A few steps towards a NL fragment

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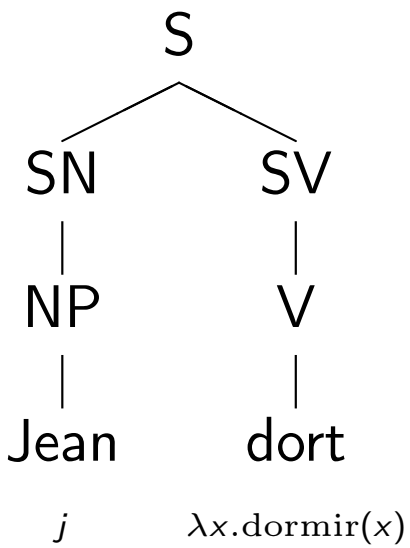
Phrase simple I

(1) a. Jean dort

b. $\mathrm{dormir}(j)$

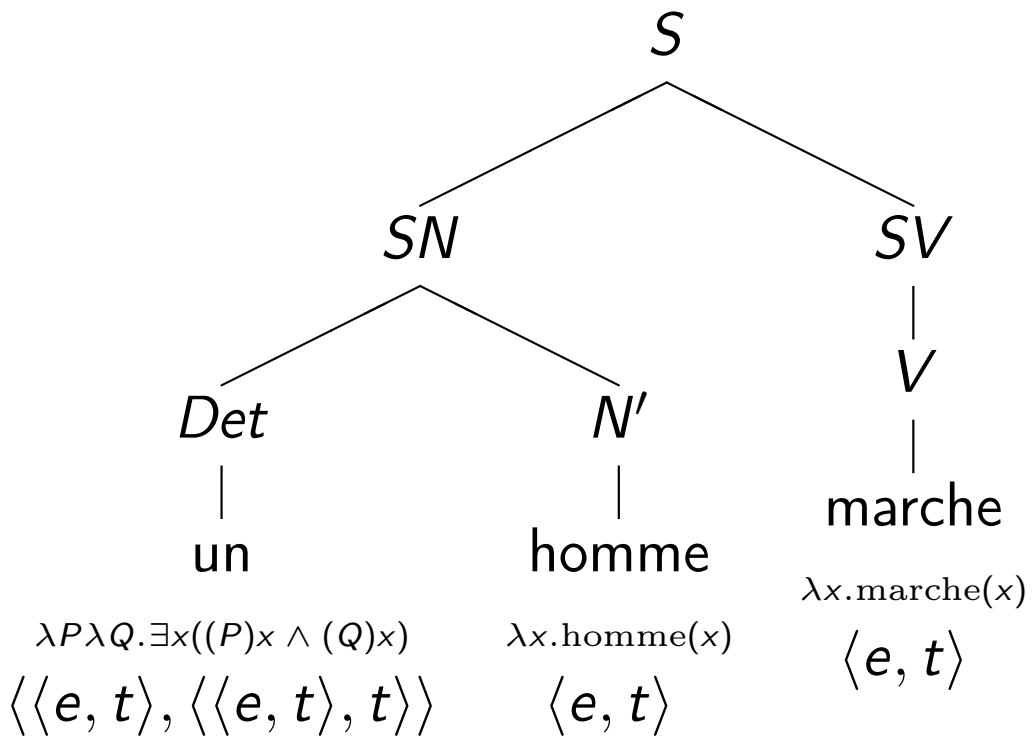


S	$\rightarrow$	SN	SV
$[\![S]\!]$	$\leftarrow$	$([\![SV]\!])$	$[\![SN]\!]$
0	$\leftarrow$	(2)	1
SN	$\rightarrow$	NP	
0	$\leftarrow$	1	
SV	$\rightarrow$	V	
0	$\leftarrow$	1	

Quantificateurs I

(2) a. Un homme marche

b. $\exists x\ (\text{homme}(x) \wedge \text{marche}(x))$



S	$\rightarrow$	SN	SV
0	$\leftarrow$	(1)	2
SN	$\rightarrow$	Det	N'
0	$\leftarrow$	(1)	2
SV	$\rightarrow$	V	
0	$\leftarrow$	1	

