Lecture 6
Predicate Modification & Predicate Abstraction

Elizabeth Coppock

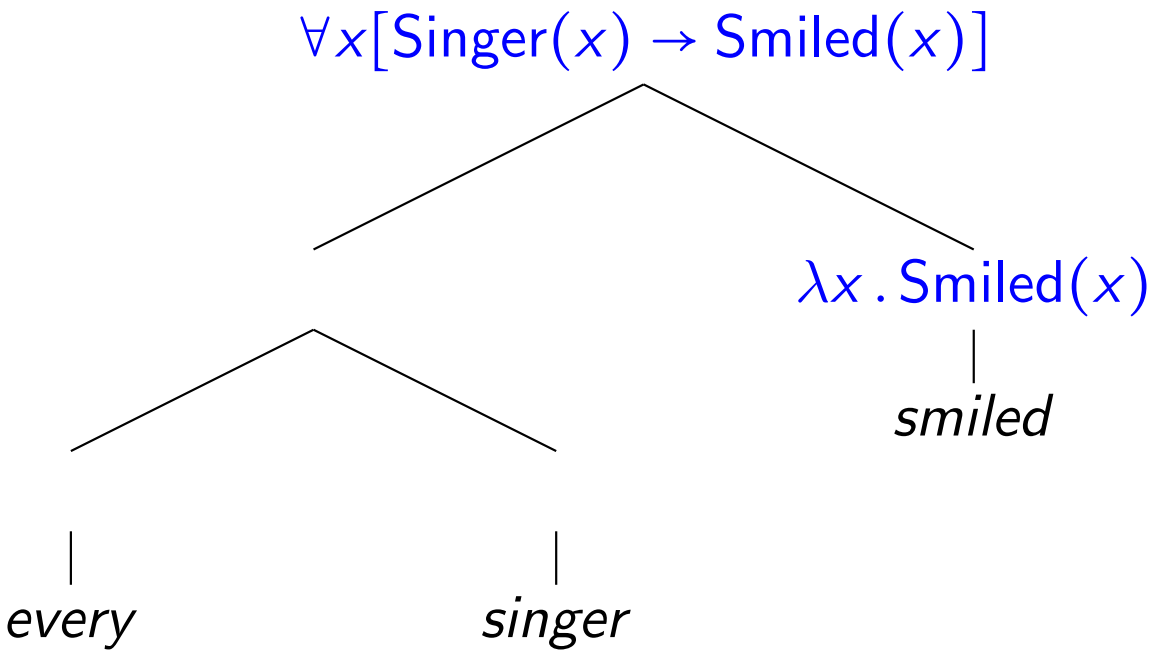
Introduction to Semantics · EGG 2019

Outline

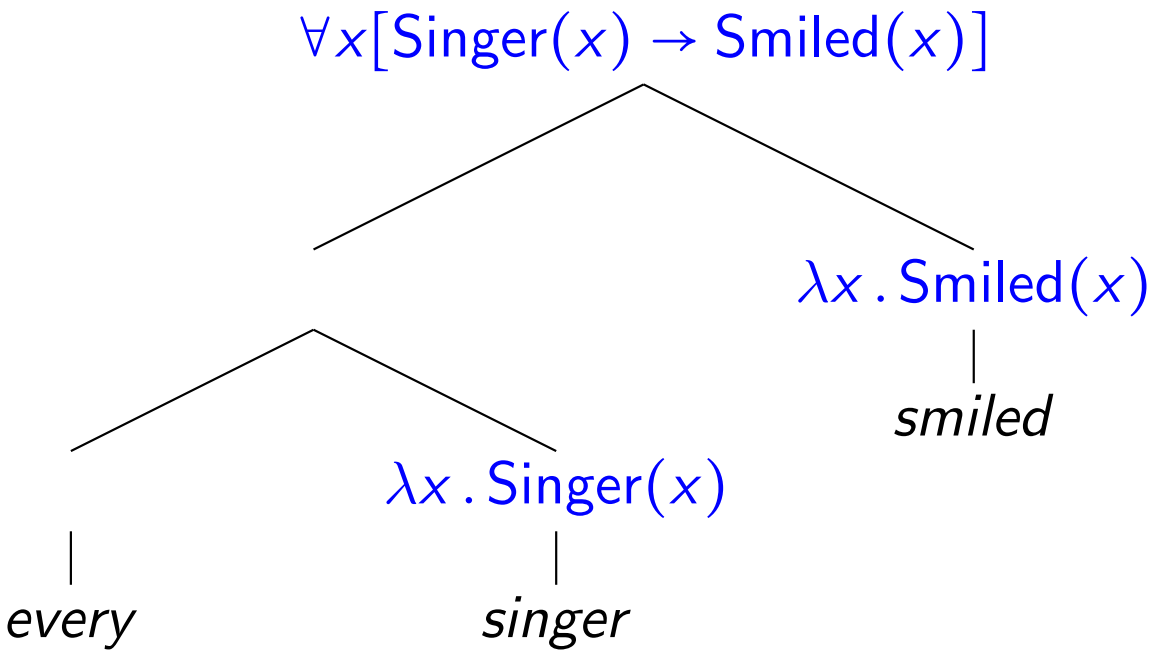
Quantificational determiner: *every*

Every singer smiled $\rightsquigarrow \forall x[\text{Singer}(x) \rightarrow \text{Smiled}(x)]$

