

## Relativization

A (boy who sleeps)      / boy  
    \ sleeps  
                  NP

boy: N :  $\lambda x. \text{boy}'x$   
       —      $\langle e, t \rangle$

sleeps': SLP :  $\lambda x. \text{sleeps}'x$   
       —      $\langle e, t \rangle$

\* A (boy and sleeps) passed.

A boy [who sleeps]

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S / (S INP)

"

a := S / (S INP) / N

(A boy) (who sleeps)

boy! > N

(A (boy (who sleeps)))

N

? = N \ N

N

who sleeps  
? S INP

(N \ N) / (S INP)

N \ N

<u>A</u>	<u>boy</u>	<u>who</u>	<u>sleeps</u>	<u>passed</u>
$S / (S \setminus NP) / N$	$N$	$(N \setminus N) / (S \setminus NP)$	$S \setminus NP$	$S \setminus NP$
$\lambda p \lambda q. \exists x. p x \wedge q x$	$(\lambda x. boy' x)$	$\lambda p \lambda q \lambda x. p x \wedge q x$	$(\lambda x. sleeps' x)$	$(\lambda x. passed' x)$

↑

$$\begin{aligned}
 & \xrightarrow{\hspace{10em}} \\
 & \quad N \setminus N \\
 & \quad \lambda q \lambda x. (\lambda x. sleeps' x) x \wedge q x \\
 & = \lambda q \lambda x. sleeps' x \wedge q x
 \end{aligned}$$

$$= \left( \lambda x. boy' x \wedge sleeps' x \right) : \langle e, t \rangle$$

$$\xrightarrow{\hspace{10em}} S / (S \setminus NP)$$

$$\begin{aligned}
 & \lambda q \exists x (\lambda x. boy' x \wedge sleeps' x) x \wedge q x \\
 & \underline{\underline{\lambda q \exists x. boy' x \wedge sleeps' x \wedge q x}} \\
 & =
 \end{aligned}$$

A boy whom (Mary likes) passed.

$\langle c, b \rangle$        $\langle e, t \rangle$        $\langle e, t \rangle$

Mary likes  $\Rightarrow \langle e, t \rangle$

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$\frac{\text{Mary}}{S / (S / NP)}$ 
 $\frac{\text{likes}}{(S / NP) / NP}$

$\frac{\frac{\text{Mary}}{S / (S / NP)} \quad \frac{\text{likes}}{(S / NP) / NP}}{S / NP} \rightarrow \frac{B}{comp}$

A      boy      who(m)      Many likes

          N      (N\N) / (S\NP)      S\NP

←—————

          N\N

—————

          N

who := (N\N) / (S\NP)

who(m) := (N\N) / (S\NP)

≡

<u>A</u>	<u>boy</u>	<u>who</u>	<u>many</u>	<u>likes</u>
$(S/(S/NP))/N$	$NP$	$(N(N)/(S/NP))$	$S/(S/NP)$	$(S/NP)/NP$
$\lambda p \lambda q \lambda x. \exists x. p x \wedge q x$	$(\lambda x. boy'x)$	$\lambda p \lambda q \lambda x. p x \wedge q x$	$\lambda p. p m'$	$(\lambda x \lambda y. likes'x y)$

$S/NP$   
 $(\lambda x. likes'x m')$

$N/N$   
 $\lambda q \lambda x. (\lambda x. likes'x m')x \wedge q x$   
 $\lambda q \lambda x. likes'x m' \wedge q x$

$N$   
 $\lambda x. (likes'x m' \wedge (\lambda x. boy'x)x$   
 $(\lambda x. likes'x m' \wedge boy'x)$

$S/(S/NP) : \lambda q \lambda x. \exists x ( \lambda x. likes'x m' \wedge boy'x )x \wedge q x$   
 $(\lambda q. \exists x. likes'x m' \wedge boy'x \wedge q x)$

