Excursus : Generalized Quantifiers

1. NL Quantifiers vs Logic Quantifiers

- Restriction
- Lack of parallelism

[Jean $_{\mathrm{NP}}$] dort	$\mathrm{dort}(j)$
[Certains hommes $_{\mathrm{NP}}$] dorment	$\exists x\,(Hx \wedge Dx)$
[Tous les hommes $_{\mathrm{NP}}$] dorment	$\forall x\,(Hx \rightarrow Dx)$
[Au moins deux hommes $_{\mathrm{NP}}$] dorment	$\exists x \exists y (x \neq y \wedge Hx \wedge Hy \wedge Dx \wedge Dy)$

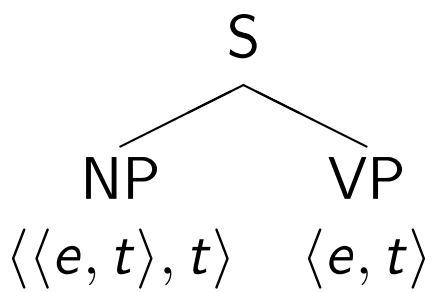
- Lack of expressivity

(3) a. Un nombre fini d'étoiles sont sensibles à l'attraction du soleil.
b. Plus de la moitié des amis de Jean sont parisiens.
c. La plupart des gens ont voté Chirac.

2. Generalized Quantifiers

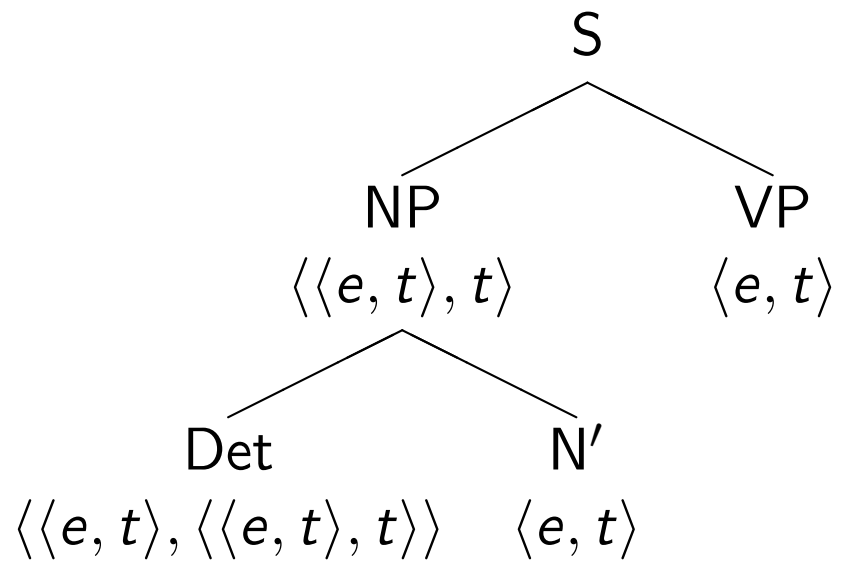
3. Thesis: $[\![\text{NP}]\!] = \text{GQ}$

(4)
a. $[\![\text{Tous les N}]\!] = \{X \subseteq E \ / \ [\![\text{N}]\!] \subseteq X\}$
b. $[\![\text{Quelques N}]\!] = \{X \subseteq E \ / \ [\![\text{N}]\!] \cap X \neq \emptyset\}$
c. $[\![\text{Jean}]\!] = \{X \subseteq E \ / \ j \in X\}$
d. $[\![\text{Au moins deux N}]\!] = \{X \subseteq E \ / \ |[\![\text{N}]\!] \cap X| \geq 2\}$
e. $[\![\text{La plupart des N}]\!] = \{X \subseteq E \ / \ |[\![\text{N}]\!] \cap X| \geq |[\![\text{N}]\!] \setminus X|\}$



Excursus : Generalized Quantifiers

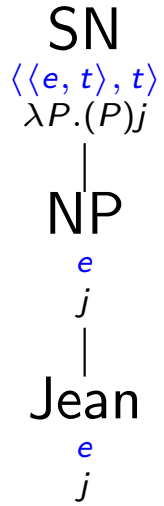
(5)
a. $[\![\text{Tous les } A\ B]\!] = 1 \Leftrightarrow [\![A]\!] \subseteq [\![B]\!]$
b. $[\![\text{Certains } A\ B]\!] = 1 \Leftrightarrow [\![A]\!] \cap [\![B]\!] \neq \emptyset$
c. $[\![\text{La plupart } A\ B]\!] = 1 \Leftrightarrow |[\![A]\!] \cap [\![B]\!]| \geq |[\![A]\!] \setminus [\![B]\!]|$
d. $[\![\text{Beaucoup } A\ B]\!] = 1 \Leftrightarrow |[\![A]\!] \cap [\![B]\!]| \geq m|[\![A]\!]|$