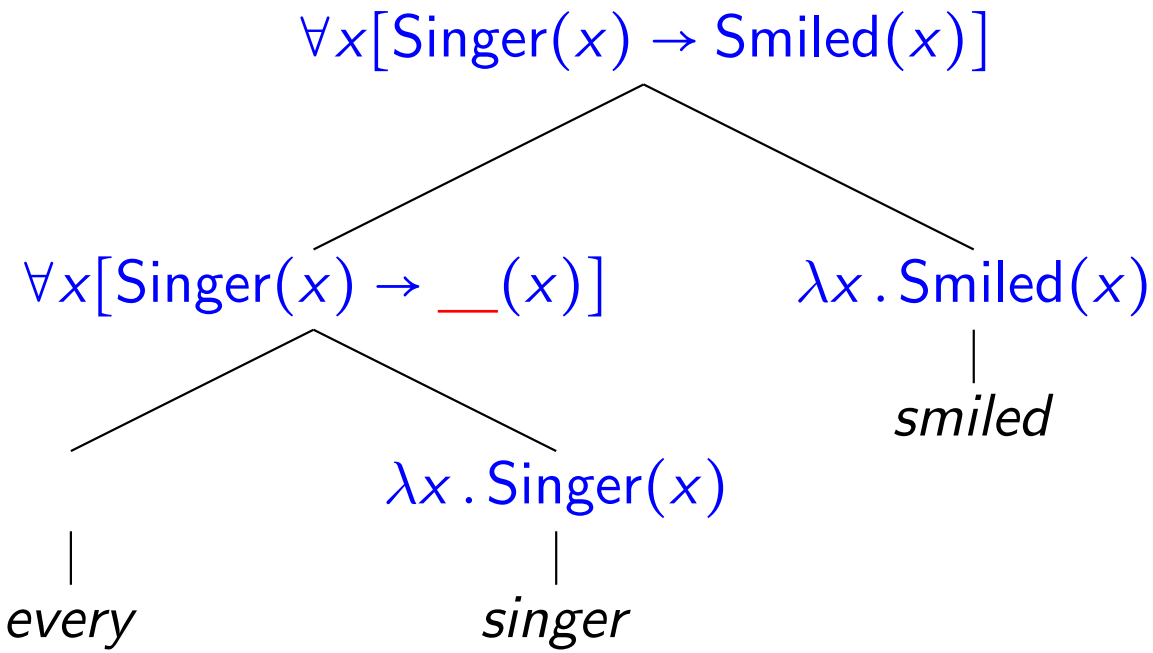
Quantificational determiner: *every*



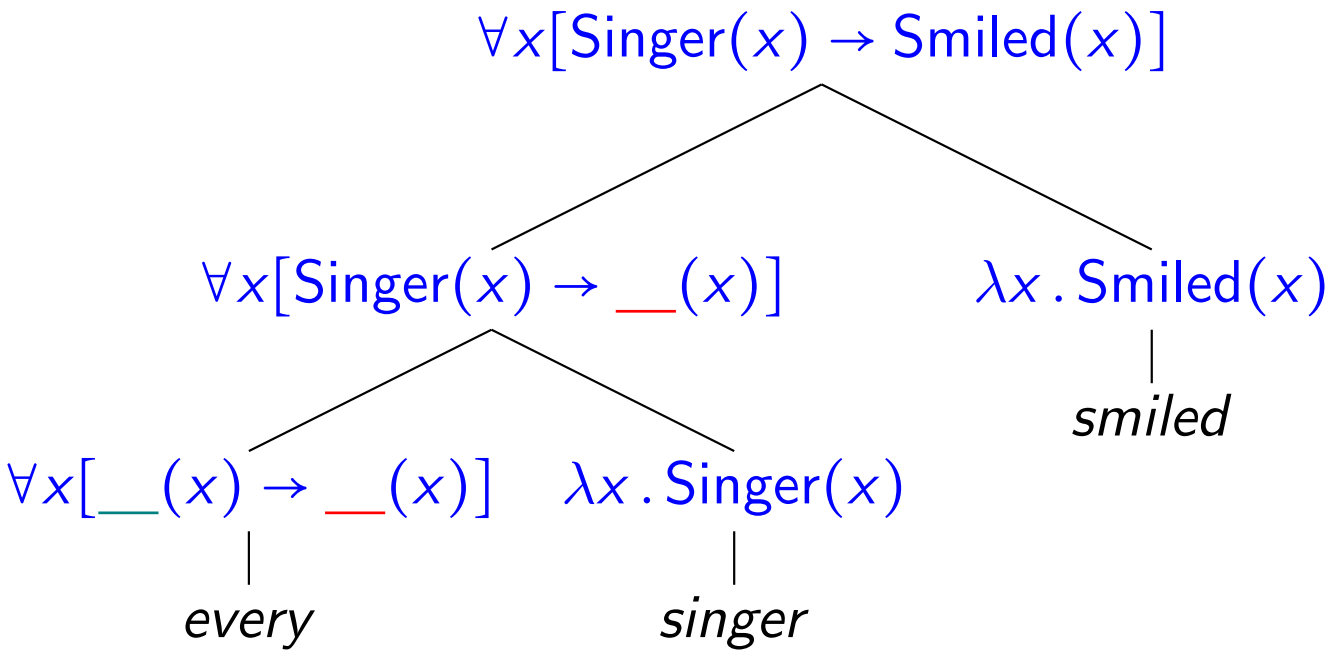
Quantificational determiner: *every*



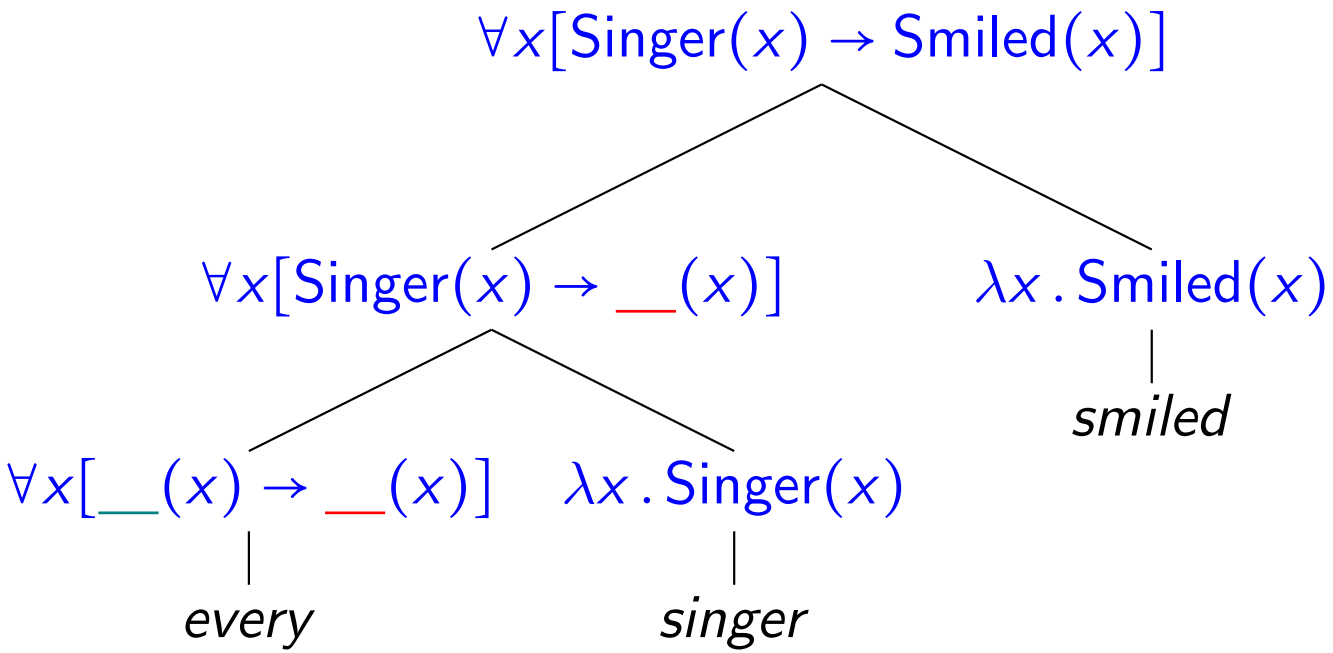
Quantificational determiner: *every*



Quantificational determiner: *every*

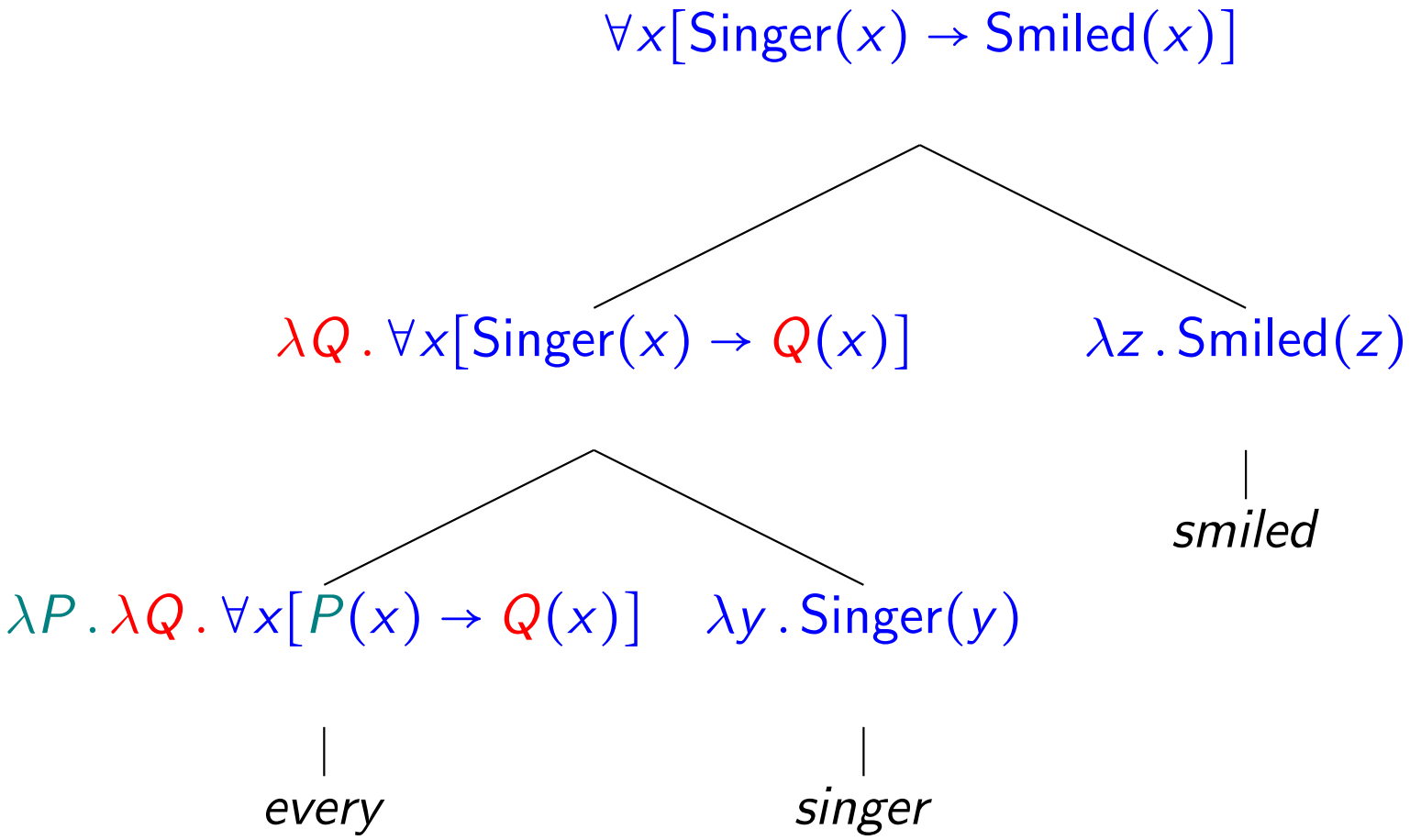


Quantificational determiner: *every*

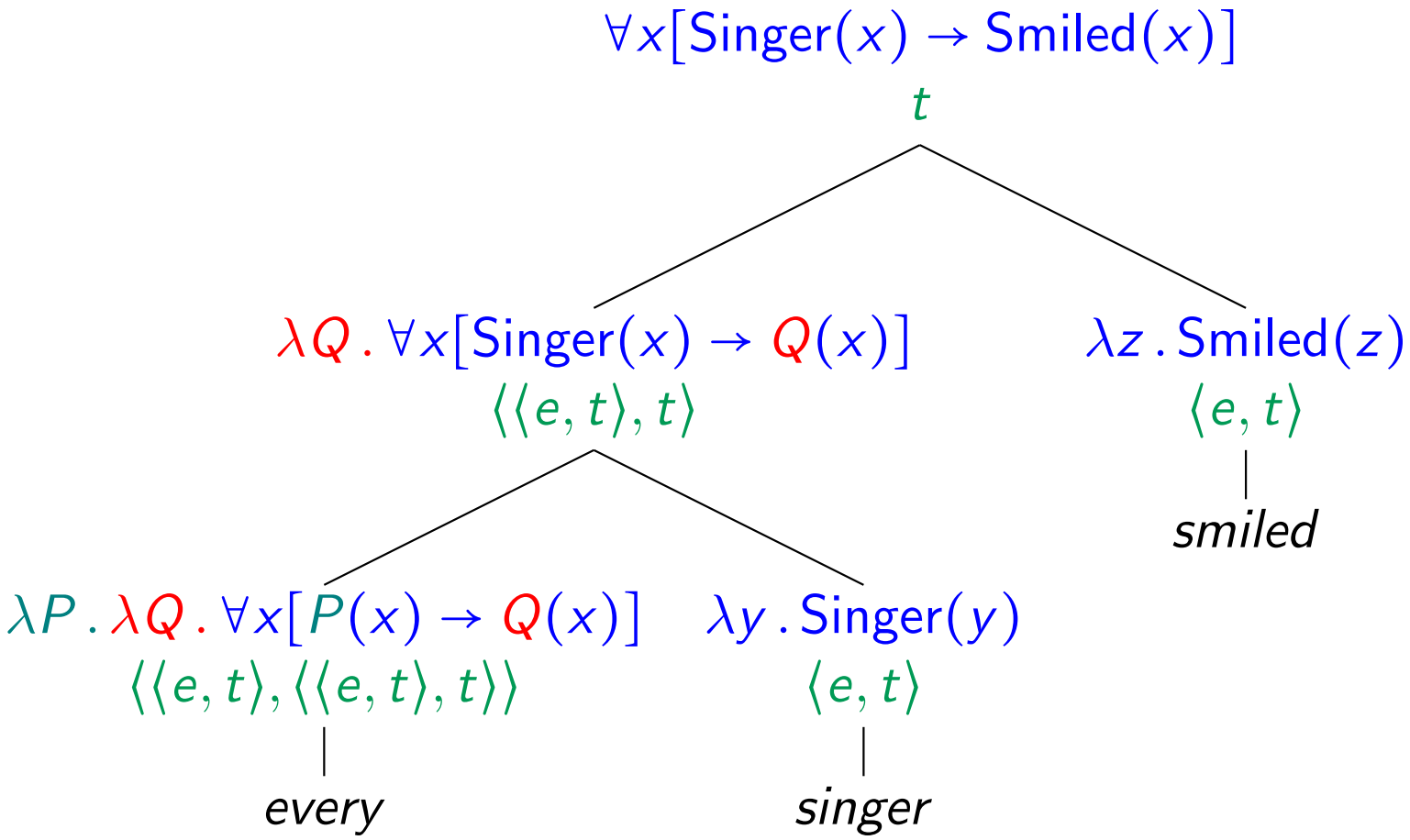


What are the types?

