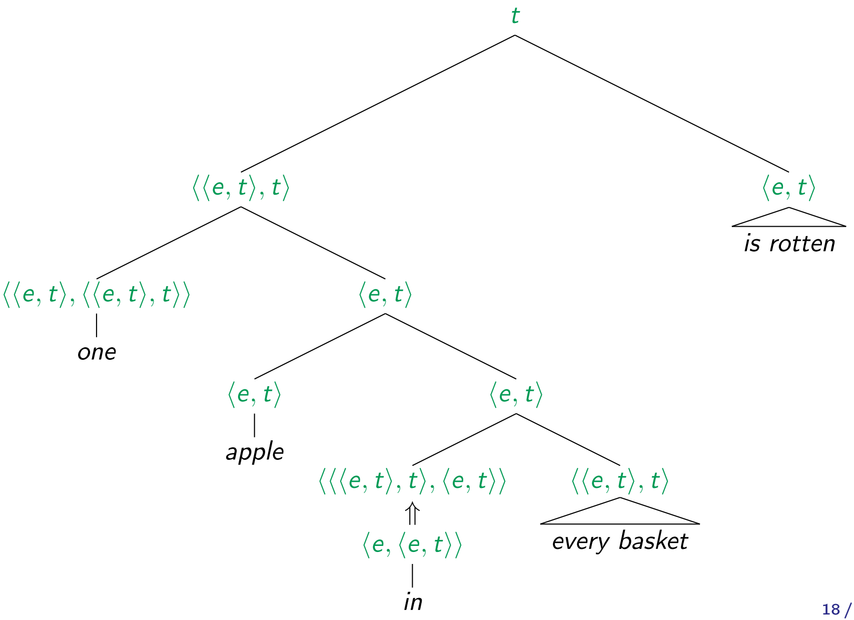
Inverse linking: the problem



Inverse linking: QR solution



Inverse linking: What happens if we object-raise *in*?



Inverse linking: Directly compositional solution

See Barker 2005: 'Remark on Jacobson 1999: Crossover as a local constraint', *Linguistics and Philosophy*.

Antecedent-contained deletion

VP-ellipsis:

(3) I read *War and Peace* before you did ~~read War and Peace~~.

Antecedent-contained deletion with and without QR:

(4) a. Mary read every novel that John did ~~read every novel that John did read every ...~~.
   b. [Every novel that John did ~~read *t*~~] Mary read *t*

Antecedent-contained deletion

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(4) a. Mary read every novel that John did
~~read every novel that John did read every ...~~.
b. [Every novel that John did ~~read *t*~~] Mary read *t*

Jacobson (1999) solves this without QR, using function composition.

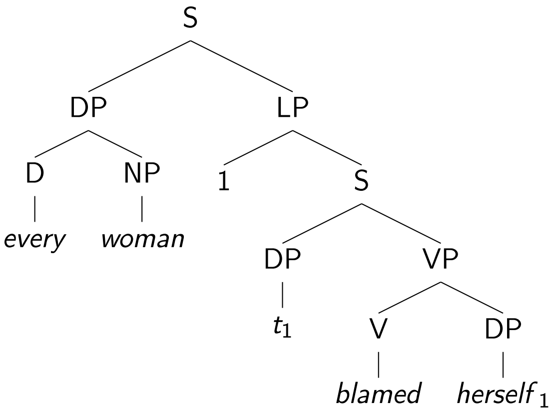
Quantifiers that bind pronouns

(5) a. Mary blamed herself.
    b. Mary blamed Mary.

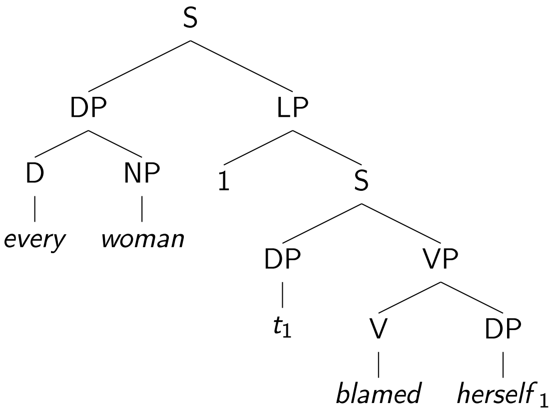
(6) a. Every woman blamed herself.
    b. Every woman blamed every woman.

