This workout has compositions with object quantifiers, and subject and object quantifiiers. First, write out the truth-conditions semi-formally. Then, build each sentence based on the scope facts. Build the LF and the structure for each clause.

Assume assignment a.

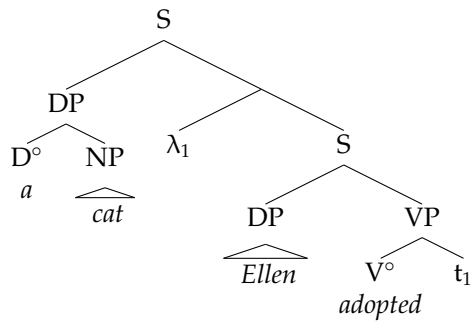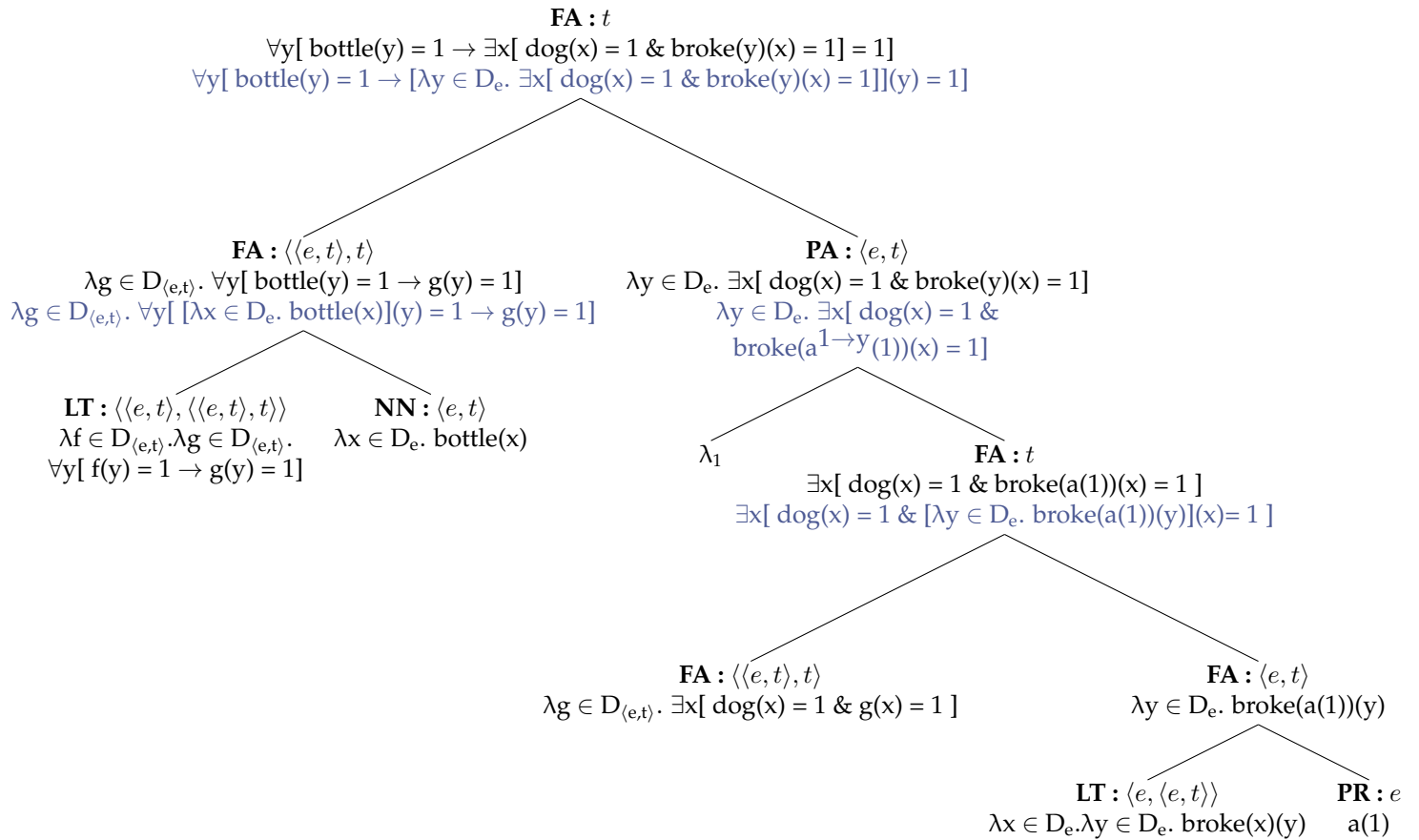**1.** *Ellen read every book.*

S
- DP
  - D° *every*
  - NP *book*
- λ_1
- S
  - DP *Ellen*
  - VP
    - V° *read*
    - t_1

