More on Generalized Quantifiers

Ling 406/802; Spring 2005

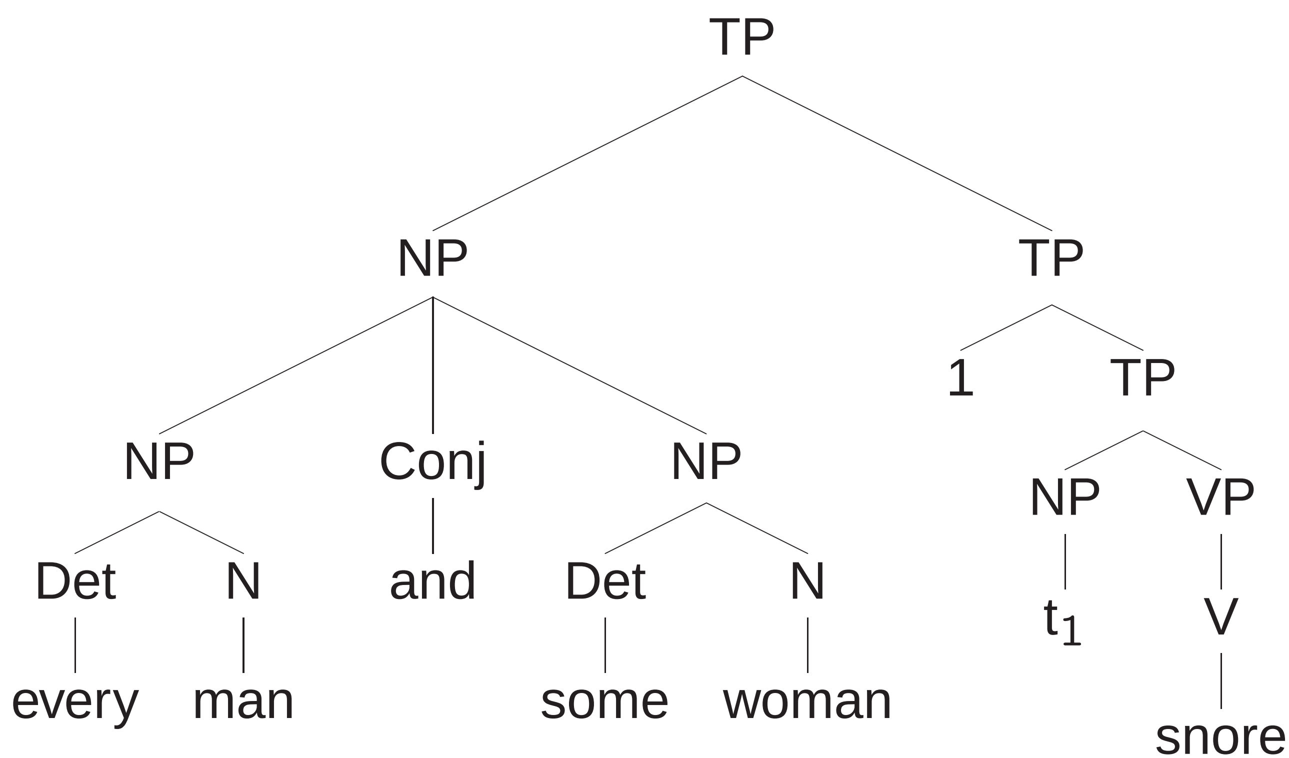
Meaning and Grammar, Ch 9.3 - 9.4

NP Conjunction: Syntax

(1) Every man and some woman snore.

- NP $\longrightarrow$ NP Conj NP

- LF:



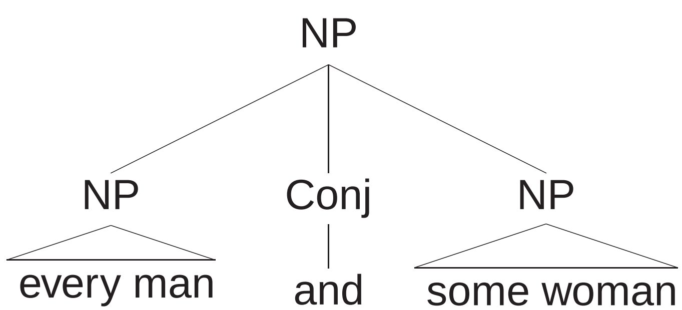
NP Conjunction: Logical Translation

- How can conjunction, which is a sentential operator, conjoin generalized quantifiers?