(7) a. No man noticed the snake next to him.
    b. No man noticed the snake next to no man.

Quantifiers that bind pronouns: QR solution



Quantifiers that bind pronouns: QR solution



Without QR, *herself* $_1$ would end up as a free variable:

$$\forall x\,.\,[\text{Woman}(x) \rightarrow \text{Blamed}(x, v_1)]$$

Quantifiers that bind pronouns without QR

There are non-QR options, including:

(8) *herself* $\rightsquigarrow \lambda R_{\langle e,\langle e,t\rangle\rangle} \lambda x \,.\, R(x,x)$

Related: Strict and sloppy readings

From *Ghostbusters*:

(9) Dr Ray Stantz: You know, it just occurred to me that we really haven't had a successful test of this equipment.
Dr. Egon Spengler: I blame myself.
Dr. Peter Venkman: So do I.

strict reading: Venkman blames Spengler
sloppy reading: Venkman blames Venkman

Related: Strict and sloppy readings

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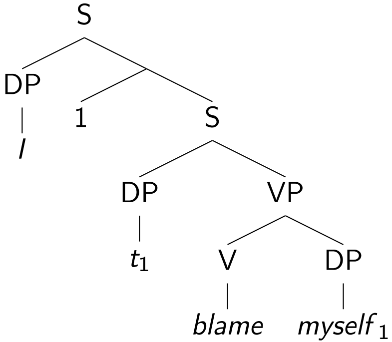
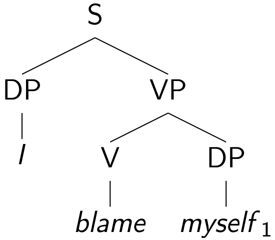
strict reading: Venkman blames Spengler $\leftarrow$ free pronoun
sloppy reading: Venkman blames Venkman $\leftarrow$ bound pronoun

Strict and sloppy readings with QR





But Polly Jacobson has addressed this issue as well.

Extraction-scope generalization

In many cases, the constraints on *wh*-extraction mirror the constraints on scope.

(10) a. John knows a woman from every country.
 b. #John knows a woman who is from every country.

(11) a. Which country does John know a woman from?
 b. *Which country does John know a woman who is from?

But many counterexamples; cf. Simon Charlow's lecture last Wednesday.

So do we really need QR?

No, direct compositionality can be maintained (as far as I can see).

You just need a bit of advanced machinery to handle:

- Antecedent-contained deletion
- Inverse linking
- Strict vs. sloppy identity

Outline

Summary

Composition rules:

- Function Application
- Predicate Modification
- Pronouns and Traces Rule
- Predicate Abstraction

Composition Rules (I)

Function Application

Let γ be a tree whose only two subtrees are α and β where:

- $\alpha \rightsquigarrow \alpha'$ and α' has type $\langle \sigma, \tau \rangle$
- $\beta \rightsquigarrow \beta'$ and β' has type σ.

Then

$$\gamma \rightsquigarrow \alpha'(\beta')$$

Composition Rules (II)

Predicate Modification

If:

- γ is a tree whose only two subtrees are α and β
- $\alpha \rightsquigarrow \alpha'$
- $\beta \rightsquigarrow \beta'$
- α' and β' are of type $\langle e, t \rangle$

Then:

$$\gamma \rightsquigarrow \lambda u \,.\, [\alpha'(u) \wedge \beta'(u)]$$

where u is a variable of type e that does not occur free in α' or β'.