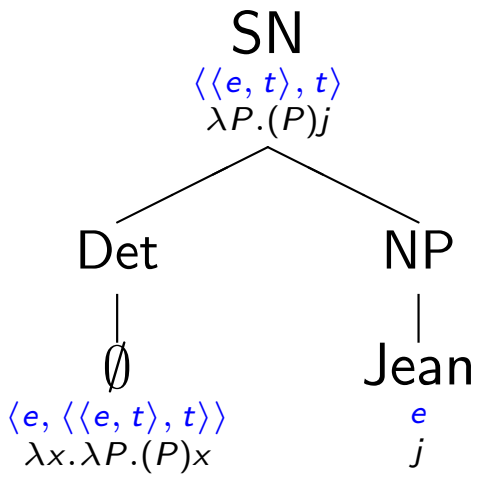
4. Determiners $\subset$ binary set relations

Back to Jean

Back to Jean



$$SN \rightarrow NP$$
$$0 \leftarrow (\lambda x.\lambda P.(P)x)1$$



Fragment actuel I

S	$\rightarrow$	SN	SV
0	$\leftarrow$	(1)	2
SN	$\rightarrow$	NP	
0	$\leftarrow$	1	
SN	$\rightarrow$	Det	N'
0	$\leftarrow$	(1)	2
N'	$\rightarrow$	N	
0	$\leftarrow$	(1)	2
SV	$\rightarrow$	V_i	
0	$\leftarrow$	1	

Det	$\rightarrow$	un
0	$\leftarrow$	$\lambda P \lambda Q . \exists x((P)x \wedge (Q)x)$
N	$\rightarrow$	homme
0	$\leftarrow$	$\lambda x.\text{homme}(x)$
V_i	$\rightarrow$	marche
0	$\leftarrow$	$\lambda x.\text{marche}(x)$
NP	$\rightarrow$	Jean
0	$\leftarrow$	$\lambda P.(P)j^1$

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Figure: Ébauche pour la dénotation des verbes transitifs