- For any Generalized Quantifiers (GQ),

  [GQ1 $\wedge$ GQ2] = λZ[GQ1(Z) $\wedge$ GQ2(Z)]

  [GQ1 $\vee$ GQ2] = λZ[GQ1(Z) $\vee$ GQ2(Z)]

- [

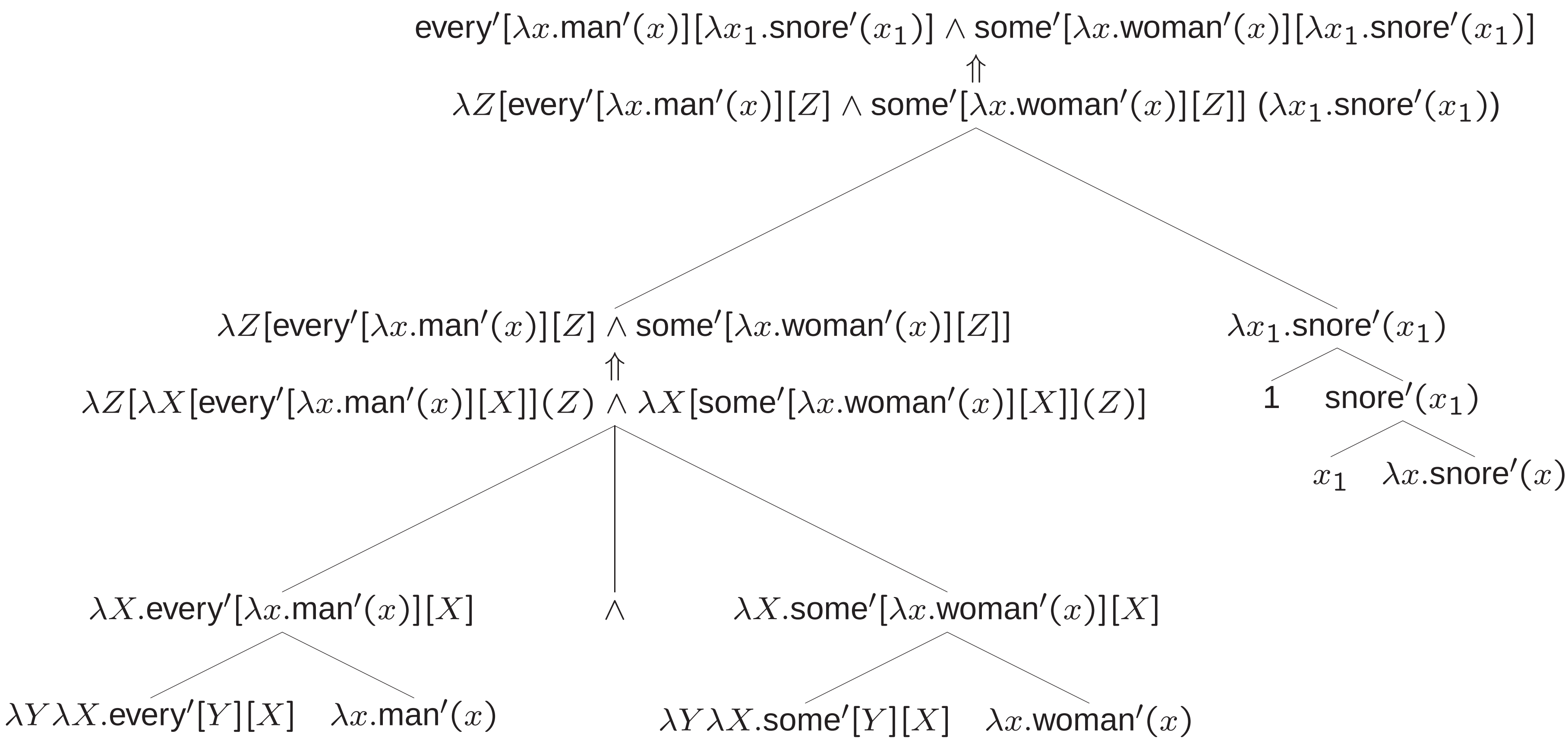
]′

  =λX.every′$[\lambda x$.man′$(x)][X] \wedge \lambda X$.some′$[\lambda x$.woman′$(x)][X]$

  =$\lambda Z[\lambda X$[every′$[\lambda x$.man′$(x)][X]](Z) \wedge \lambda X$[some′$[\lambda x$.woman′$(x)][X]](Z)$]

  =λZ[every′$[\lambda x$.man′$(x)][Z] \wedge$ some′$[\lambda x$.woman′$(x)][Z]$]

NP Conjunction: Logical Translation (cont.)