Composition rules (III)

Pronouns and Traces Rule

If α is an indexed trace or pronoun, $\alpha_i \rightsquigarrow v_{e,i}$

Predicate Abstraction

If

- γ is an expression whose only two subtrees are α_i and β
- $\beta \rightsquigarrow \beta'$
- β' is an expression of type t

Then $\gamma \rightsquigarrow \lambda v_{i,e} \,.\, \beta'$

Outline

The theremin

- Electronic instrument
- Controlled without physical contact
- Patented in 1928 by Léon Theremin.
- Clara Rockmore (1911–1998) was a theremin virtuoso

Wolfgang Amadeus Mozart

- Lived 1756-1771
- Composed pieces for many different instruments
- Never encountered a theremin
- As a consequence, never composed a theremin duo

True or not true?

(12) There is at least one theremin duo by Mozart.

True or not true?

(12) There is at least one theremin duo by Mozart. **Not true**

True or not true?

(12) There is at least one theremin duo by Mozart. **Not true**

Negation:

True or not true?

(12) There is at least one theremin duo by Mozart. **Not true**

Negation:

(13) There are no theremin duos by Mozart.

True or not true?

(12) There is at least one theremin duo by Mozart. **Not true**

Negation:

(13) There are no theremin duos by Mozart. **True**

True or not true?

(14) Every theremin duo by Mozart is famous.

True or not true?

(14) Every theremin duo by Mozart is famous. **Not true**

True or not true?

(14) Every theremin duo by Mozart is famous. **Not true**

Negation:

True or not true?

(14) Every theremin duo by Mozart is famous. **Not true**

Negation:

(15) Not every theremin duo by Mozart is famous.

True or not true?

(14) Every theremin duo by Mozart is famous. **Not true**

Negation:

(15) Not every theremin duo by Mozart is famous. **Not true**

Presupposition

If A **presupposes** B, then A not only implies B but also implies that the truth of B is somehow taken for granted, treated as uncontroversial.

(Chierchia & McConnell-Ginet 2000, 28)

Presupposition accommodation

On Jimmy Kimmel's *Lie Witness News*:

INTERVIEWER: What do you think of *the government's plan to schedule earthquakes for every five years*, instead of the current 12 years?

INTERVIEWEE: I think it's very.... conservation-minded.

Presupposition

> If A presupposes B, then to assert A, deny A, wonder whether A, or suppose A – to express any of these attitudes toward A is generally to imply B, to suggest that B is true and, moreover, uncontroversially so. That is, considering A from almost any standpoint seems already to assume or presuppose the truth of B; B is part of the background against [which] we (typically) consider A.
>
> (Chierchia & McConnell-Ginet 2000, 28)

Family of sentences

Every Mozart theremin duo is famous

Mozart wrote at least one theremin duo

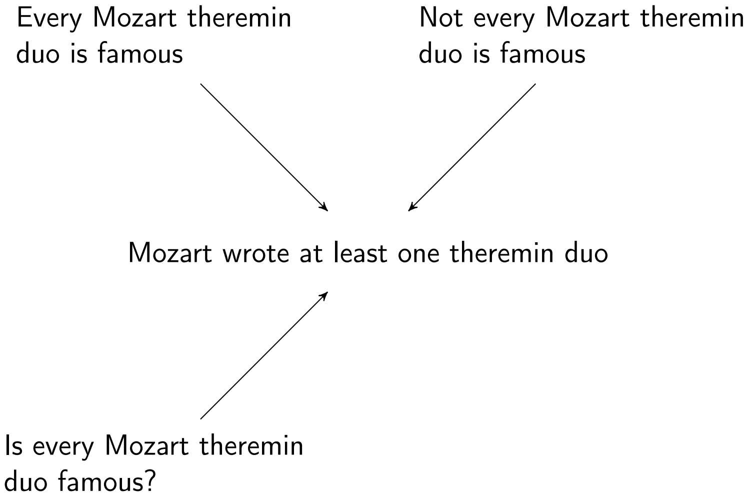
Family of sentences

Every Mozart theremin duo is famous

Not every Mozart theremin duo is famous

Mozart wrote at least one theremin duo

Family of sentences



Family of sentences

Every Mozart theremin duo is famous

Not every Mozart theremin duo is famous

Mozart wrote at least one theremin duo

Is every Mozart theremin duo famous?