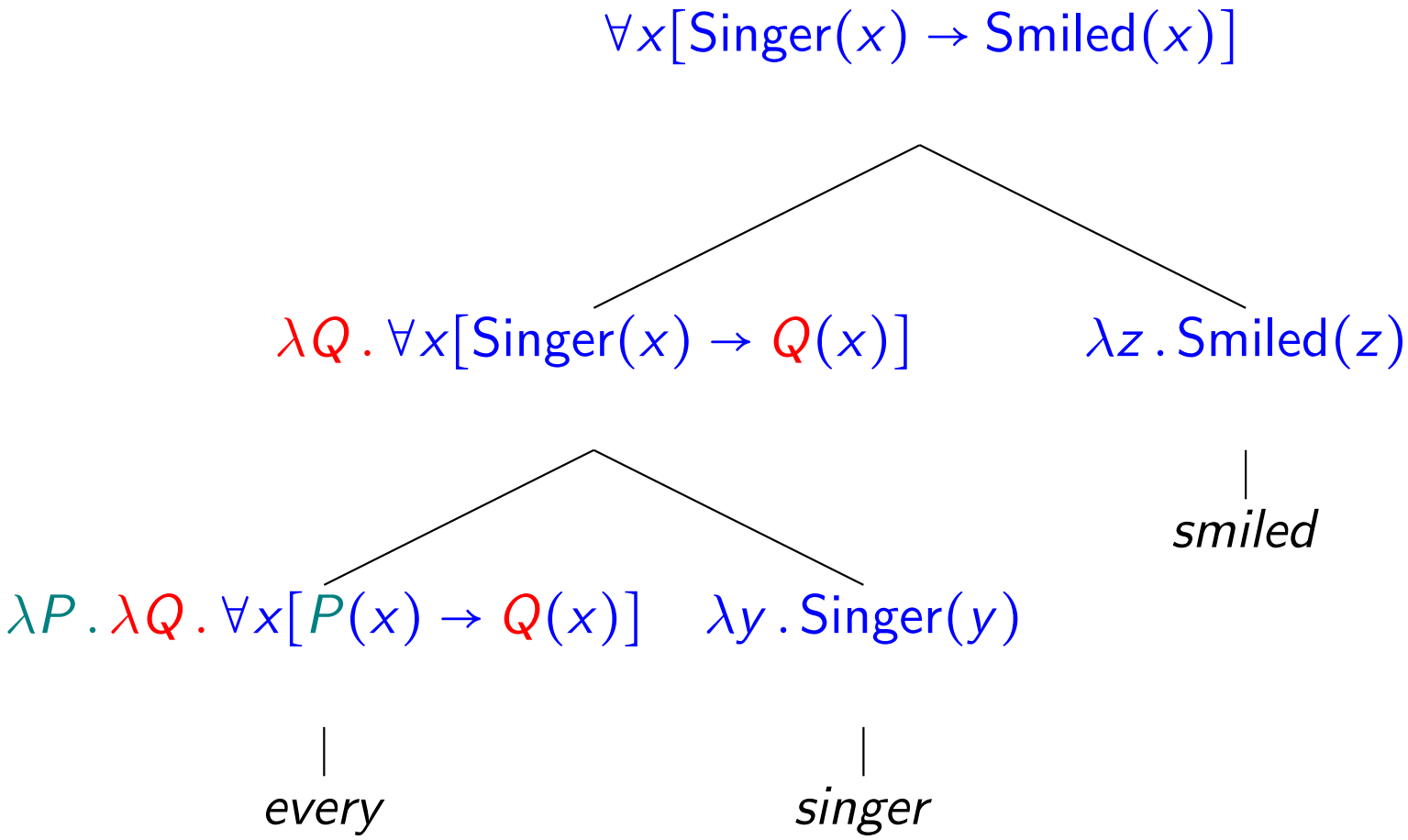
Quantificational determiner: *every*



Quantificational determiner: *every*

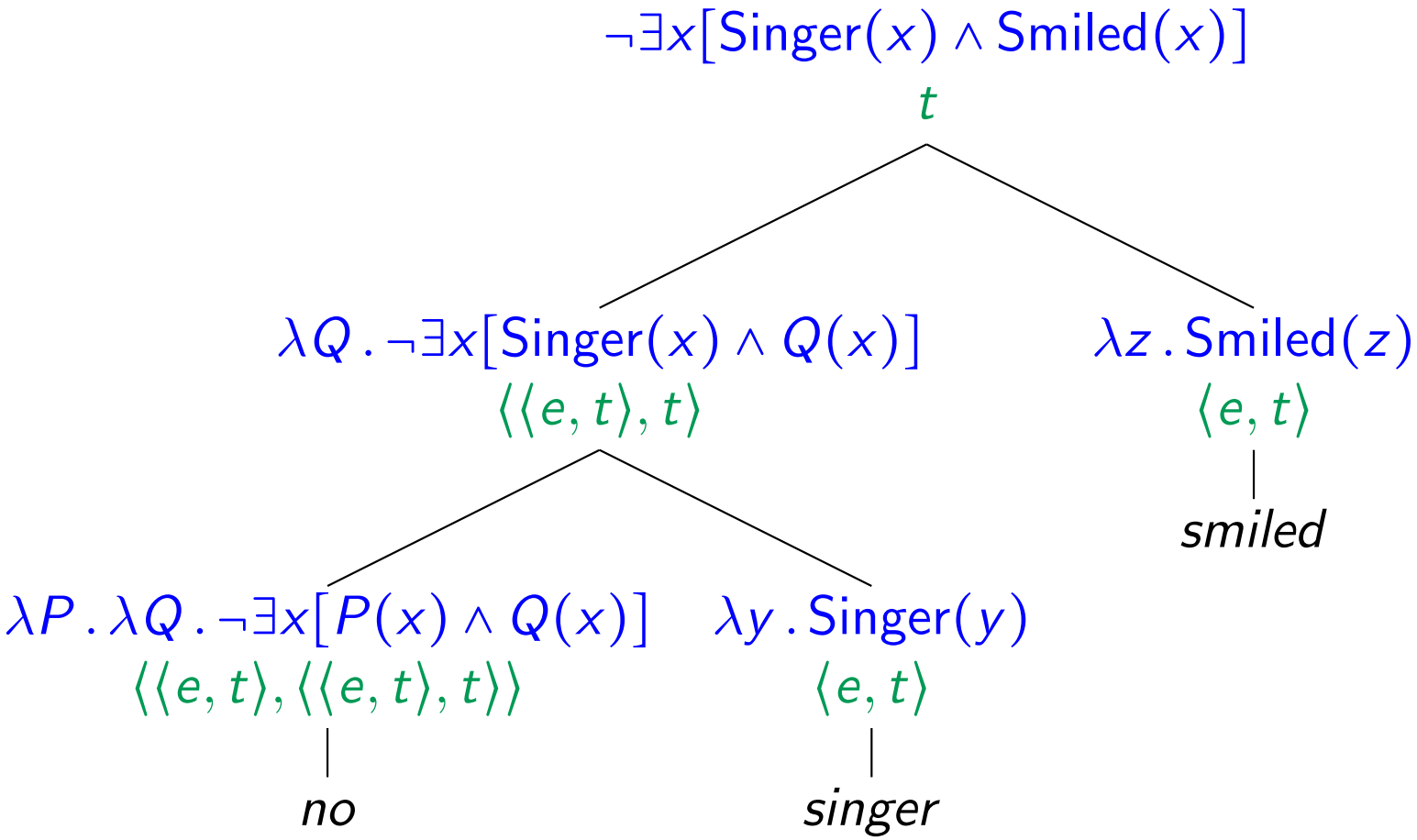


Quantificational determiner: *every*

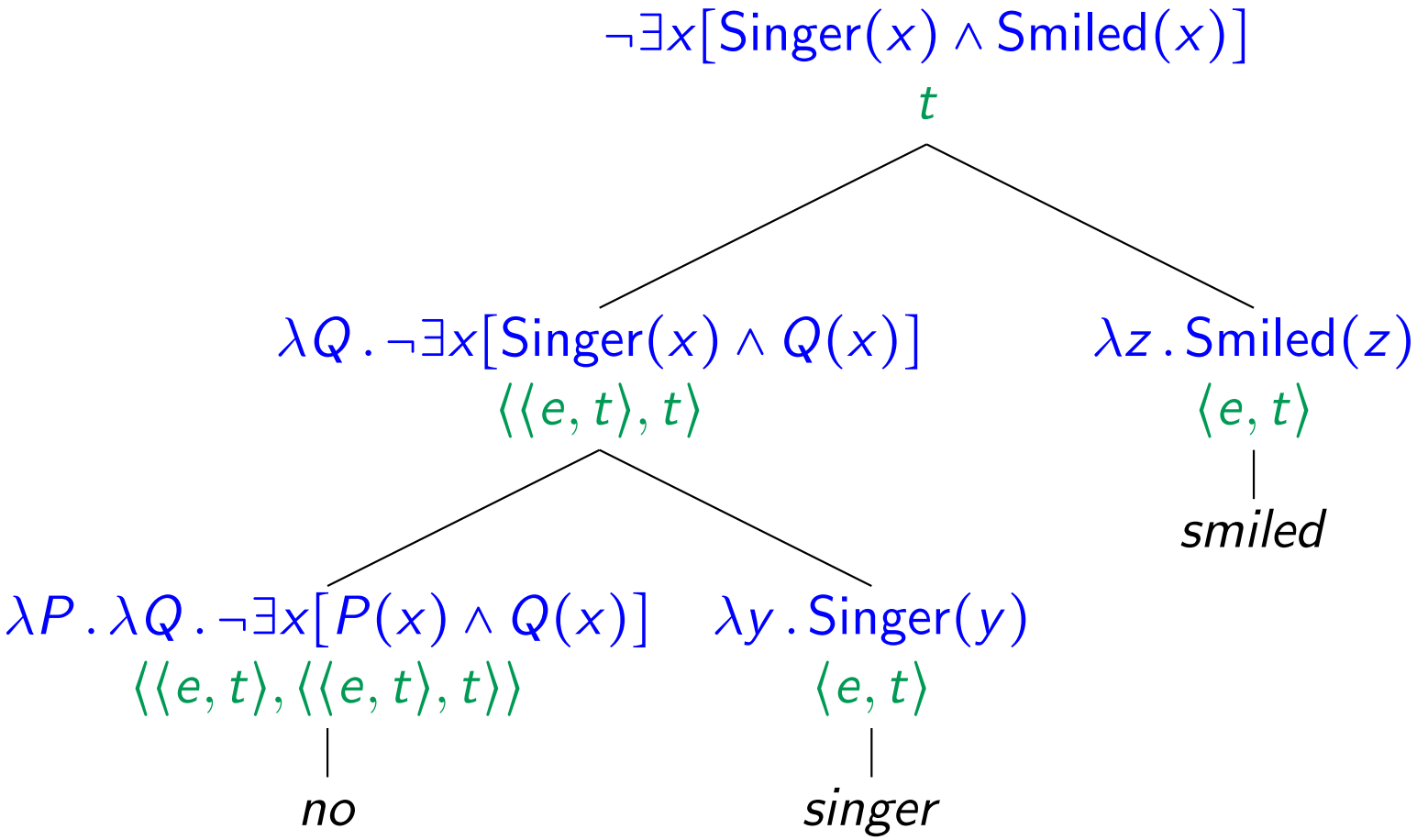


What would the lexical entry for *no* be?

Quantificational determiner: *no*

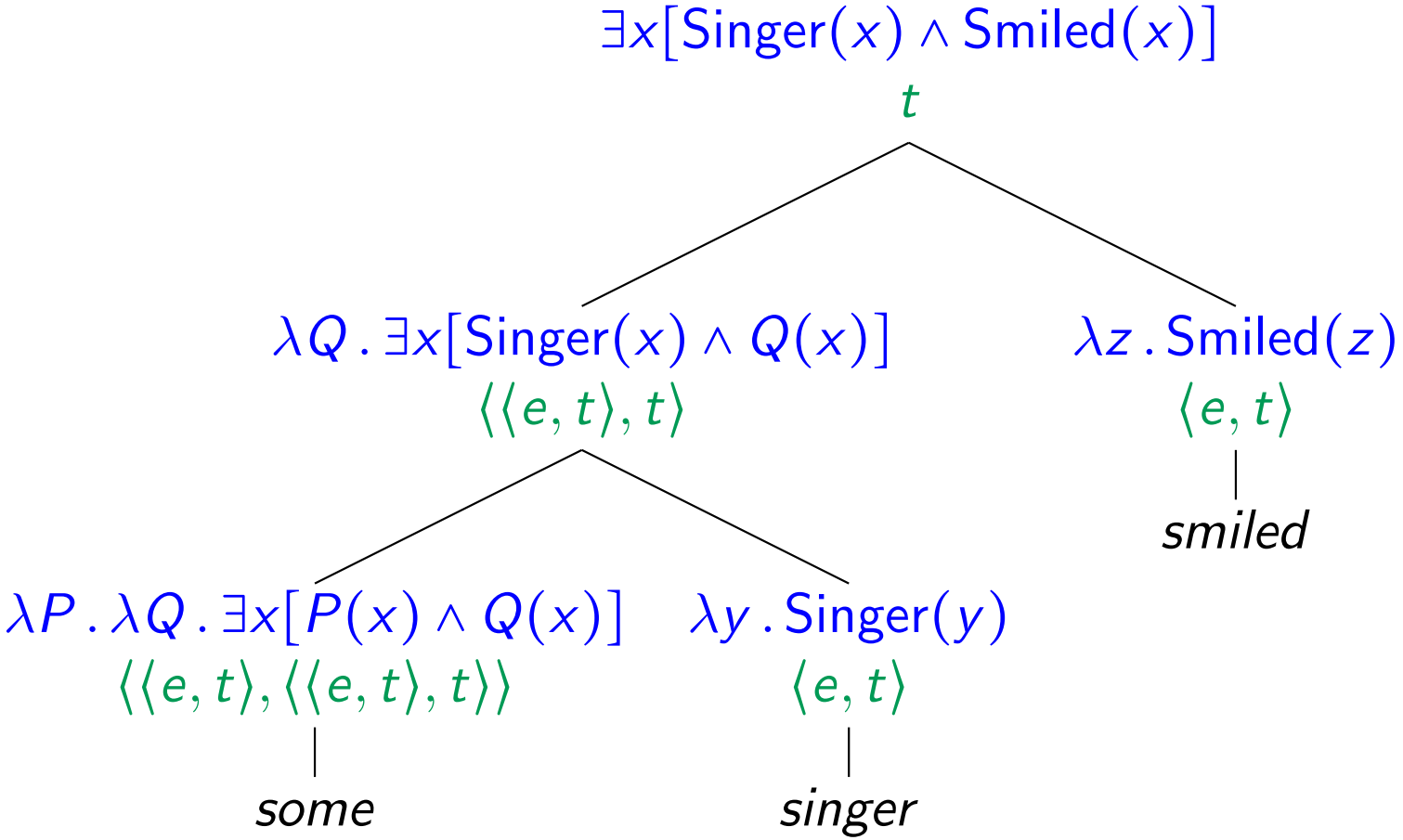


Quantificational determiner: *no*

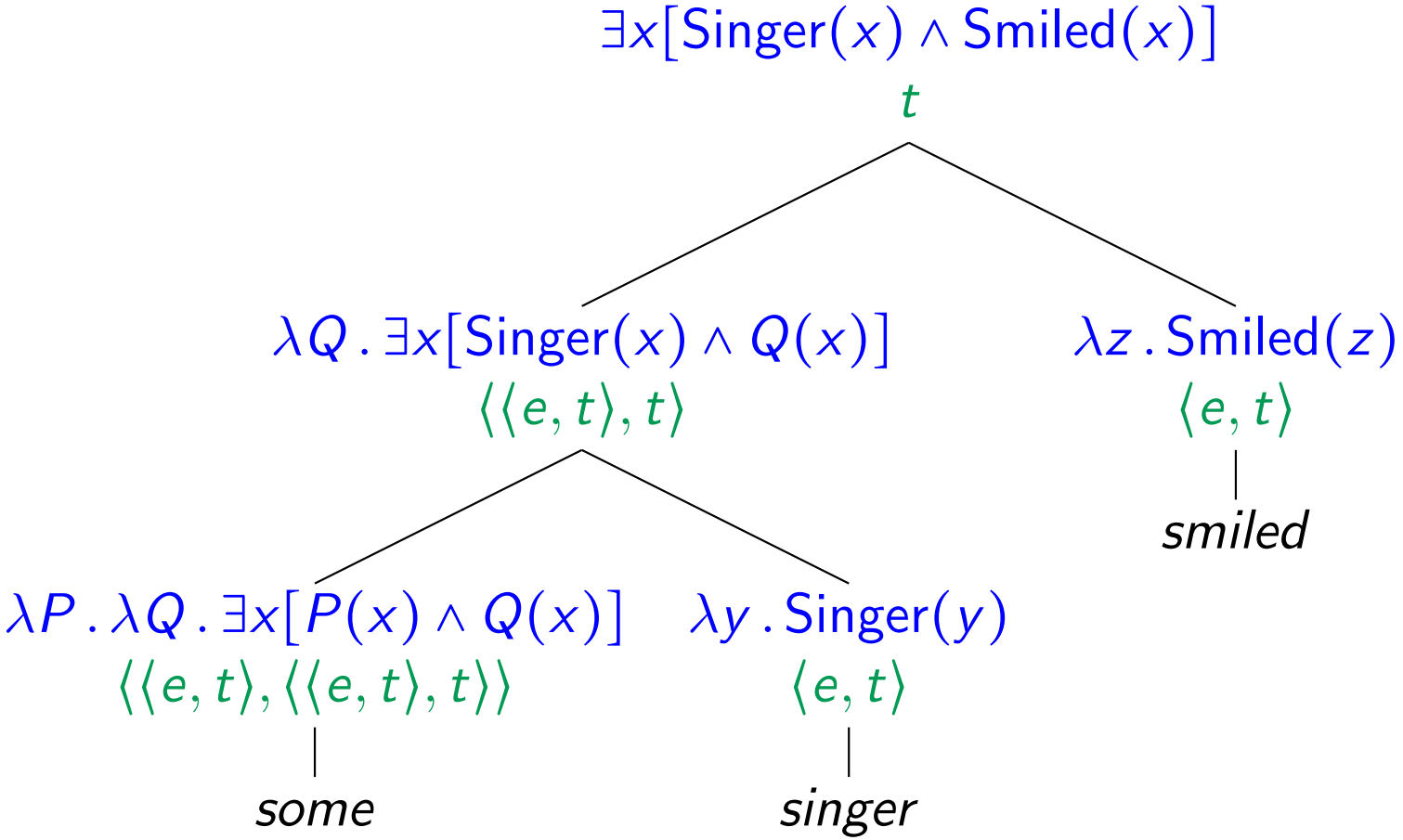


What would the lexical entry for *some* be?

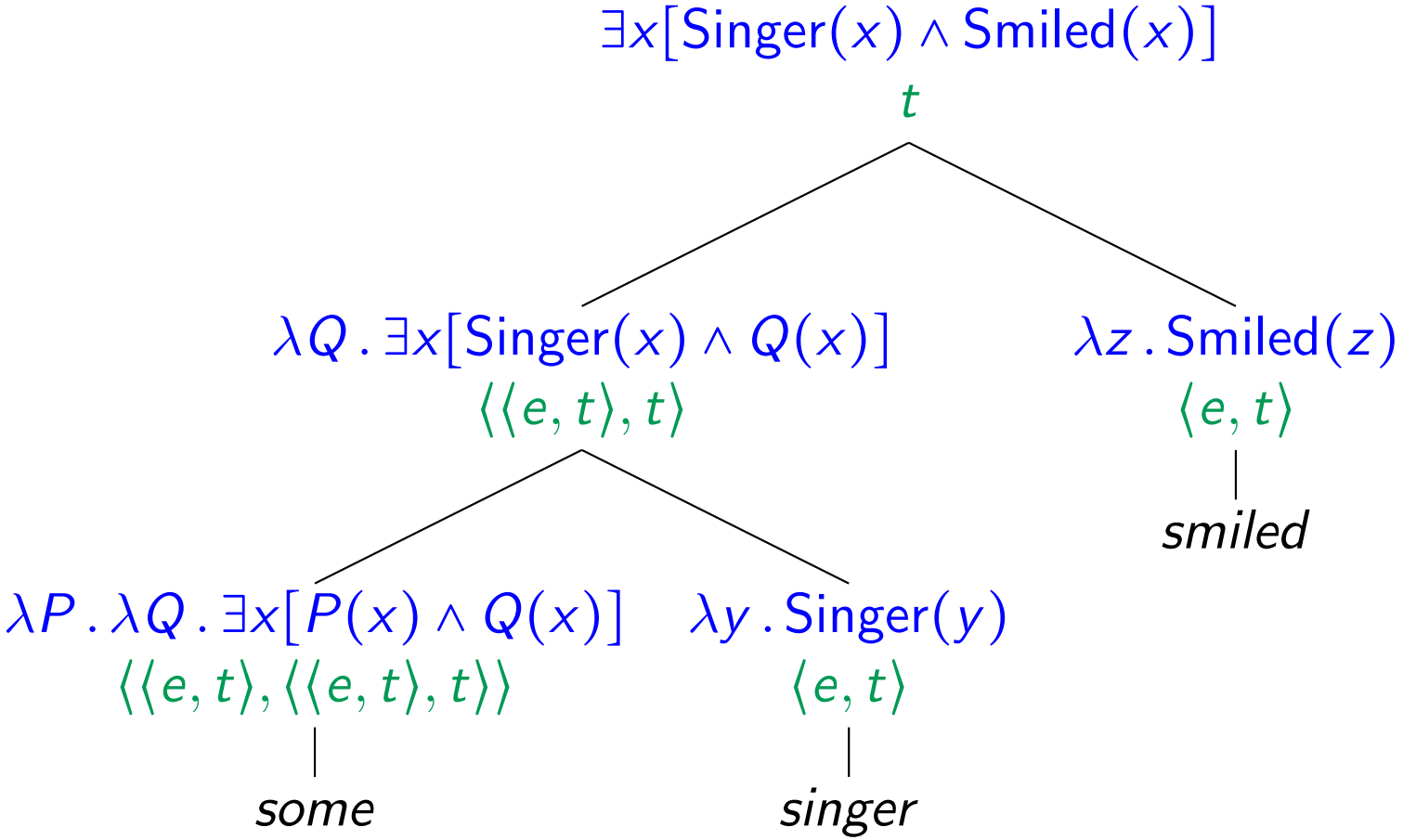
Quantificational determiner: *some*



Quantificational determiner: *some*



Quantificational determiner: *some*



What about the indefinite article *a*?