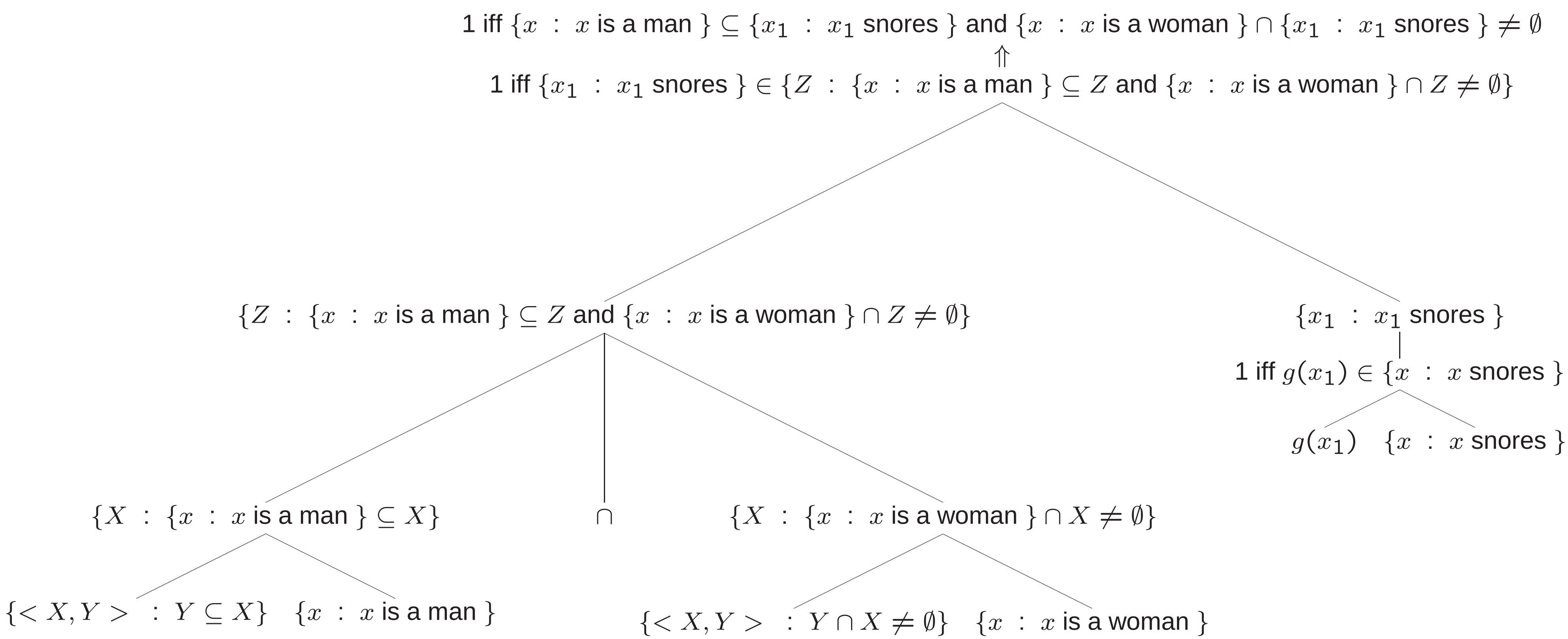


NP Conjunction: Truth-conditional Interpretation

- For any Generalized Quantifiers (GQ),

  ⟦GQ1 ∧ GQ2⟧ = ⟦GQ1⟧ ∩ ⟦GQ2⟧

  ⟦GQ1 ∨ GQ2⟧ = ⟦GQ1⟧ ∪ ⟦GQ2⟧



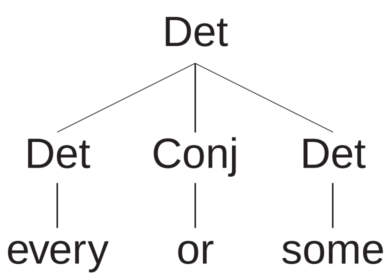
Det Conjunction: Logical Translation

(2) Every or some men snore.