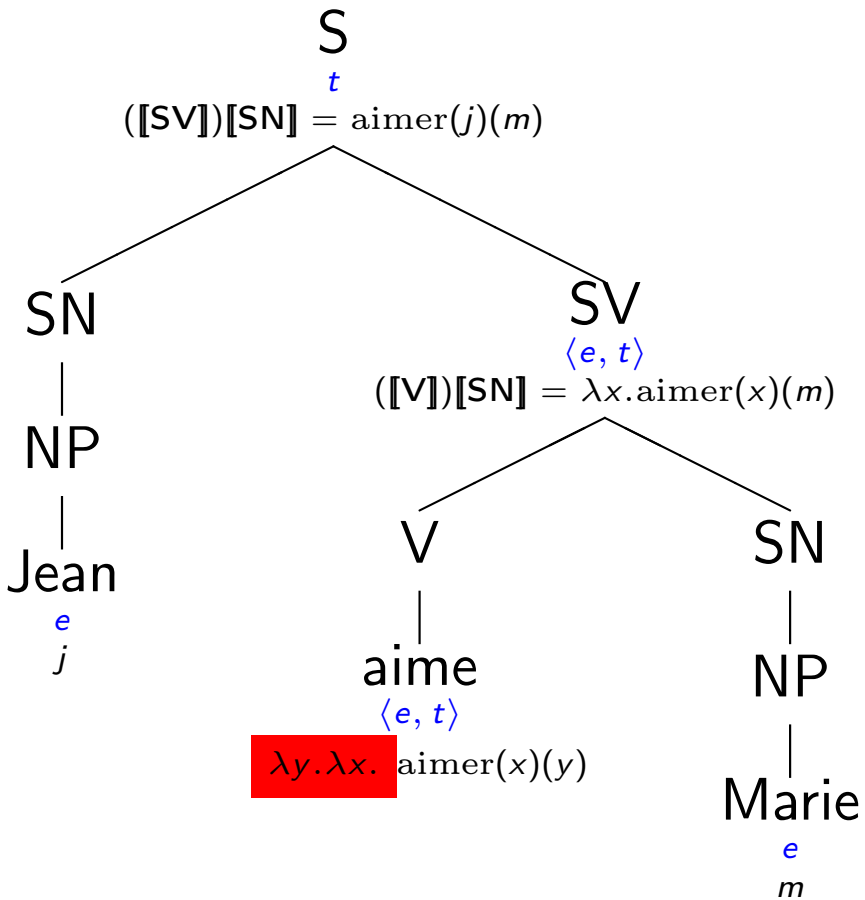


Figure: 1ere version verbes transitifs