Are indefinites quantificational (as Bertrand Russell said)?

Evidence in favor: They can scope above or below negation.

Are indefinites quantificational (as Bertrand Russell said)?

Evidence in favor: They can scope above or below negation.

(1) Why are you late?
Because I didn't make a turn.

Are indefinites quantificational (as Bertrand Russell said)?

Evidence in favor: They can scope above or below negation.

(1) Why are you late?
Because I didn't make a turn.
$\exists x[\mathsf{Turn}(x) \wedge \neg\mathsf{Make}(\mathsf{i}, x)]$

Are indefinites quantificational (as Bertrand Russell said)?

Evidence in favor: They can scope above or below negation.

(1) Why are you late?
Because I didn't make a turn.
$\exists x[\mathsf{Turn}(x) \wedge \neg\mathsf{Make}(\mathsf{i}, x)]$

(2) Why is he upset?

Are indefinites quantificational (as Bertrand Russell said)?

Evidence in favor: They can scope above or below negation.

(1) Why are you late?
Because I didn't make a turn.
$\exists x[\mathsf{Turn}(x) \wedge \neg\mathsf{Make}(\mathsf{i}, x)]$

(2) Why is he upset?
Because I didn't make a cake.

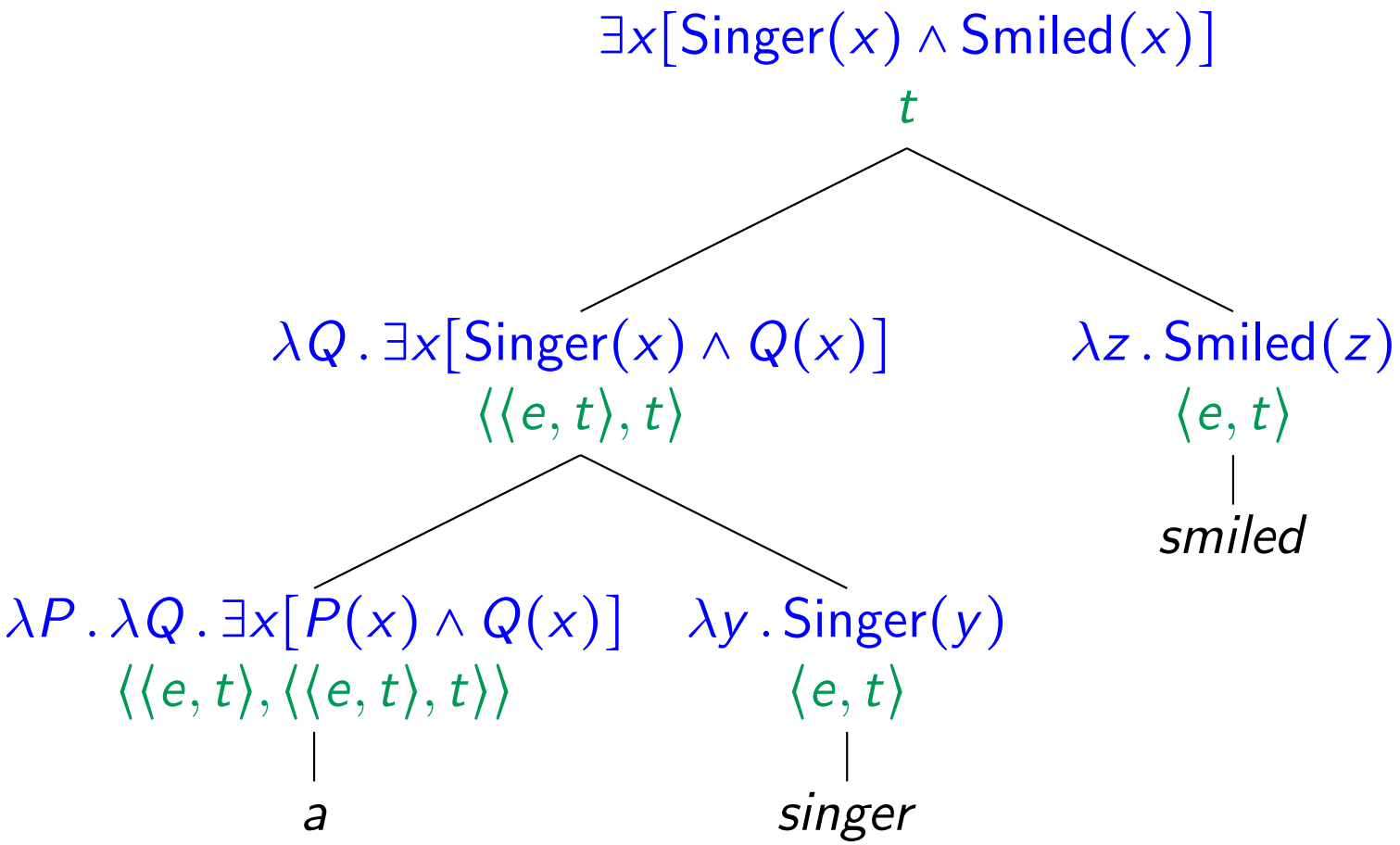
Are indefinites quantificational (as Bertrand Russell said)?

Evidence in favor: They can scope above or below negation.

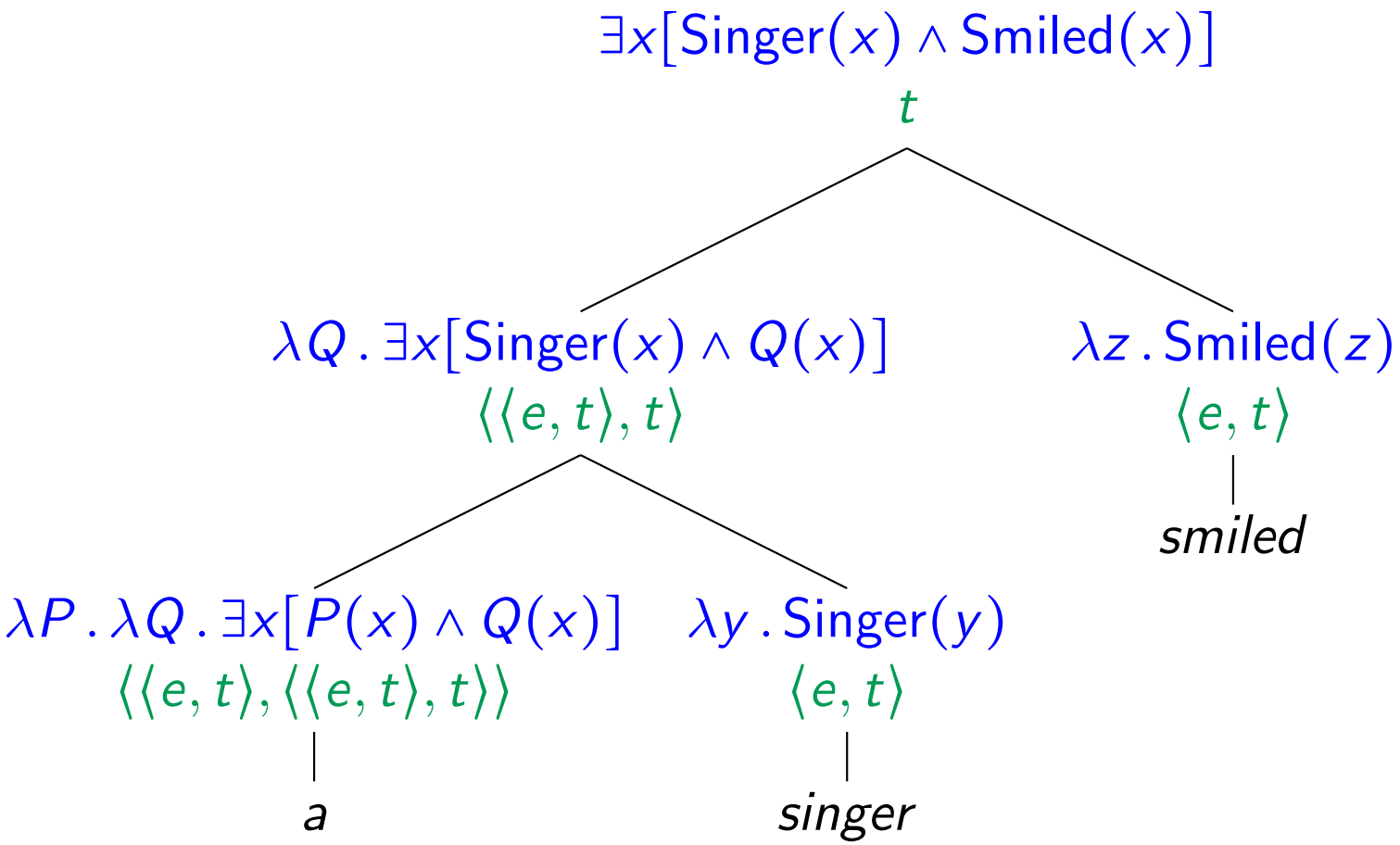
(1) Why are you late?
Because I didn't make a turn.
$\exists x[\mathsf{Turn}(x) \wedge \neg\mathsf{Make}(\mathsf{i}, x)]$

(2) Why is he upset?
Because I didn't make a cake.
$\neg\exists x[\mathsf{Cake}(x) \wedge \mathsf{Make}(\mathsf{i}, x)]$

Indefinites as existential quantifiers



Indefinites as existential quantifiers



But stay tuned for a refinement on this view...

Summary: Lexicon

- *Björn* $\rightsquigarrow$ bj $\qquad e$
- *Agneta* $\rightsquigarrow$ ag $\qquad e$
- *smiled* $\rightsquigarrow \lambda x\,.\,\mathsf{Smiled}(x)$ $\qquad \langle e, t\rangle$
- *singer* $\rightsquigarrow \lambda x\,.\,\mathsf{Singer}(x)$ $\qquad \langle e, t\rangle$
- *loves* $\rightsquigarrow \lambda x\,.\,\mathsf{Loves}(x, y)$ $\qquad \langle e, \langle e, t\rangle\rangle$
- *everybody* $\rightsquigarrow \lambda P\,.\,\forall x\,.\,P(x)$ $\qquad \langle\langle e, t\rangle, t\rangle$
- *nobody* $\rightsquigarrow \lambda P\,.\,\neg\exists x\,.\,P(x)$ $\qquad \langle\langle e, t\rangle, t\rangle$
- *every* $\rightsquigarrow \lambda Q\lambda P\,.\,\forall x\,.\,[Q(x) \rightarrow P(x)]$ $\qquad \langle\langle e, t\rangle, \langle\langle e, t\rangle, t\rangle\rangle$
- *no* $\rightsquigarrow \lambda Q\lambda P\,.\,\neg\exists x\,.\,[Q(x) \wedge P(x)]$ $\qquad \langle\langle e, t\rangle, \langle\langle e, t\rangle, t\rangle\rangle$
- *some/a* $\rightsquigarrow \lambda Q\lambda P\,.\,\exists x\,.\,[Q(x) \wedge P(x)]$ $\qquad \langle\langle e, t\rangle, \langle\langle e, t\rangle, t\rangle\rangle$

Composition rule

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

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

Defining a fragment

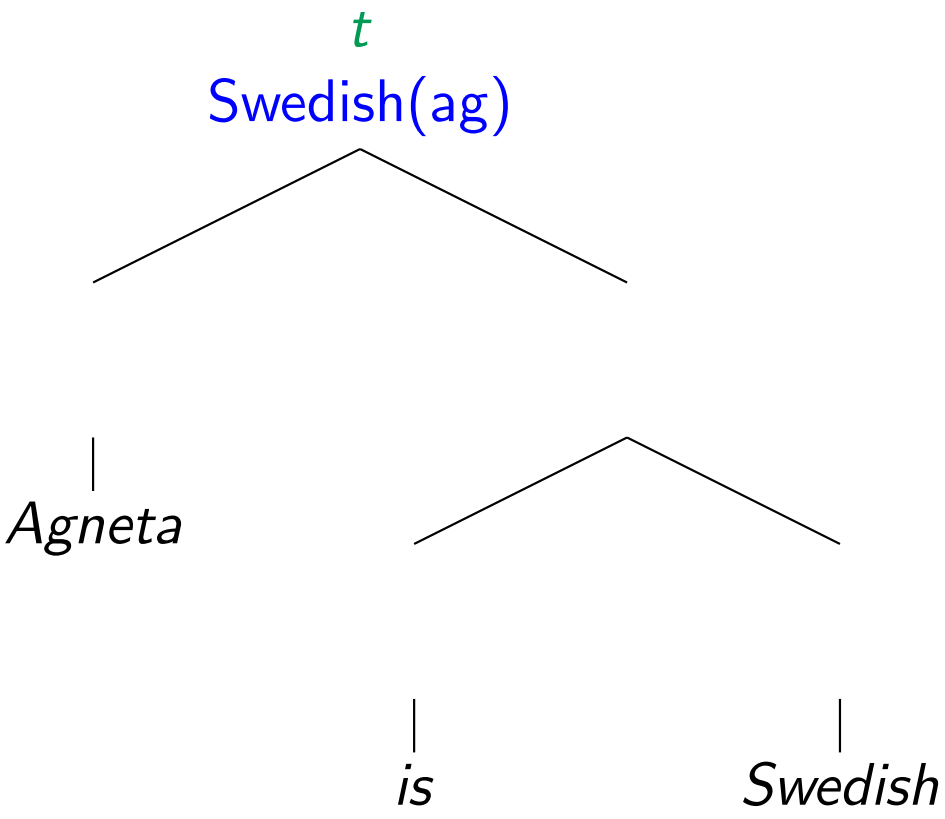
A fully specified **fragment** of English would consist of:

- A list of lexical entries
- A list of composition rules
- A specification of our formal representation language, with syntactic and semantic rules.
- A specification of the syntax of the English expressions we cover.