If every Mozart theremin duo is famous, then I'm out of the loop.

Presupposition projection

If A implies B, and ‘not A’ implies B, then inference from A to B **projects over negation**.

Presuppositions project (i) over negation, (ii) through question formation, and (iii) from the antecedent of a conditional.

To run the projection test

1. Construct the examples:
   (i) not-A (the negation of A)
   (ii) A? (a yes/no question)
   (iii) If A, then C (a conditional)
2. Ask the question:
   Do these sentences imply B?
3. Interpret the result: Yes $\Rightarrow$ presupposition.

Triggers

A presupposition trigger is a word or construction that conventionally signals a presupposition.

Example: *every*.

Presupposition triggers

Ed is glad we won	$\gg$ We won
Ed knows we won	$\gg$ We won
Ed's son is bald	$\gg$ Ed has a son
Only Ed came	$\gg$ Ed came
The balcony is lovely	$\gg$ There is a balcony

To paraphrase Strawson

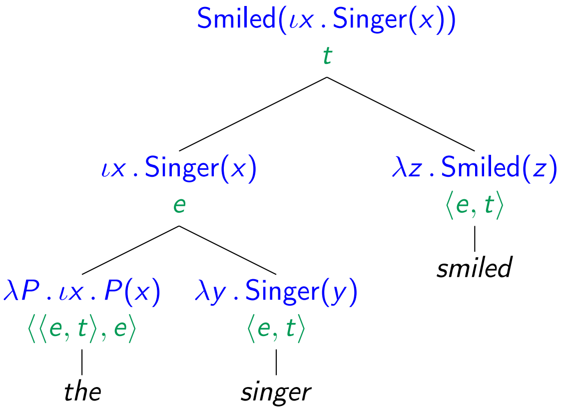
Your friend says:

(16) The king of France is wise.
(using an **empty definite description**)

Would you agree or disagree? Preferably neither.

Outline

Definite descriptions (Fregean analysis)



Iota

Syntax rule: Iota

If ϕ is an expression of type t, and u is a variable of type e, then $\iota u \,.\, \phi$ is an expression of type e.

Semantic rule: Iota

$$[\![\iota u \,.\, \phi]\!]^{M,g} = \begin{cases} d \text{ if } \{k : [\![\phi]\!]^{M,g[u \mapsto k]} = 1\} = \{d\} \\ \#_{\mathrm{e}} \text{ otherwise} \end{cases}$$

$\#_e$: 'a completely alien entity' (Kaplan 1989), what definite descriptions denote when they don't denote anything that exists.

Sentences with empty descriptions

If a sentence contains an empty description, what does the sentence denote?

- Normally, the third truth value: $\#$
- Exception: the existence predicate
- Other exceptions: with presupposition plugs and filters

Existence predicate with empty descriptions

(17) The golden mountain does not exist.

(18) $\neg\text{Exists}(\iota x\,.\,[\text{Golden}(x) \wedge \text{Mountain}(x)])$

Semantic rule: Existence predicate

$[\![\text{Exists}(\alpha)]\!]^{M,g} = 1$ if $[\![\alpha]\!]^{M,g} \neq \#_e$ and 0 otherwise

Other predicates with empty descriptions

(19) The golden mountain is in Nebraska.
$\mathsf{In}(\iota x\,.\,[\mathsf{Golden}(x) \wedge \mathsf{Mountain}(x)], \mathsf{nebraska})$

(20) The golden mountain is not in Nebraska.
$\neg\mathsf{In}(\iota x\,.\,[\mathsf{Golden}(x) \wedge \mathsf{Mountain}(x)], \mathsf{nebraska})$

Both would normally denote the third truth value, $\#$.

Negation in 3-valued logic

	$\neg$
T	F
F	T
#	#

Other presupposition triggers

(21) a. Both candidates laughed.
     b. If both candidates laughed, then...