FA : t
$\forall x[\ book(x) = 1 \rightarrow read(x)(Ellen) = 1\ ]$
$\forall x[\ book(x) = 1 \rightarrow [\lambda x \in D_e.\ read(x)(Ellen)](x) = 1\ ]$

FA : $\langle\langle e, t\rangle, t\rangle$
$\lambda g \in D_{\langle e,t\rangle}.\ \forall x[\ book(x) = 1 \rightarrow g(x) = 1]$
$\lambda g \in D_{\langle e,t\rangle}.\ \forall x[\ [\lambda x \in D_e.\ book(x)](x) = 1 \rightarrow g(x) = 1]$

PA : $\langle e, t\rangle$
$\lambda x \in D_e.\ read(x)(Ellen)$
$\lambda x \in D_e.\ read(a^{1\rightarrow x}(x))(Ellen)$

LT : $\langle\langle e, t\rangle, \langle\langle e, t\rangle, t\rangle\rangle$
$\lambda f \in D_{\langle e,t\rangle}.\lambda g \in D_{\langle e,t\rangle}.$
$\forall x[\ f(x) = 1 \rightarrow g(x) = 1]$

NN : $\langle e, t\rangle$
$\lambda x \in D_e.\ book(x)$

λ_1

FA : t
$read(a(1))(Ellen)$

FA : e
Ellen

FA : $\langle e, t\rangle$
$\lambda y \in D_e.\ read(a(1))(y)$

LT : $\langle e, \langle e, t\rangle\rangle$
$\lambda x \in D_e.\lambda y \in D_e.\ read(x)(y)$