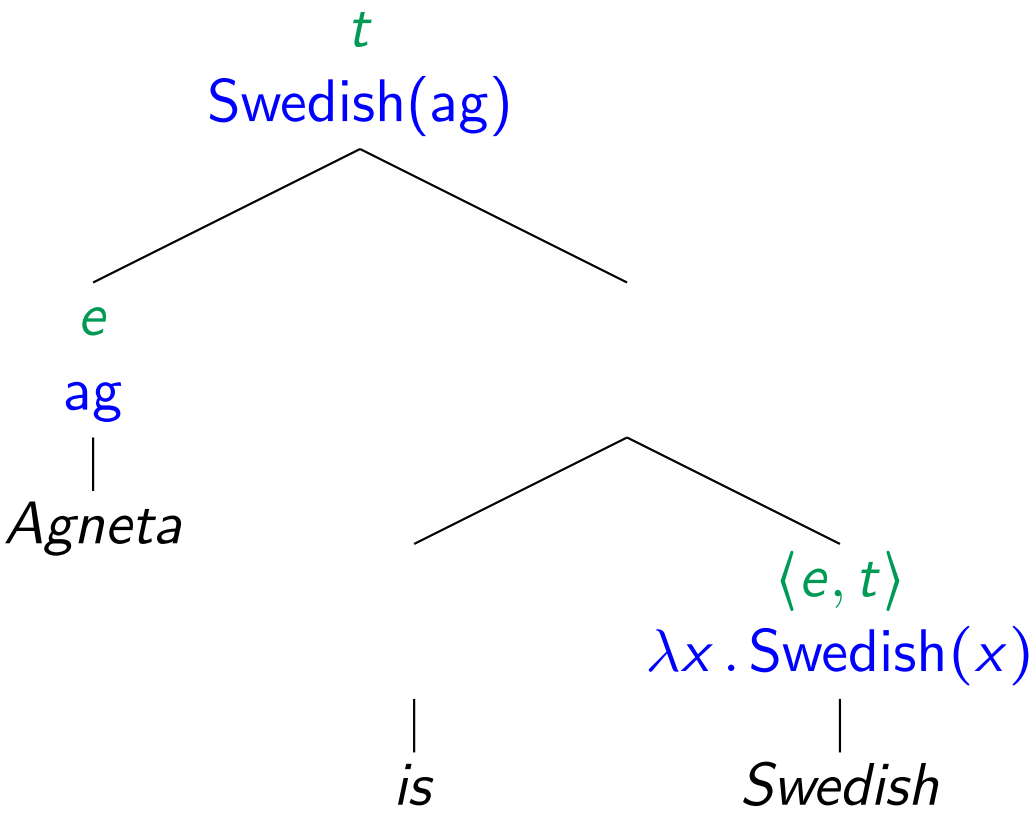
In 'The Proper Treatment of Quantification in Ordinary English', Richard Montague formally defined the first fragment of English.