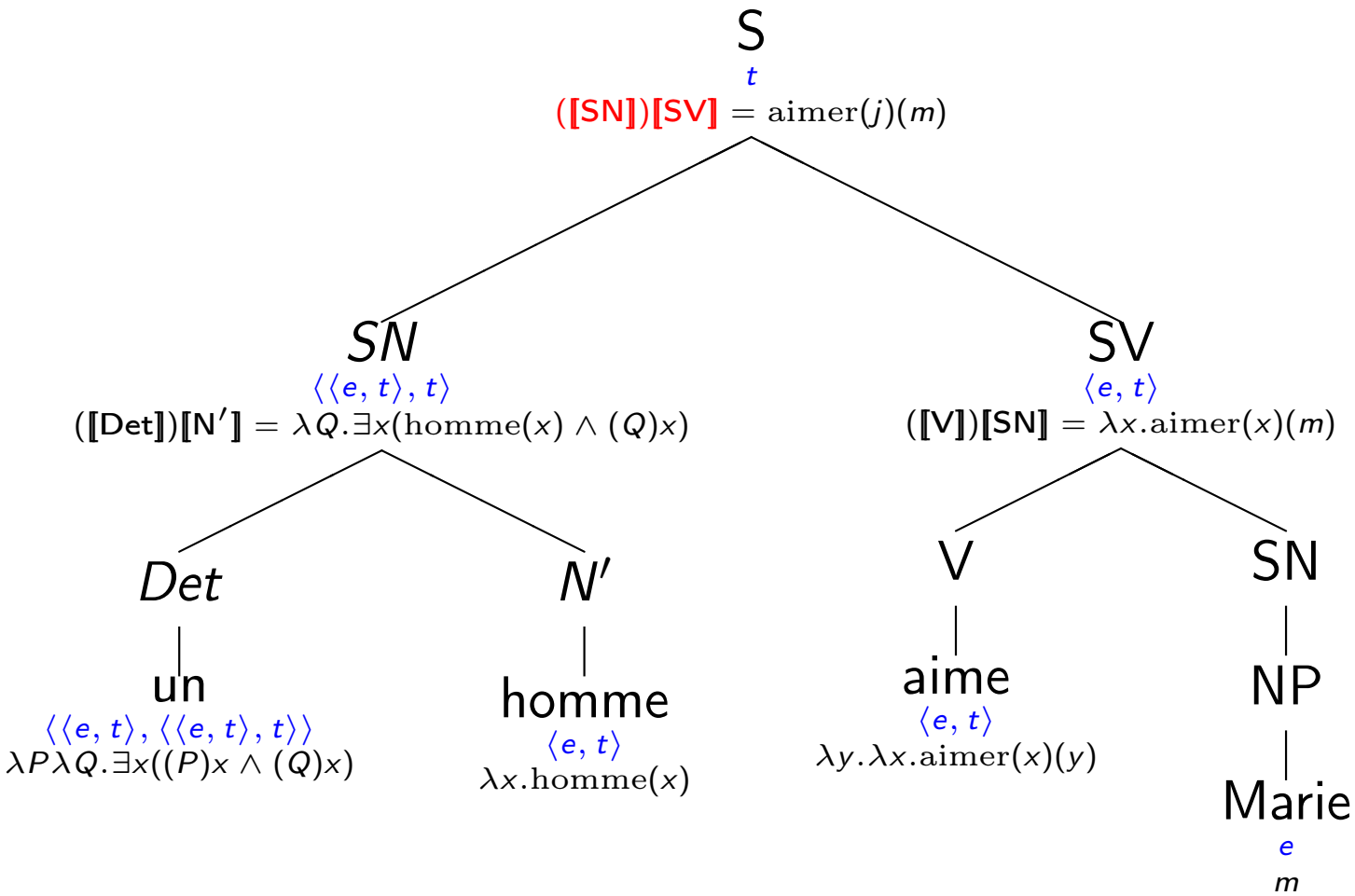


Figure: 1ere version