- For any Det categories,

  [Det1′ ∧ Det2′] = $\lambda P \lambda Q$[Det1′$(P)(Q)$ ∧ Det2′$(P)(Q)$]

  [Det1′ ∨ Det2′] = $\lambda P \lambda Q$[Det1′$(P)(Q)$ ∨ Det2′$(P)(Q)$]

- [

]′

  =$\lambda Y \lambda X$.every′$[Y][X]$ ∧ $\lambda Y \lambda X$.some′$[Y][X]$

  =$\lambda P \lambda Q[\lambda Y \lambda X$[every′$[Y][X]](P)(Q)$ ∧ $\lambda Y \lambda X$[some′$[Y][X]](P)(Q)$]

  = $\lambda P \lambda Q$[every′$[P][Q]$ ∧ some′$[P][Q]$]

Det Conjunction: Truth-conditional Interpretation

- For any Det categories,

  $[\![\text{Det1}' \wedge \text{Det2}']\!] = [\![\text{Det1}']\!] \cap [\![\text{Det2}']\!]$

  $[\![\text{Det1}' \vee \text{Det2}']\!] = [\![\text{Det1}']\!] \cup [\![\text{Det2}']\!]$

- $[\![\text{every}' \text{ or}' \text{ some}']\!]$

  $= \{< X, Y >: \ Y \subseteq X\} \cup \{< X, Y >: \ Y \cap X \neq \emptyset\}$

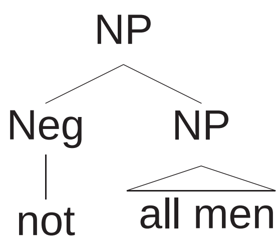
  $= \{< X, Y >: \ Y \subseteq X \text{ or } Y \cap X \neq \emptyset\}$

Negating an NP

(3) Not all men snore.

- Logical translation

  For any GQ, [¬ GQ] = $\lambda Z[\neg \mathrm{GQ}(Z)]$

[]′

$= \neg\lambda X[\text{every}'[\lambda x.\text{man}'(x)][X]]$
$= \lambda Z[\neg\lambda X[\text{every}'[\lambda x.\text{man}'(x)][X]](Z)]$
$= \lambda Z[\neg\text{every}'[\lambda x.\text{man}'(x)][Z]]$

- Truth-conditional interpretation

  For any GQ, $[\![\neg \mathrm{GQ}]\!] = [\![\mathrm{GQ}]\!]^{-}$

  $[\![\text{not}\,'[\text{all men}]']\!]$
  $= \{X : \{x : x \text{ is a man}\} \subseteq X\}^{-} = \{X : \{x : x \text{ is a man}\} \not\subseteq X\}$

Proper Names

- So far, we have been saying that proper names denote individuals.

  $[\![\text{Pete}']\!]$ = Pete

  $[\![[\text{Pete snores}]']\!]$ = 1 iff Pete $\in \{x : x \text{ snores } \}$

- But proper names can be conjoined with GQs.

  (4) [Pete and some woman] snore.

  Pete $\cap \{X : \{x : x \text{ is a woman } \} \cap X \neq \emptyset\}$???

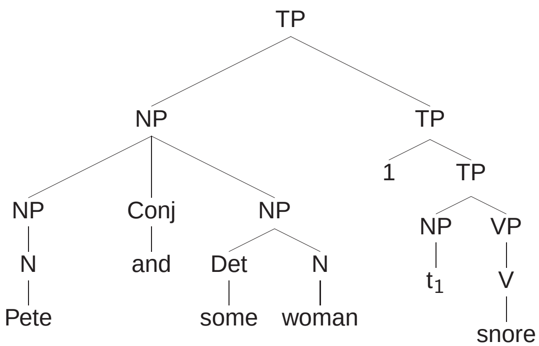
- Proper names are also GQs.

  $[\![\text{Pete}']\!]$ = $\{X : \text{Pete} \in X\}$

  [Pete]$'$ = $\lambda X [X(\text{Pete}')]$

Proper Names: Logical Translation

(5) Pete and some woman snore.