Outline

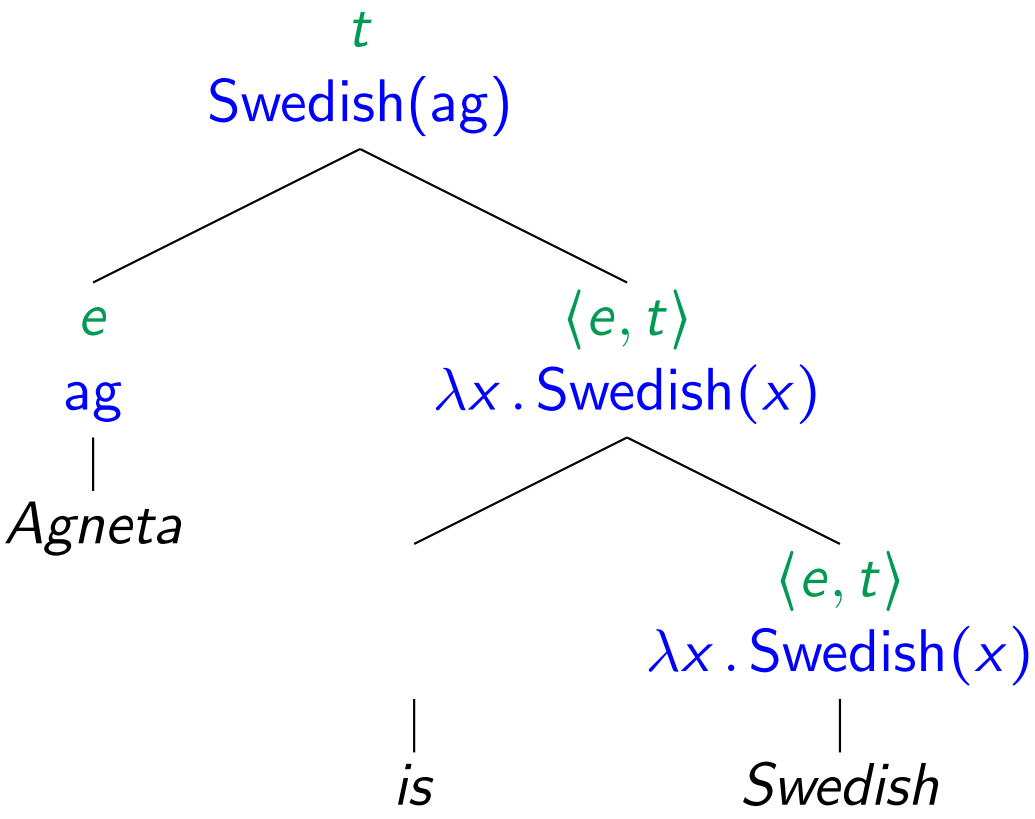
Predicative adjectives



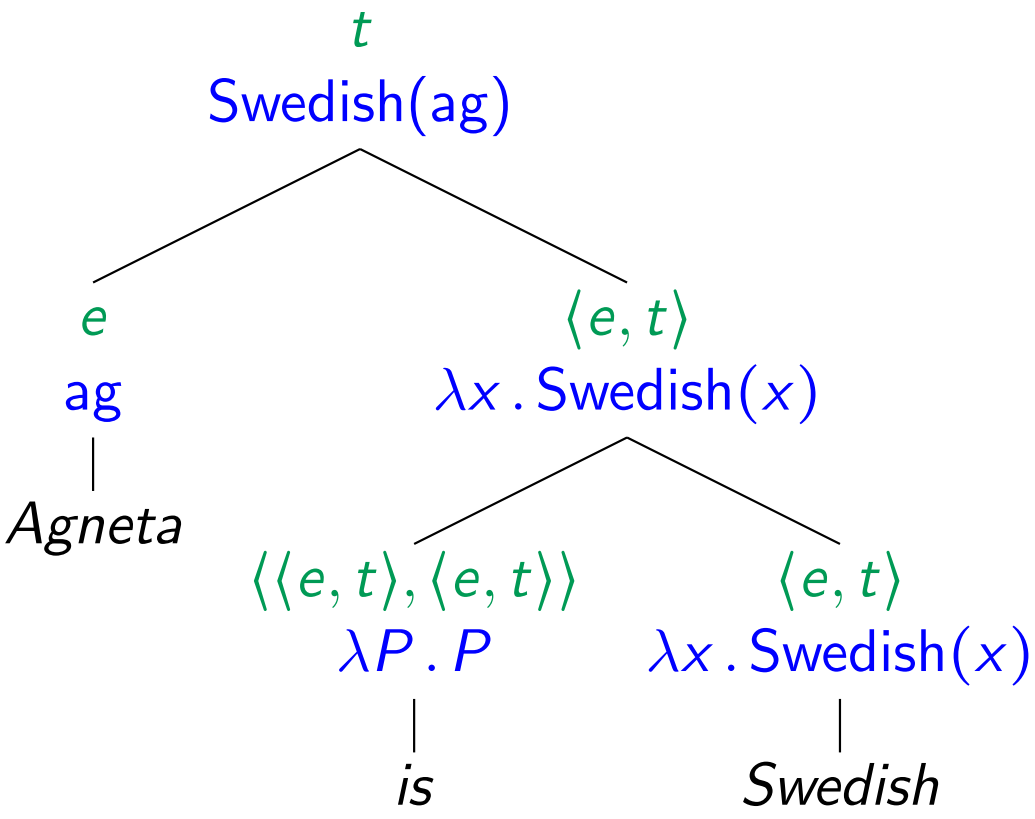
Predicative adjectives



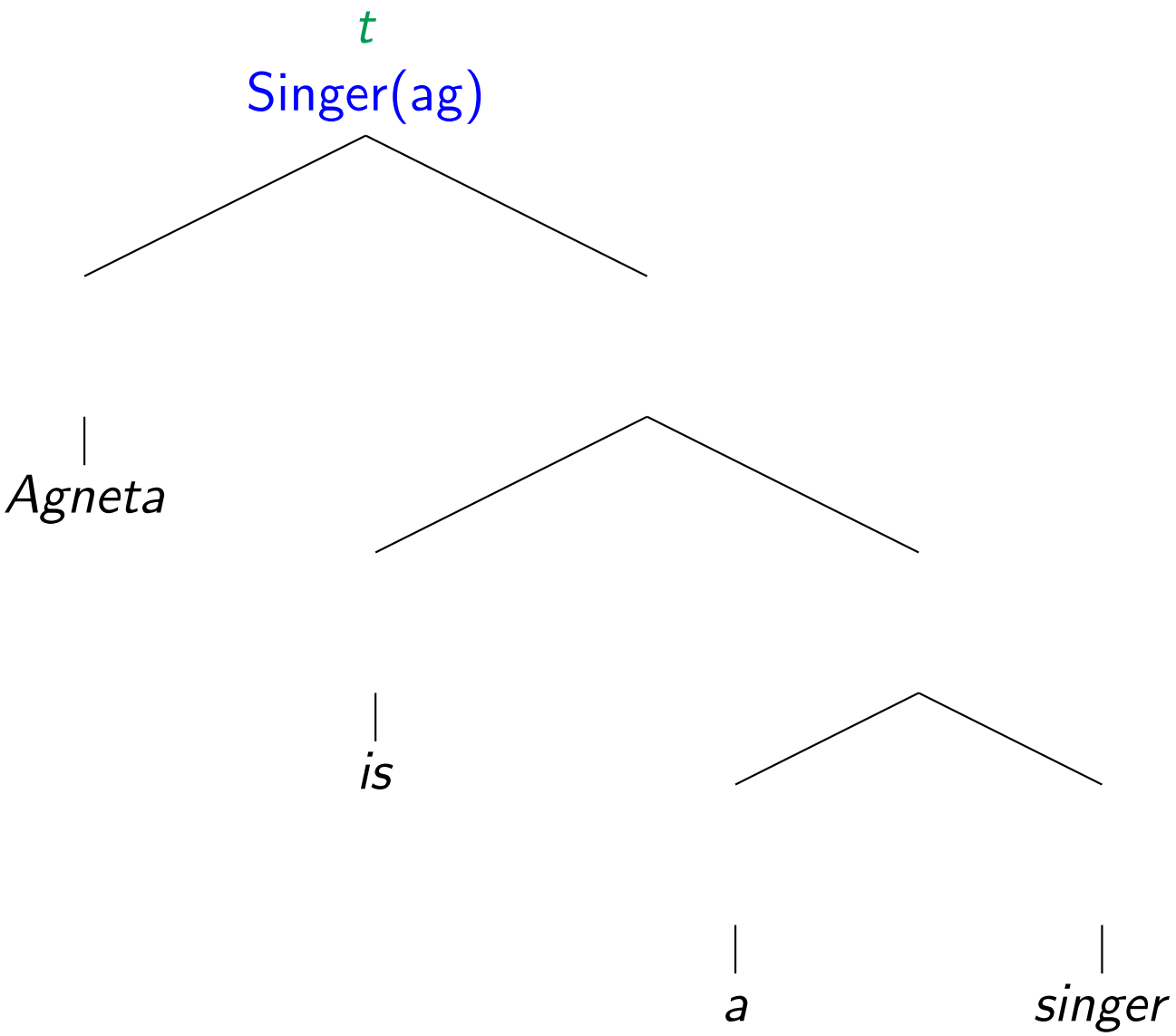
Predicative adjectives



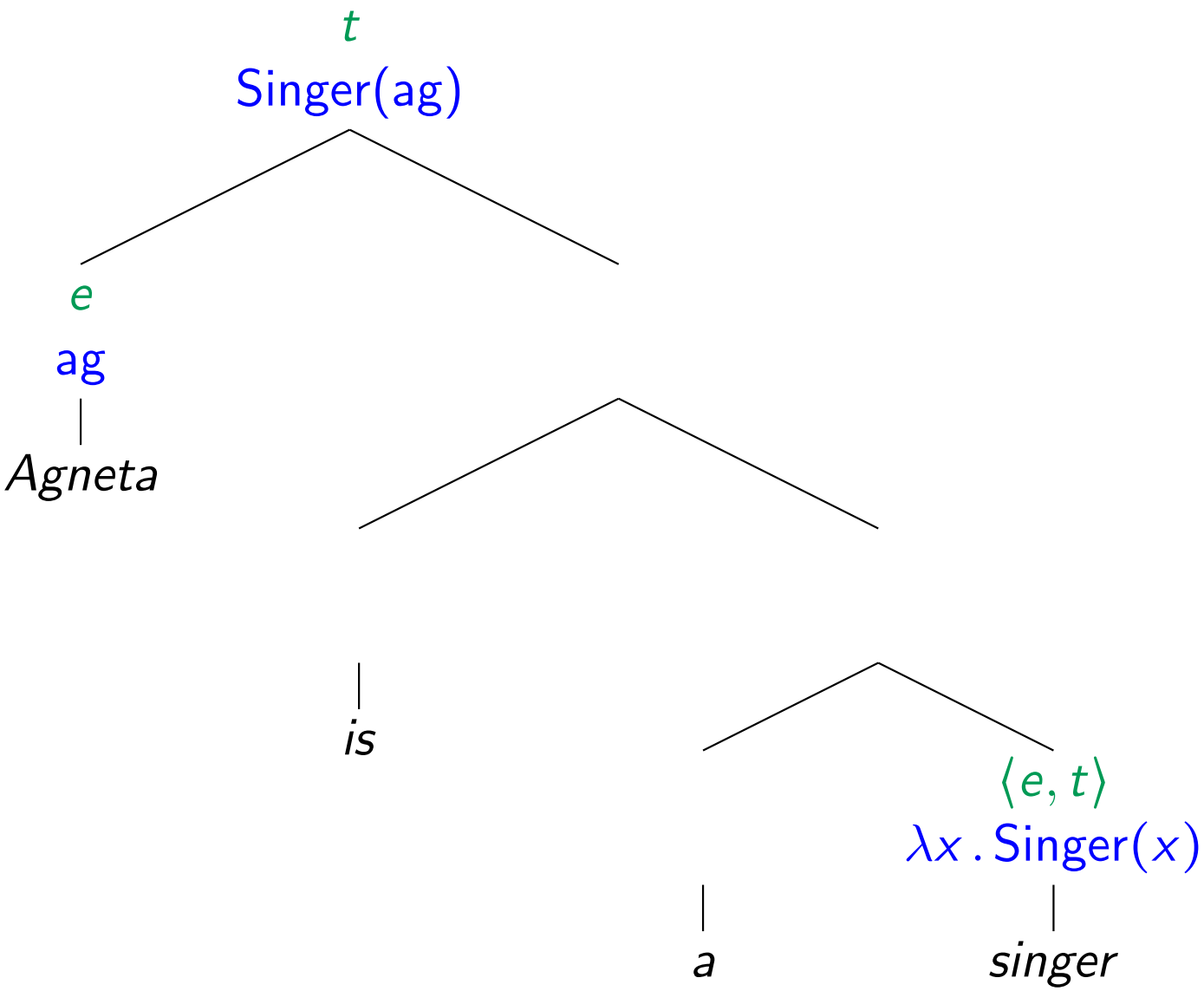
Predicative adjectives



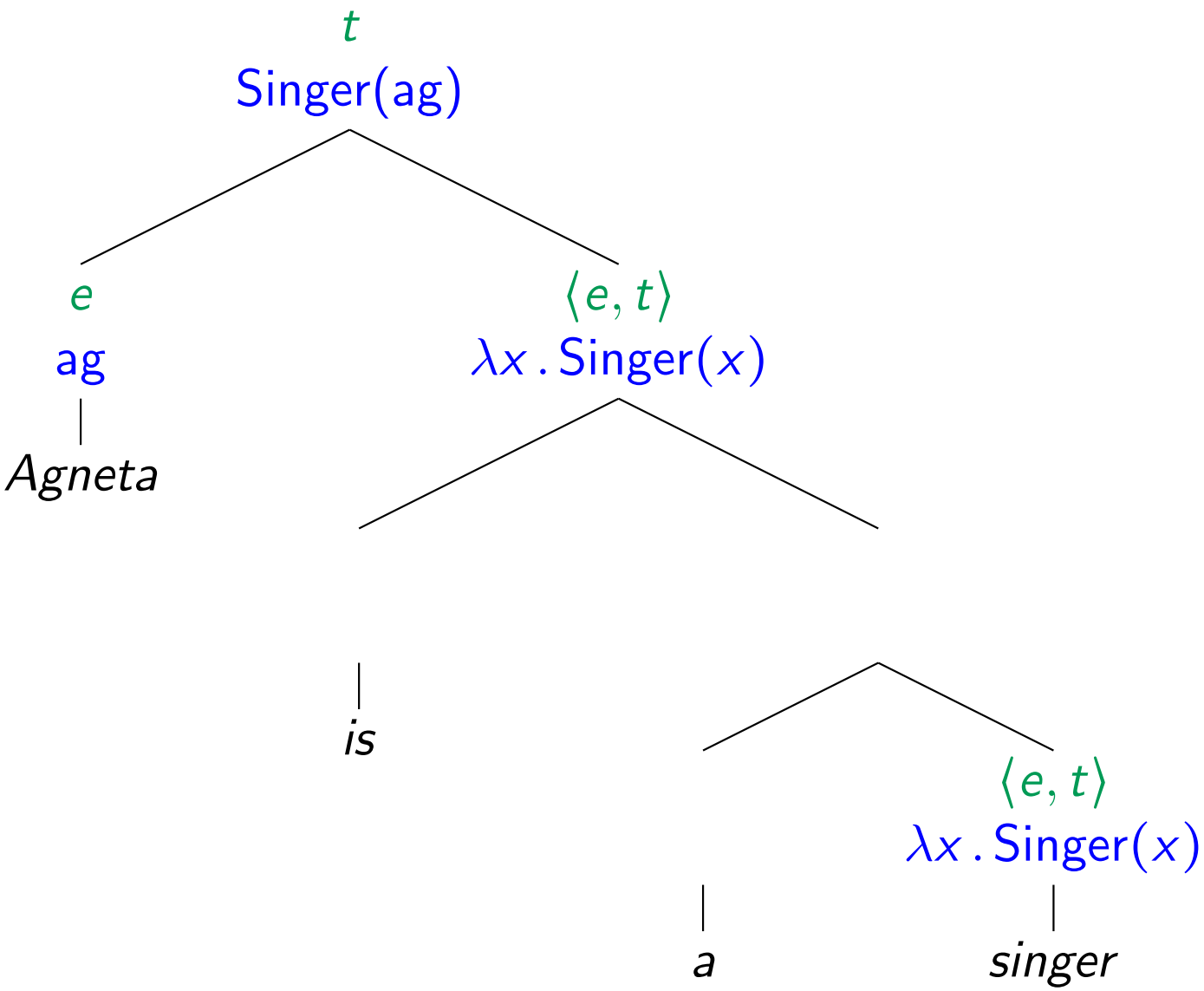
Predicate nominals



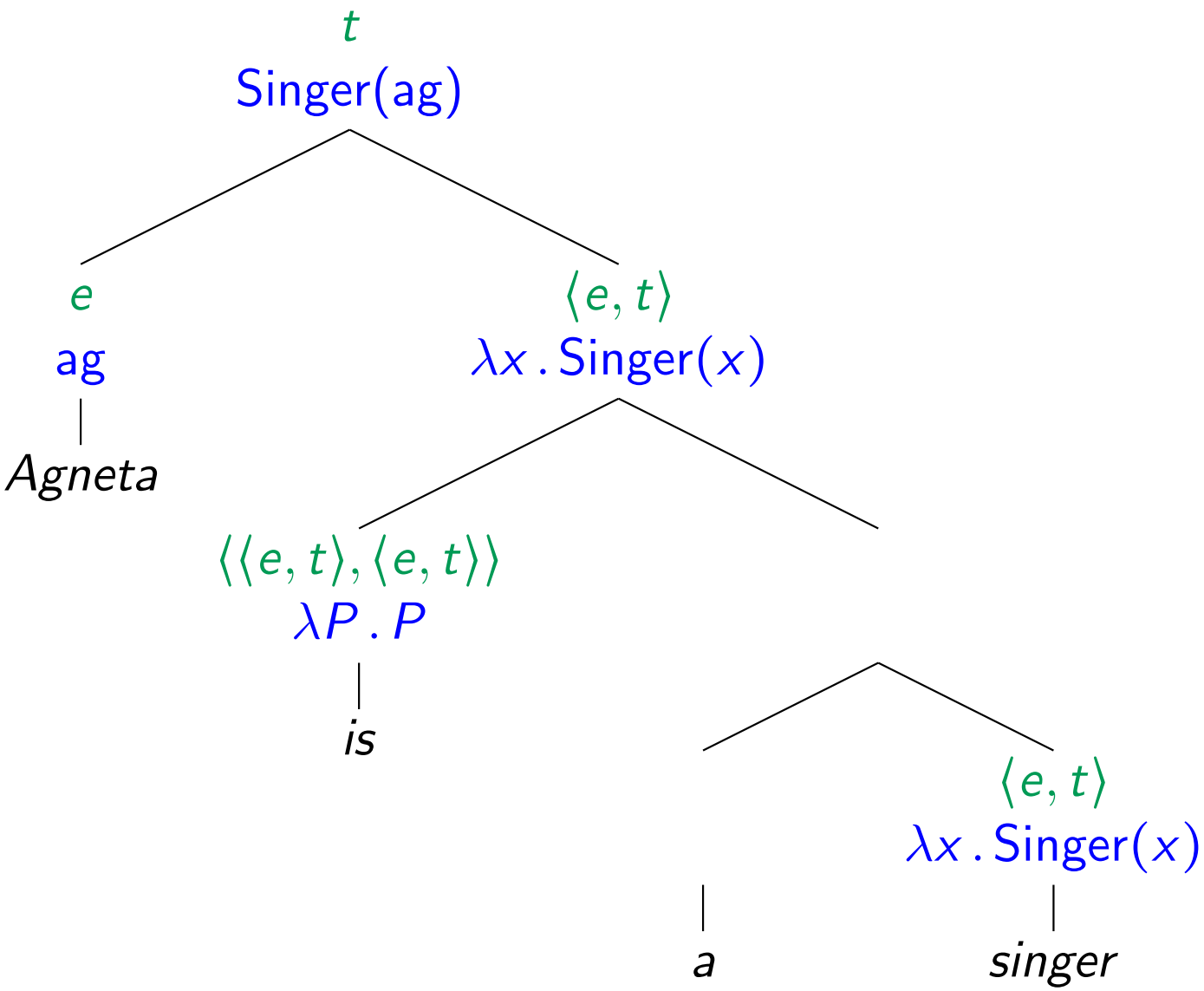
Predicate nominals



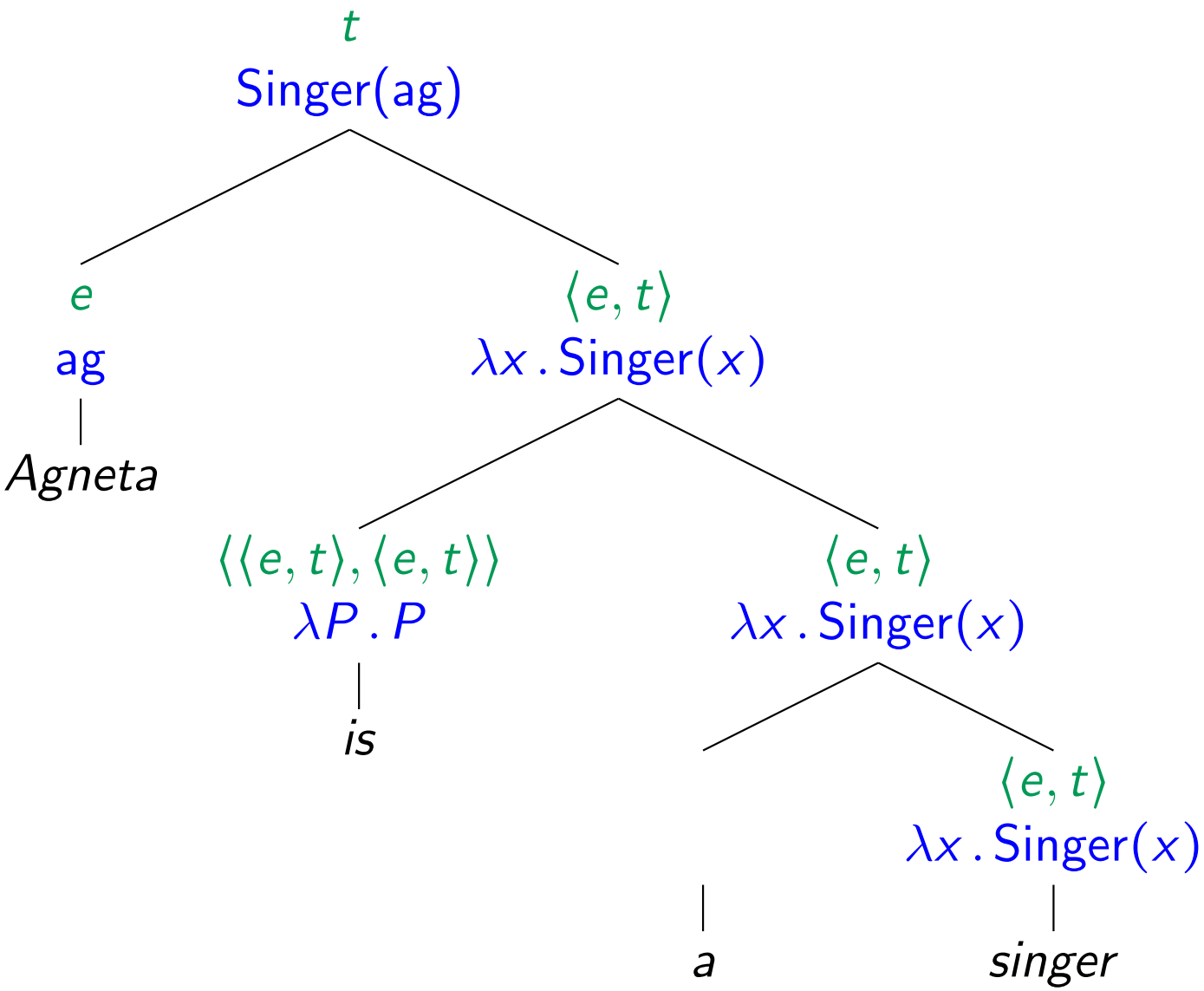