verbes transitifs: problème

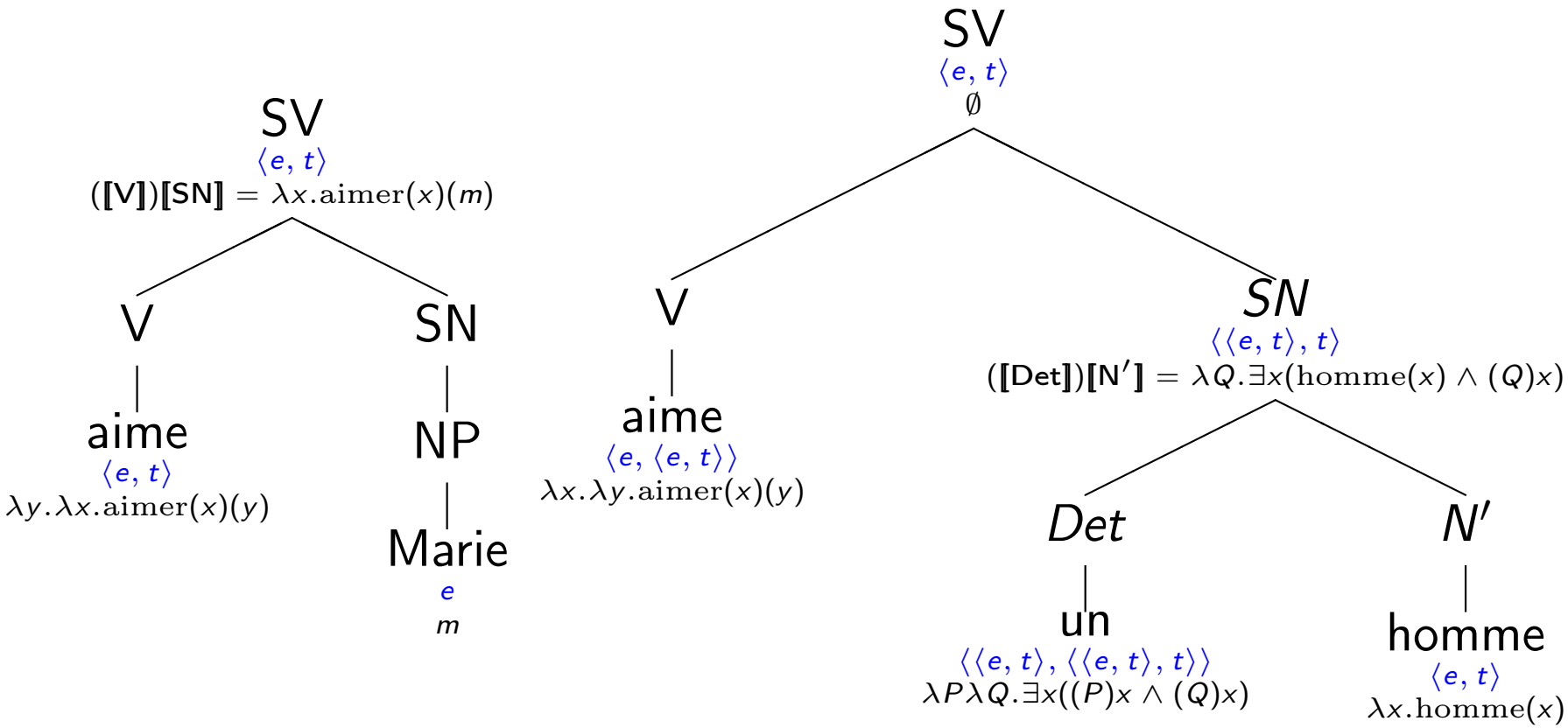