(22) a. Neither candidate laughed.
     b. If neither candidate laughed, then...

All imply: There were two candidates.

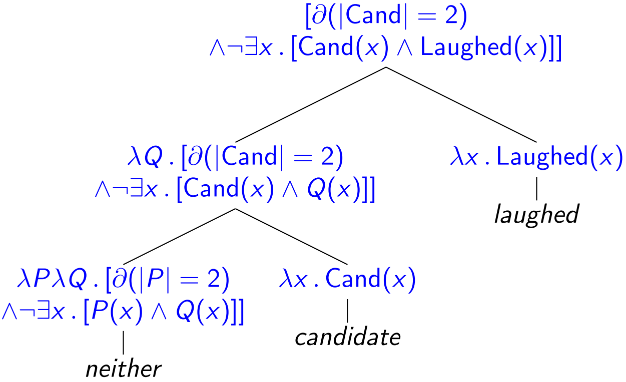
Semantics of ∂ 'partial'

	∂
T	T
F	$\#$
$\#$	$\#$

Example

Neither candidate laughed $\rightsquigarrow$
$[\partial(|\text{Cand}| = 2) \wedge \neg\exists x \,.\, [\text{Cand}(x) \wedge \text{Laughed}(x)]]$

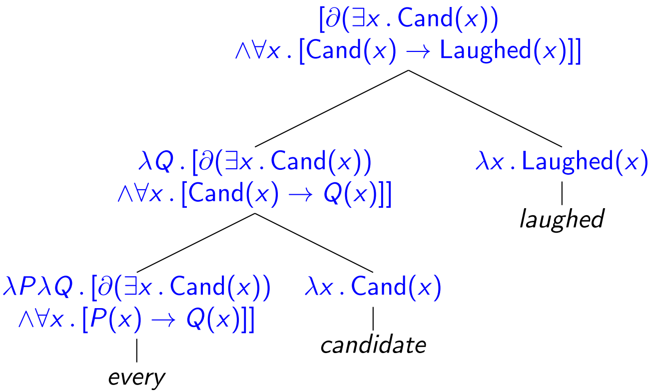
Compositional derivation



Example

Every candidate laughed $\rightsquigarrow$
$[\partial(\exists x \,.\, \mathrm{Cand}(x)) \wedge \forall x \,.\, [\mathrm{Cand}(x) \rightarrow \mathrm{Laughed}(x)]]$

Compositional derivation



Comparison with Heim and Kratzer style

$\lambda Q\,.\,[\partial(\exists x\,.\,\mathrm{Cand}(x)) \wedge \forall x\,.\,[\mathrm{Cand}(x) \rightarrow Q(x)]]$

in Heim and Kratzer style would be:

$\lambda Q : \exists x[x \text{ is a candidate }]\,.\,\forall x[x \text{ is a candidate } \rightarrow Q(x)]$

The colon and the dot separate the **domain restriction** for the function.

Comparison with Heim and Kratzer style

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Comparison with Heim and Kratzer style

$[\partial(\exists x\,.\,\mathsf{Cand}(x)) \wedge \forall x\,.\,[\mathsf{Cand}(x) \rightarrow \mathsf{Laughed}(x)]]$

In Heim and Kratzer style would be:

???

Barker, Chris. 2005. Remark on Jacobson 1999: Crossover as a local constraint. *Linguistics and Philosophy* 28(4). 447–472.
Chierchia, Gennaro & Sally McConnell-Ginet. 2000. *Meaning and grammar: An introduction to semantics*. Cambridge, MA: MIT Press 2nd edn.
Hendriks, Hermann. 1993. *Studied flexibility*: ILLC dissertation.
Jacobson, Pauline. 1999. Towards a variable-free semantics. *Linguistics and Philosophy* 22. 117–184.
Jacobson, Pauline. 2012. Direct compositionality. In *The Oxford handbook of compositionality*, 109–129. Oxford University Press.