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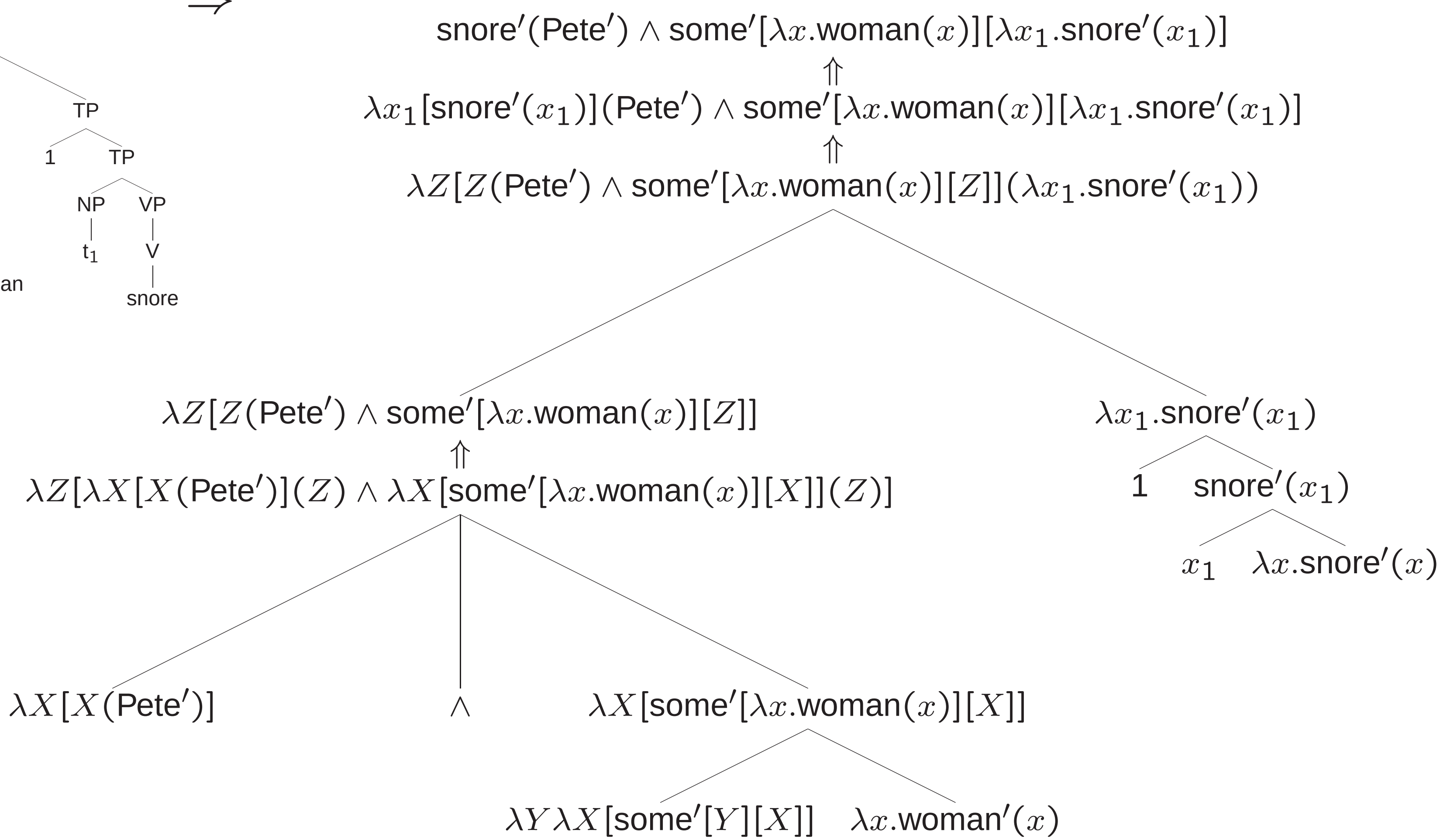
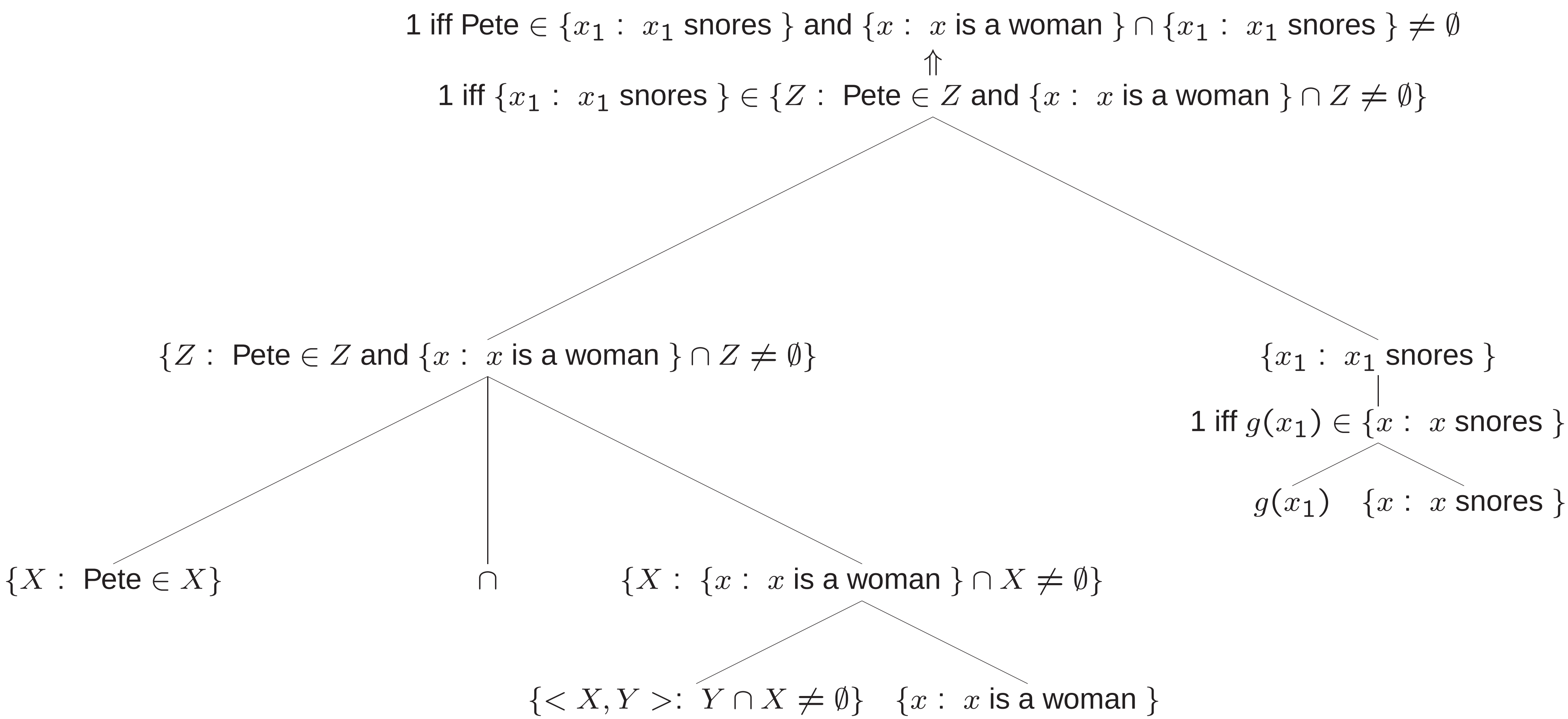