Predicate nominals



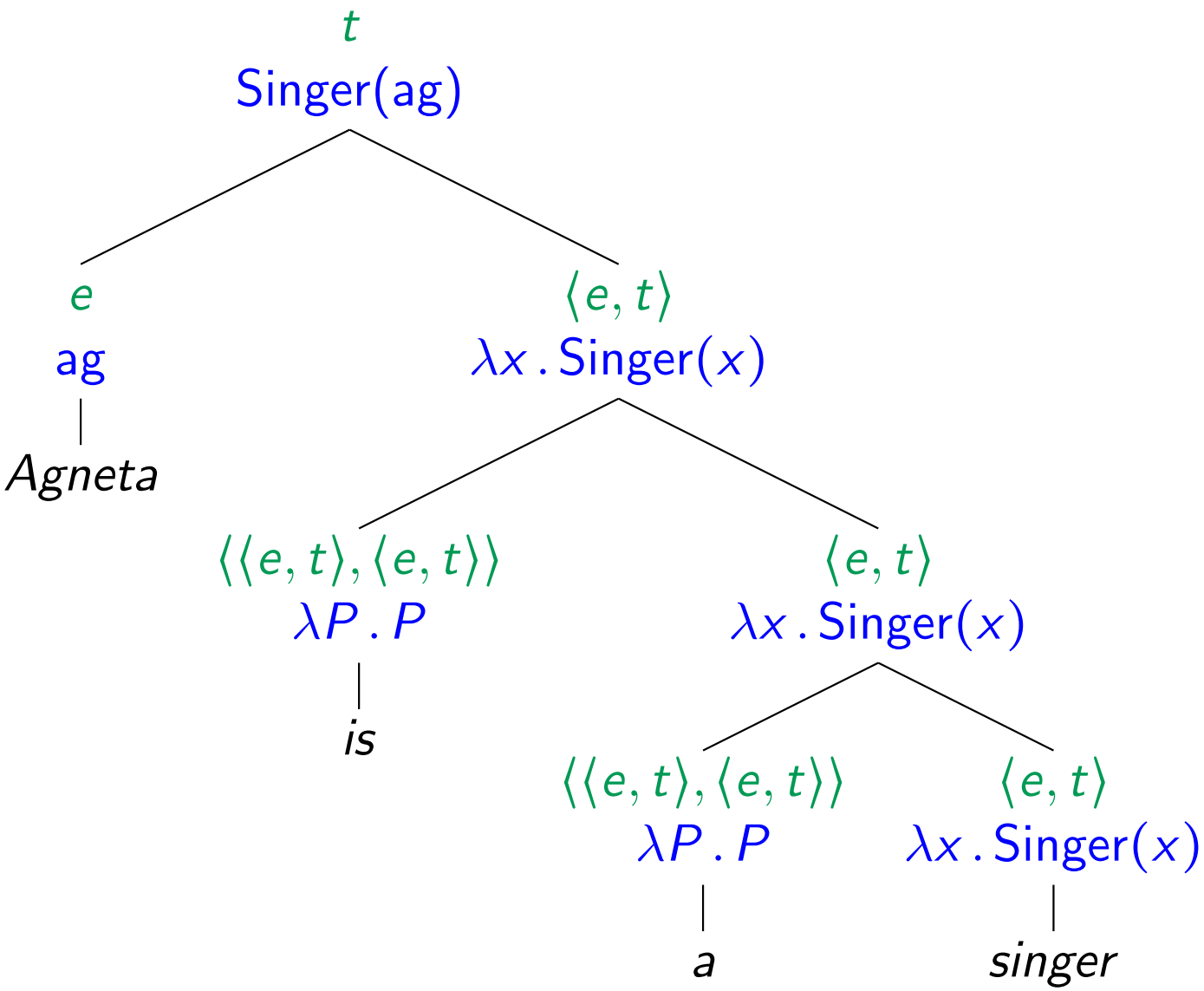
Predicate nominals



Predicate nominals



Predicate nominals



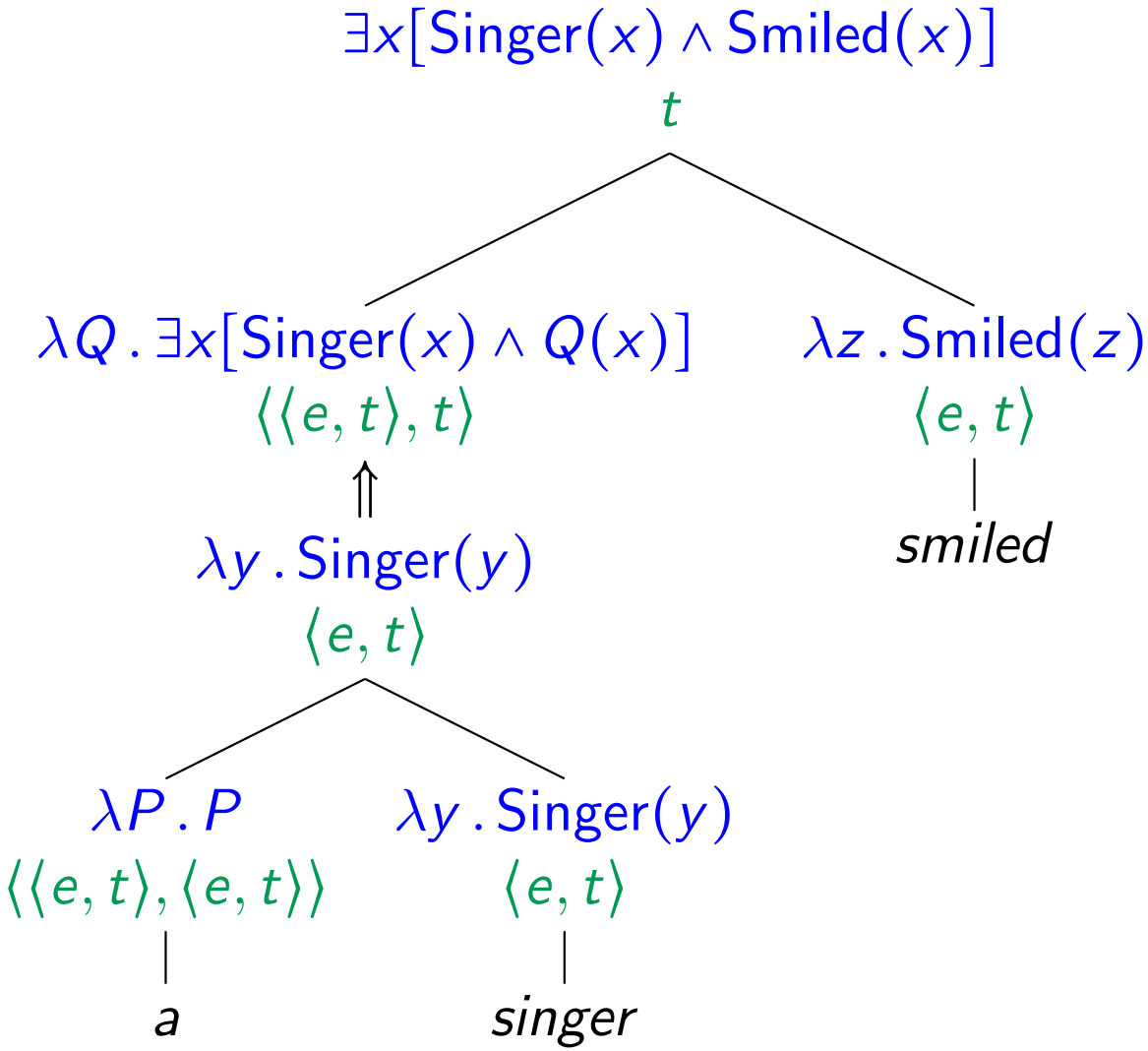
Relating predicative and argumental *a*

Type-shifting rule: EX

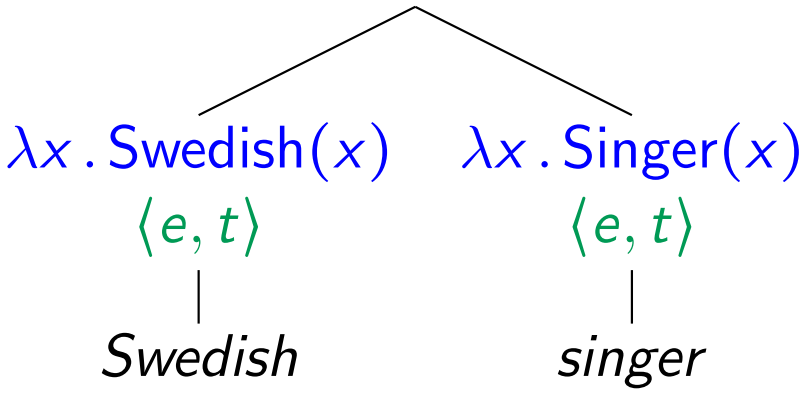
If $\alpha \rightsquigarrow \alpha'$, where α' is of type $\langle e, t \rangle$,
then $\alpha \rightsquigarrow \lambda P \,.\, \exists x \,.\, \alpha'(x)$

(dubbed A in Partee 1987)