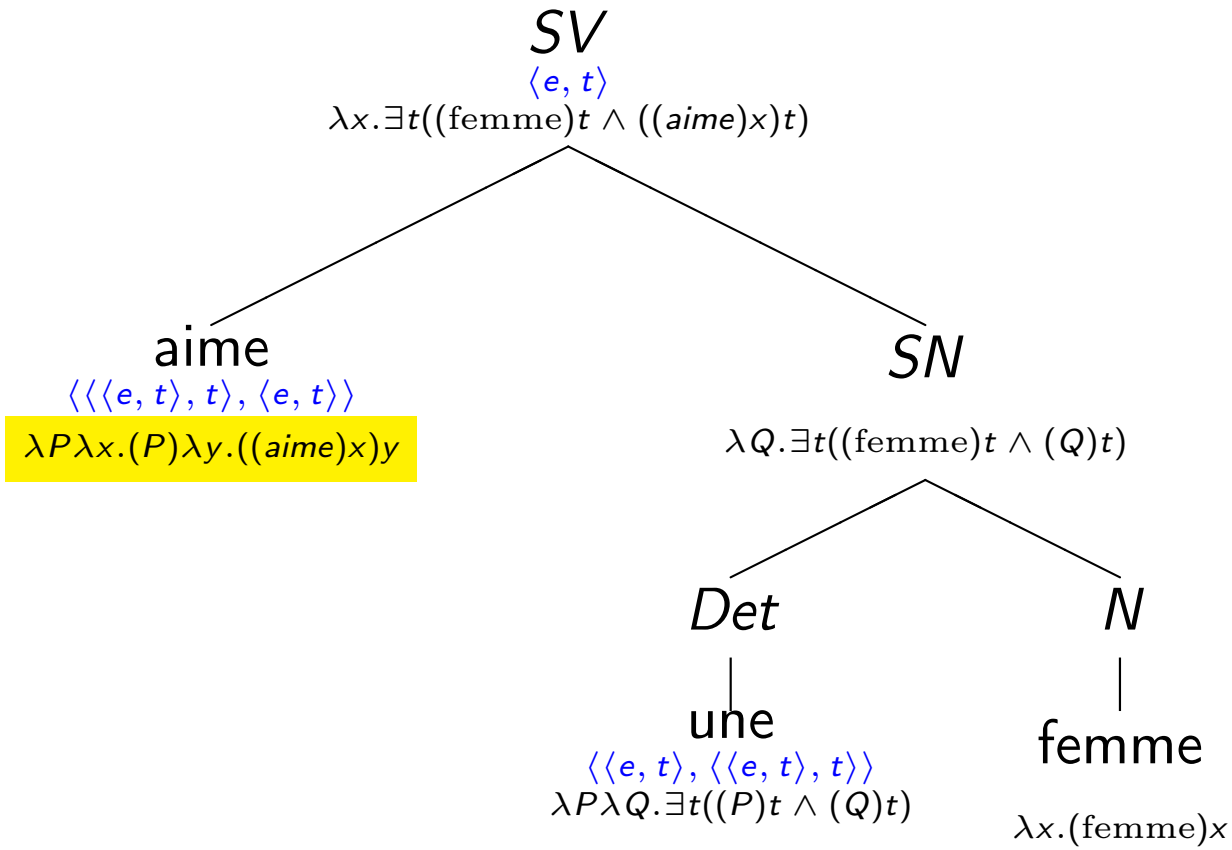
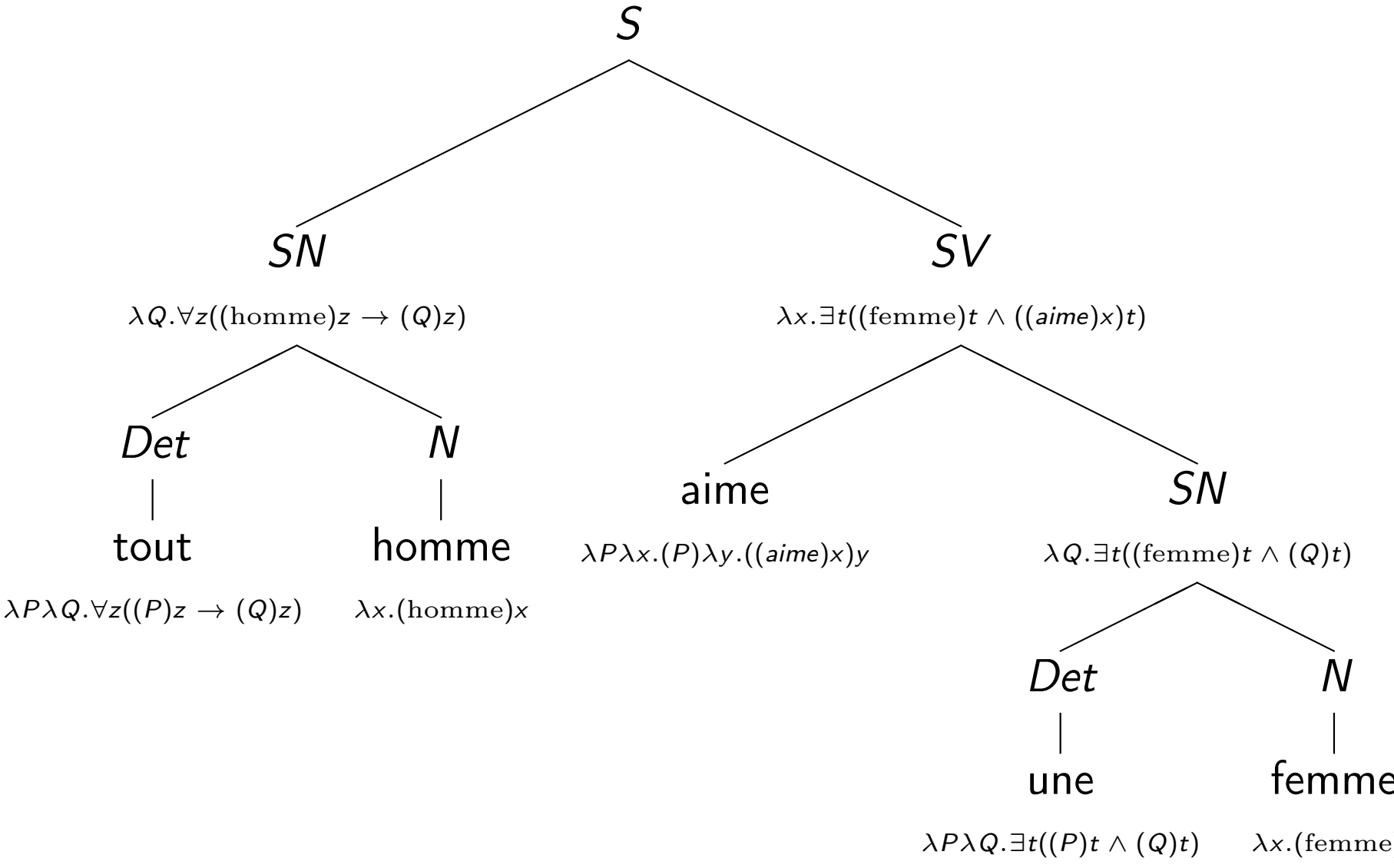