PR : e
$a(1)$

2. *Ellen adopted a cat.*

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                        S
             ┌──────────┴────────┐
            DP                   S
         ┌───┴───┐    λ₁    ┌─────┴─────┐
        D°      NP         DP           VP
         a      ╱‾╲       ╱‾‾╲        ╱‾‾╲
               cat       Ellen      V°     t₁
                                  adopted
```
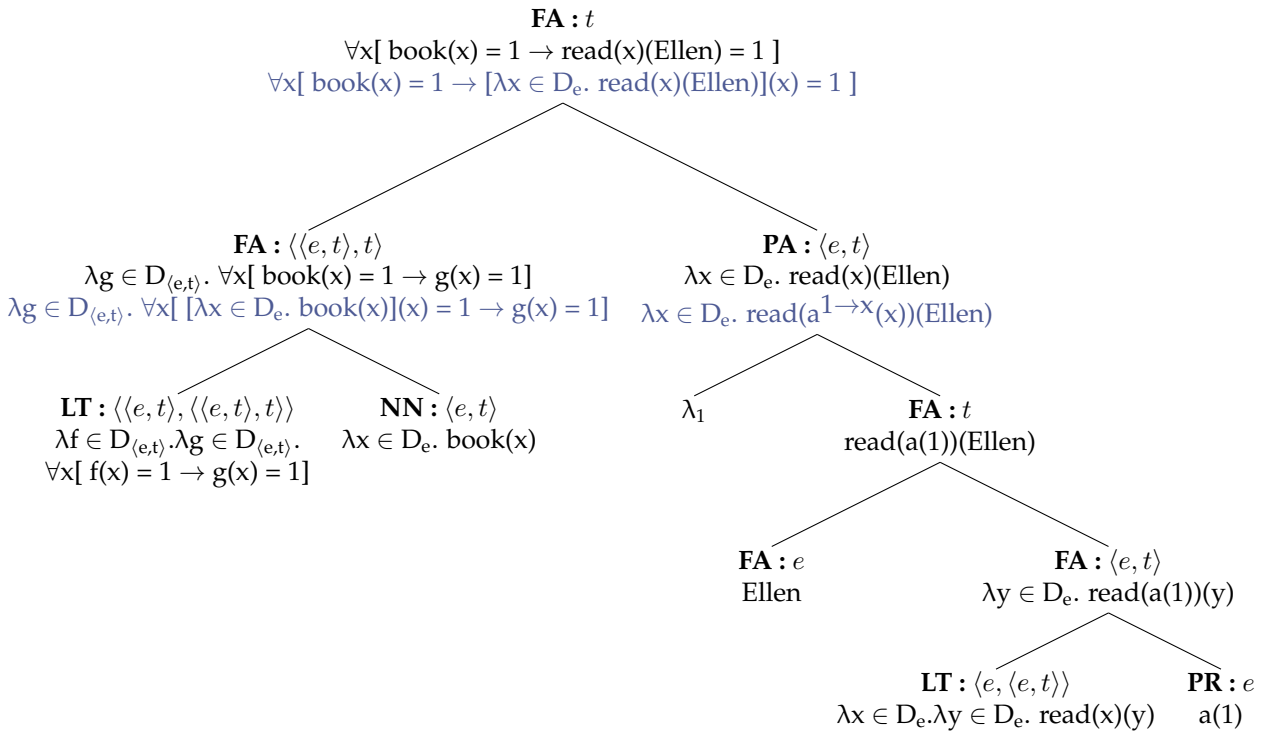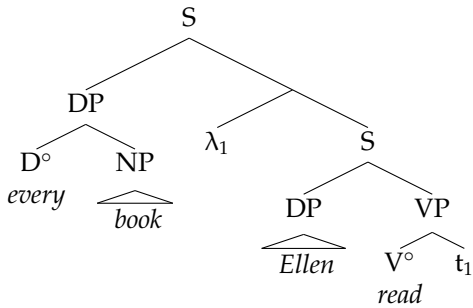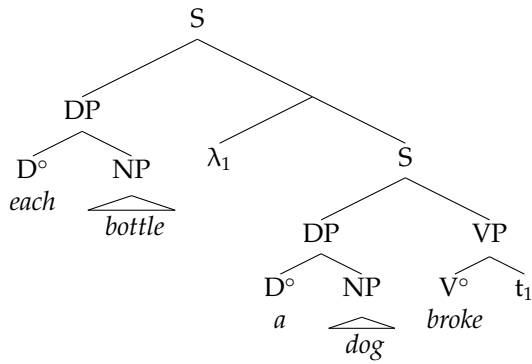
3. *Ellen broke each lamp.*

4. *A dog broke each bottle.* (inverse scope)

Truth-conditions: Each bottle y is such that there is a dog x such that x broke y

S
- DP
  - D° *each*
  - NP *bottle*
- λ_1
- S
  - DP
    - D° *a*
    - NP *dog*
  - VP
    - V° *broke*
    - t_1

FA : t
$\forall y[\text{ bottle}(y) = 1 \rightarrow \exists x[\text{ dog}(x) = 1\ \&\ \text{broke}(y)(x) = 1] = 1]$
$\forall y[\text{ bottle}(y) = 1 \rightarrow [\lambda y \in D_e.\ \exists x[\text{ dog}(x) = 1\ \&\ \text{broke}(y)(x) = 1]](y) = 1]$

FA : $\langle\langle e, t\rangle, t\rangle$
$\lambda g \in D_{\langle e,t\rangle}.\ \forall y[\text{ bottle}(y) = 1 \rightarrow g(y) = 1]$
$\lambda g \in D_{\langle e,t\rangle}.\ \forall y[\ [\lambda x \in D_e.\ \text{bottle}(x)](y) = 1 \rightarrow g(y) = 1]$

LT : $\langle\langle e, t\rangle, \langle\langle e, t\rangle, t\rangle\rangle$
$\lambda f \in D_{\langle e,t\rangle}.\lambda g \in D_{\langle e,t\rangle}.$
$\forall y[\ f(y) = 1 \rightarrow g(y) = 1]$

NN : $\langle e, t\rangle$
$\lambda x \in D_e.\ \text{bottle}(x)$

PA : $\langle e, t\rangle$
$\lambda y \in D_e.\ \exists x[\text{ dog}(x) = 1\ \&\ \text{broke}(y)(x) = 1]$
$\lambda y \in D_e.\ \exists x[\text{ dog}(x) = 1\ \&$
$\text{broke}(a^{1 \rightarrow y}(1))(x) = 1]$

λ_1

FA : t
$\exists x[\text{ dog}(x) = 1\ \&\ \text{broke}(a(1))(x) = 1\ ]$
$\exists x[\text{ dog}(x) = 1\ \&\ [\lambda y \in D_e.\ \text{broke}(a(1))(y)](x) = 1\ ]$

FA : $\langle\langle e, t\rangle, t\rangle$
$\lambda g \in D_{\langle e,t\rangle}.\ \exists x[\text{ dog}(x) = 1\ \&\ g(x) = 1\ ]$

FA : $\langle e, t\rangle$
$\lambda y \in D_e.\ \text{broke}(a(1))(y)$

LT : $\langle e, \langle e, t\rangle\rangle$
$\lambda x \in D_e.\lambda y \in D_e.\ \text{broke}(x)(y)$

PR : e
$a(1)$

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5. *A writer drank every coffee.* (inverse scope)

Truth-conditions:

6. *A cat caught every mouse.* (surface scope)

7. *One professor missed no meeting.* (surface scope; treat *one* like *a*)

8. *A doctor treated every patient.*

1. Write a context for inverse scope, or fill in the circles in a way that satisfies such a context…and draw its LF.

	Dr	**A**	**B**	**C**	**D**
Jason		○	○	○	○
Peter		○	○	○	○
Maisie		○	○	○	○
Emilia		○	○	○	○

2. Write a context for surface scope, or fill in the circles in a way that satisfies such a context…and draw its LF.

	Dr	**A**	**B**	**C**	**D**
Jason		○	○	○	○
Peter		○	○	○	○
Maisie		○	○	○	○
Emilia		○	○	○	○

3. Draw the composition for one of these LFs.