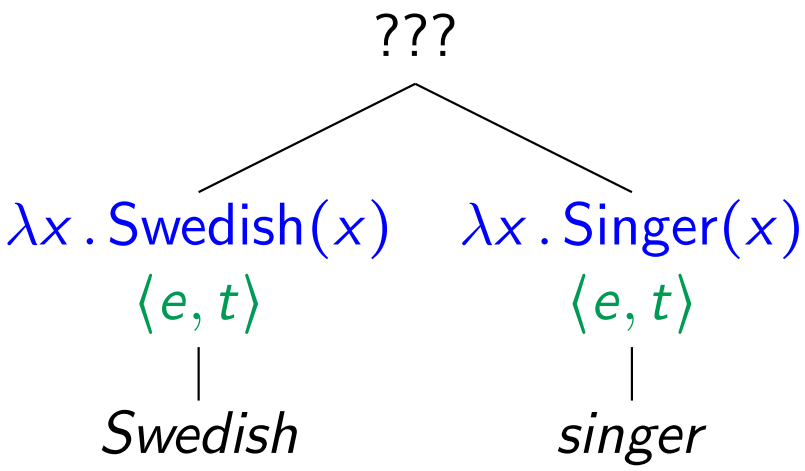
Using the EX-shift



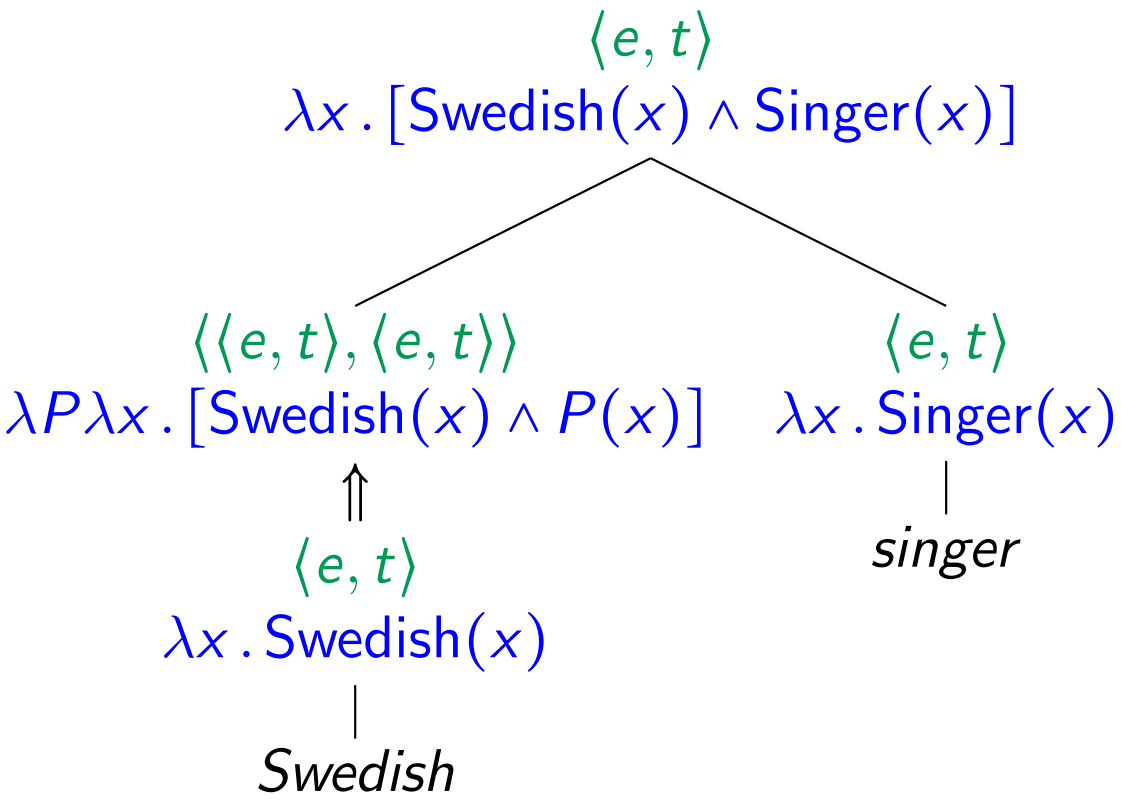
Intersective modifiers



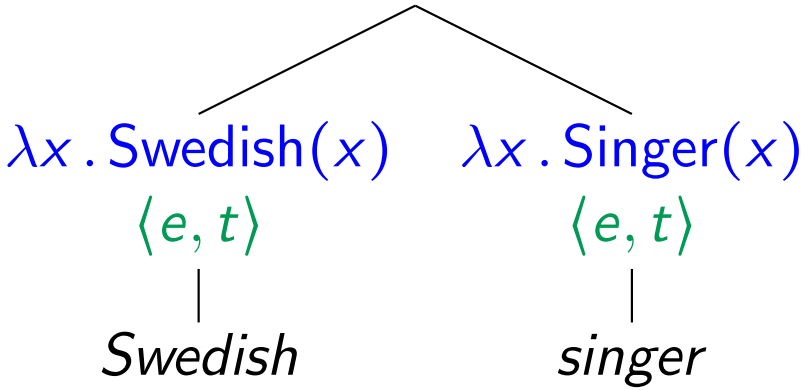
Intersective modifiers



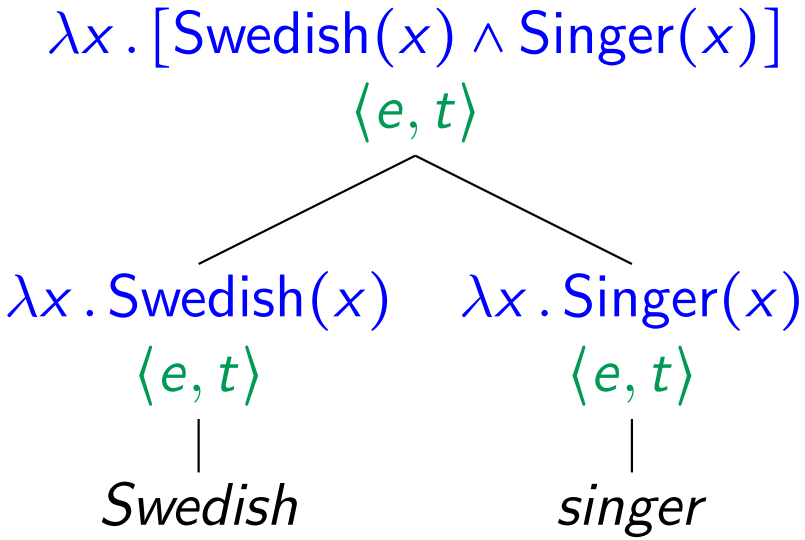
Type-shifting analysis



Predicate Modification



Predicate Modification



Predicate Modification

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'.

Possible evidence

Sproat & Shih (1988): 'direct' vs. 'indirect' modification;
'direct' ↔ Predicate Modification

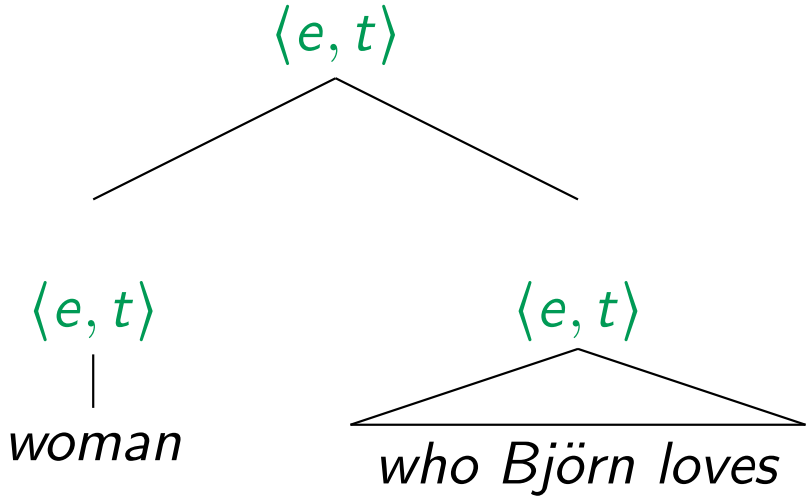
(3) Maria ha intervistato ogni possibile candidato.
Direct: every potential candiate
#*Indirect*: every candidate possible for her to interview

(4) Maria ha intervistato ogni candidato possibile.
Direct: every potential candidate
Indirect: every candidate possible for her to interview

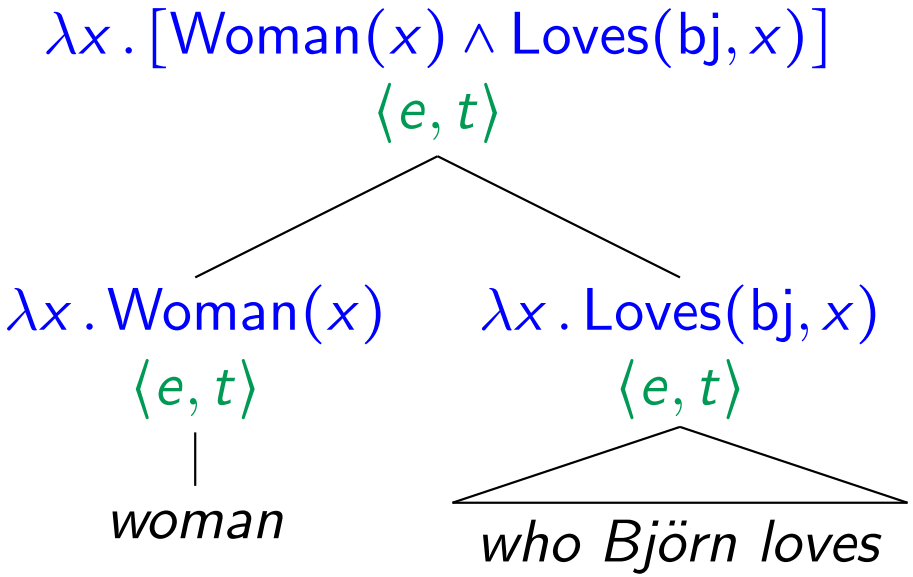
(Cinque, 2010, i.a.)

Outline

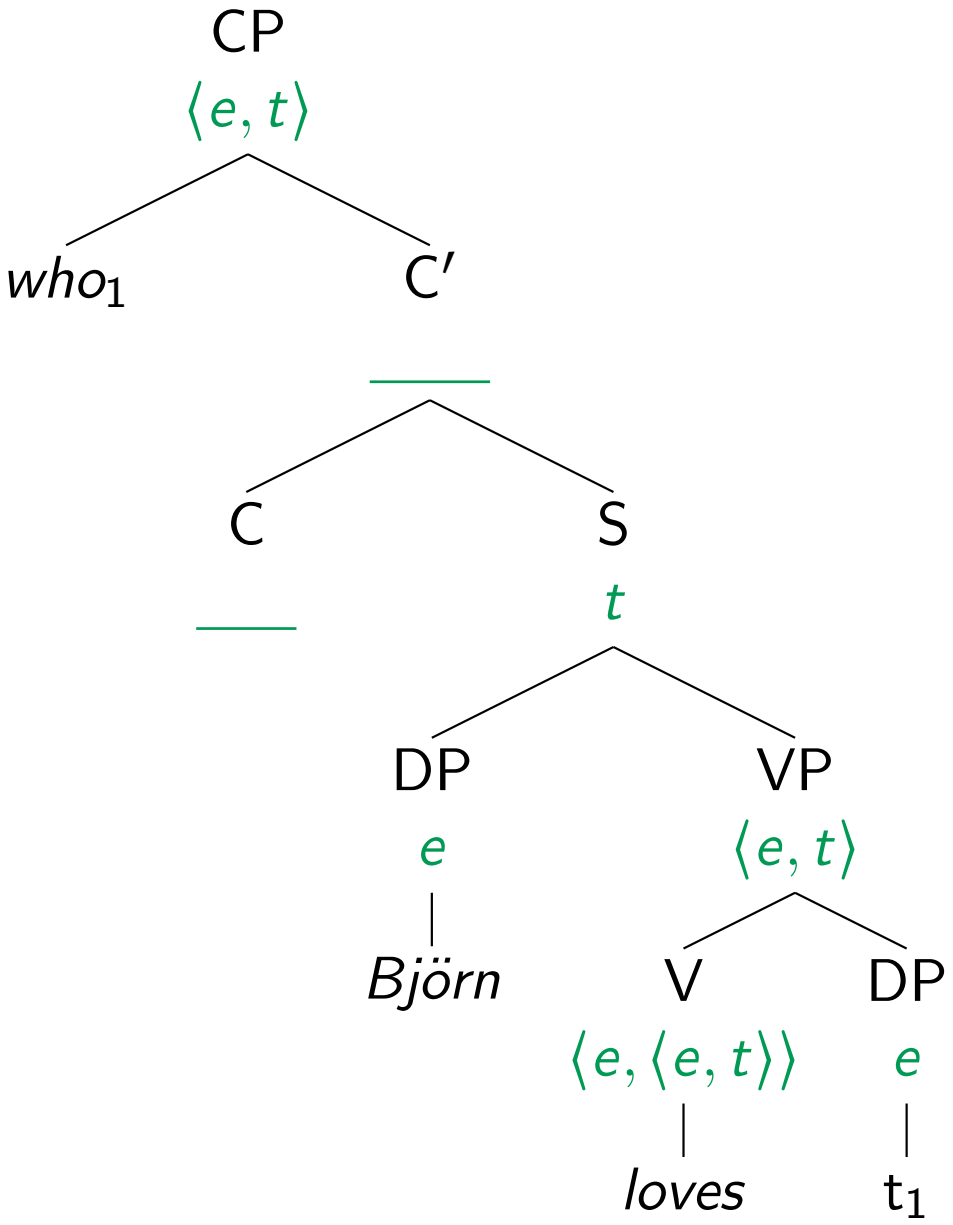
Relative clauses



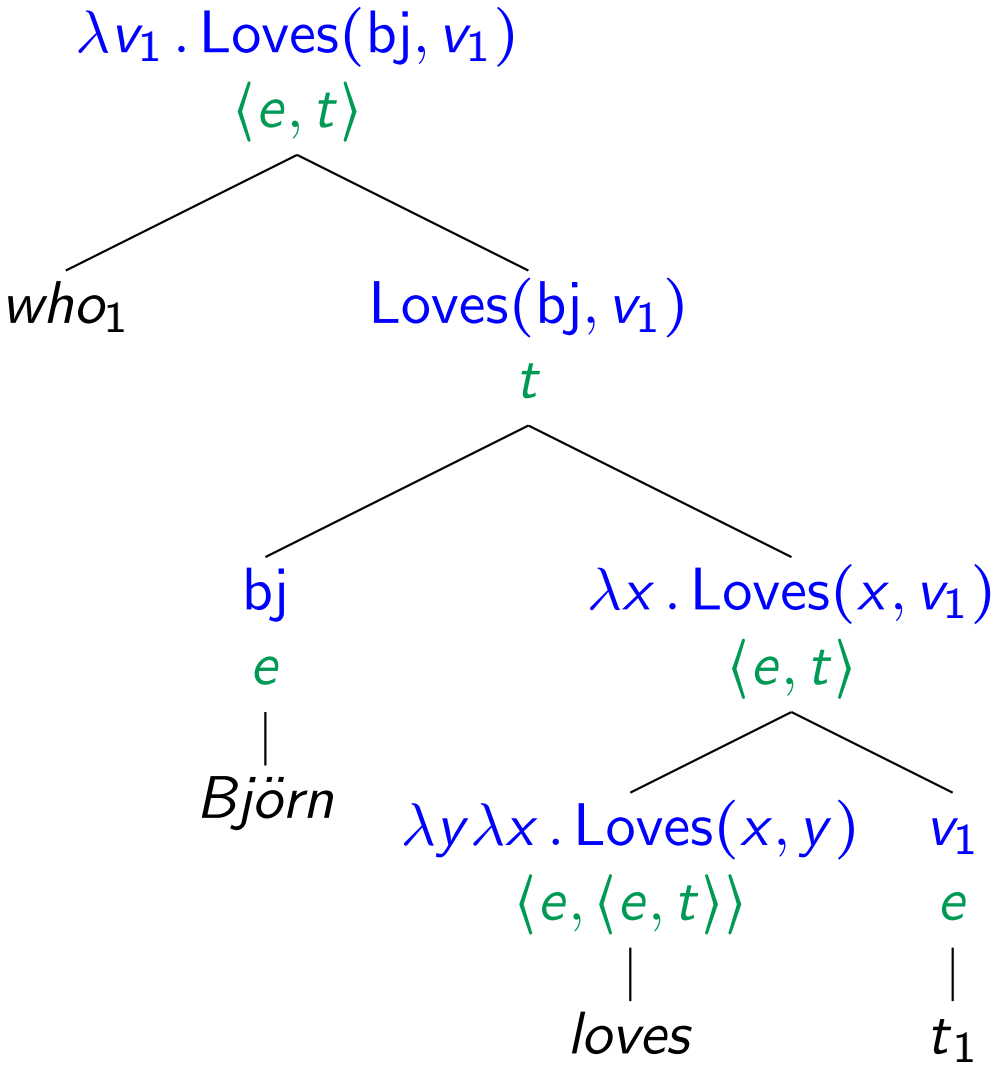
Relative clauses



Relative clauses



Relative clauses



New composition rules

Pronouns and Traces Rule

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

New composition rules

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

Barker, Chris. 2005. Remark on Jacobson 1999: Crossover as a local constraint. *Linguistics and Philosophy* 28(4). 447–472.

Cinque, Gugliemo. 2010. *The Syntax of Adjectives* (Linguistic Inquiry Monographs 57). Cambridge, MA: MIT Press.

Heim, Irene & Angelika Kratzer. 1998. *Semantics in generative grammar*. Oxford: Blackwell.

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.

Partee, Barbara H. 1987. Noun phrase interpretation and type-shifting principles. In Jeroen Groenendijk, Dick de Jongh & Martin Stokhof (eds.), *Studies in Discourse Representation Theory and the theory of generalized quantifiers*, 115–143. Dordrecht: Foris.

Sproat, Richard & Chinlin Shih. 1988. Prenominal adjectival ordering in English and Mandarin. In Jim Blevins & Juli Carter (eds.), *Proceedings of NELS 18*, 465–489. Amherst: GSLA