Figure: Version correcte verbes transitifs



$$\begin{aligned}
&\Big(\lambda P\lambda x.(P)\lambda y.((\text{aime})x)y\Big)\ \lambda P.(P)m \\
\longrightarrow_\beta\ &\lambda x.\ \Big(\lambda P.(P)m\Big)\ \lambda y.((\text{aime})x)y \\
\longrightarrow_\beta\ &\lambda x.(\lambda y((aime)x)y)m \\
\longrightarrow_\beta\ &\lambda x.((aime)x)m
\end{aligned}$$


S
SN
$\lambda Q.\forall z((\text{homme})z \rightarrow (Q)z)$
SV
$\lambda x.\exists t((\text{femme})t \wedge ((aime)x)t)$
Det
N
aime
SN
tout
homme
$\lambda P\lambda x.(P)\lambda y.((aime)x)y$
$\lambda Q.\exists t((\text{femme})t \wedge (Q)t)$
$\lambda P\lambda Q.\forall z((P)z \rightarrow (Q)z)$
$\lambda x.(\text{homme})x$
Det
N
une
femme
$\lambda P\lambda Q.\exists t((P)t \wedge (Q)t)$
$\lambda x.(\text{femme}$

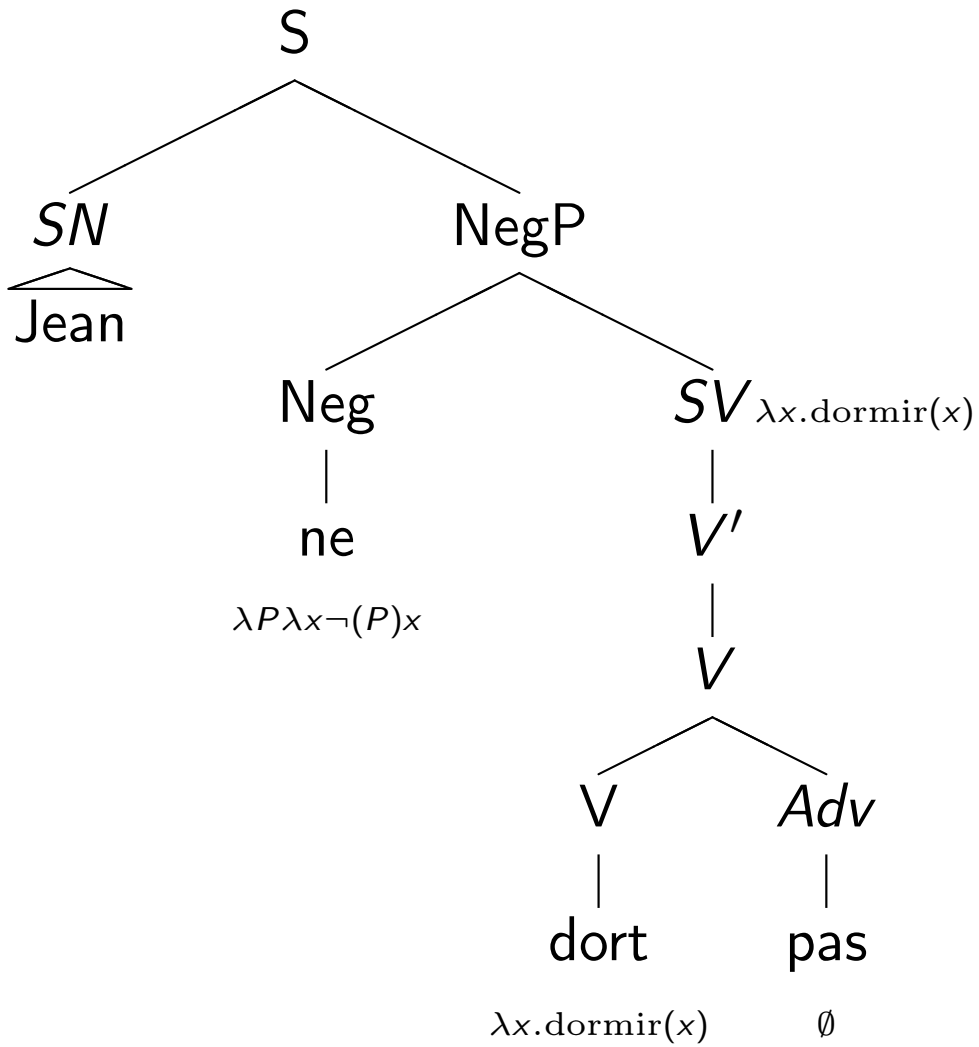


Figure: Composition pour la négation

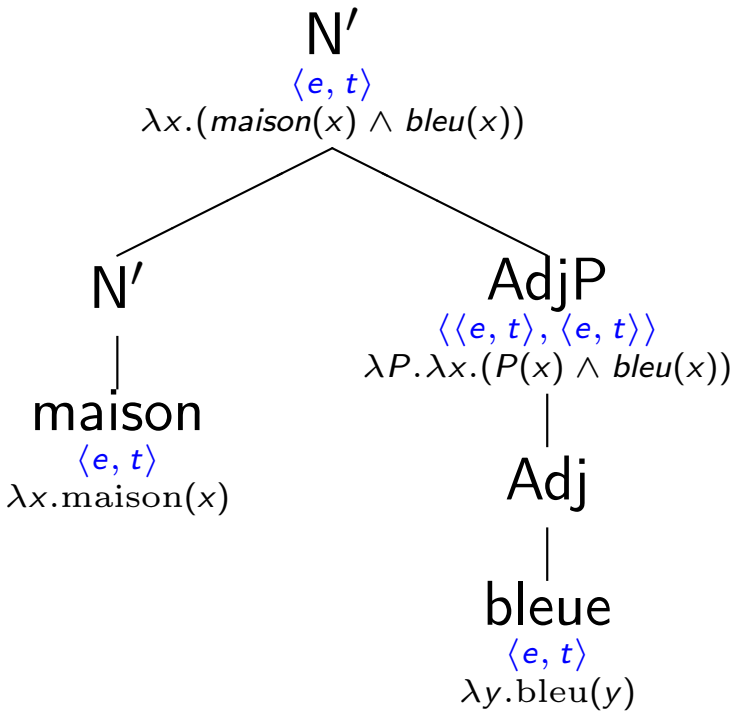


Figure: Modification adjectivale

(6) Tous ceux qui rejettent tout le monde apprécient un gourou.