Proper Names: Truth-conditional Interpretation



Conservativity

- A determiner Det is conservative iff for every X and every Y, $X \in$ Det(Y) iff $X \cap Y \in$ Det(Y).

- For all conservative determiners δ, $\delta(\alpha)(\beta) \leftrightarrow \delta(\alpha)(\alpha \wedge \beta)$.

- Examples

(6) a. Every student snores iff every student is a student who snores.
b. Some student snores iff some student is a student who snores.
c. No student snores iff no student is a student who snores.
d. Most students snore iff most students are students who snore.

- Conservativity Hypothesis

Every determiner in every language is conservative.

Testing the Conservativity Hypothesis

- Is δ_1 in $\delta_1(\alpha)(\beta)$ conservative, where $\delta 1$ has the following meaning?

(7) a. $[\![\delta_1]\!] = \{< X, Y >: \ Y^- \subseteq X\}$
    b. $[\![\delta_1(\alpha)]\!] = \{X : \ [\![\alpha]\!]^- \subseteq X\}$

- Assume $U = \{$a, b, c$\}$, $[\![\alpha]\!] = \{$a,b$\}$, $[\![\beta]\!] = \{$a,c$\}$.

$[\![\delta_1(\alpha)(\beta)]\!]$ = ?

$[\![\delta_1(\alpha)(\alpha \wedge \beta)]\!]$ = ?

- Is there a determiner in English that corresponds to the meaning of δ_1 as defined in (7a)?

(8) [δ_1 student] [snores].
    a. $\delta_1{}'[\lambda x.$student$'(x)][\lambda x.$snore$'(x)]$
    b. $\{x : \ x$ is a student $\}^- \subseteq \{x : \ x$ snores $\}$
    c. “All non-students snore.”

There is no lexically simple determiner in English that means *all non*.