$\subset BN$ $\quad C ::= \subset M \mid \bullet$

$(\lambda x.M)N$

MN

$\downarrow \bullet N$

$(\lambda x.M')\ N$

$\downarrow_\beta$

$M'[N/x]$

$\downarrow$

$\subset BV$ $\quad C ::= \subset M \mid (\lambda x.M) \subset \mid \bullet$

$(\lambda x.M)V \longrightarrow M[V/x]$

$M\ N$

$\downarrow \bullet N$

$(\lambda x.M')\ N$

$\downarrow$

$(\lambda x.M')\ V$

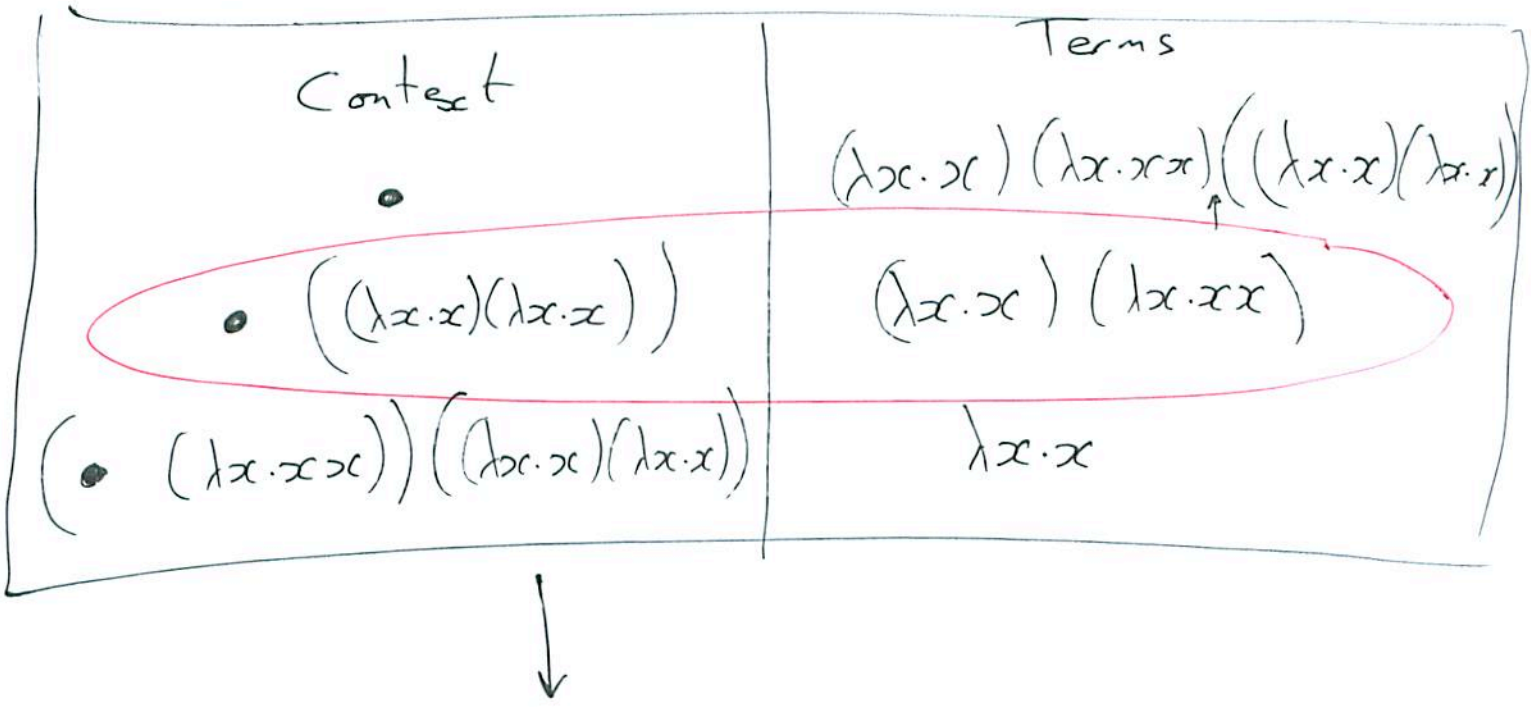
$\downarrow_\beta$

$M'[V/x]$

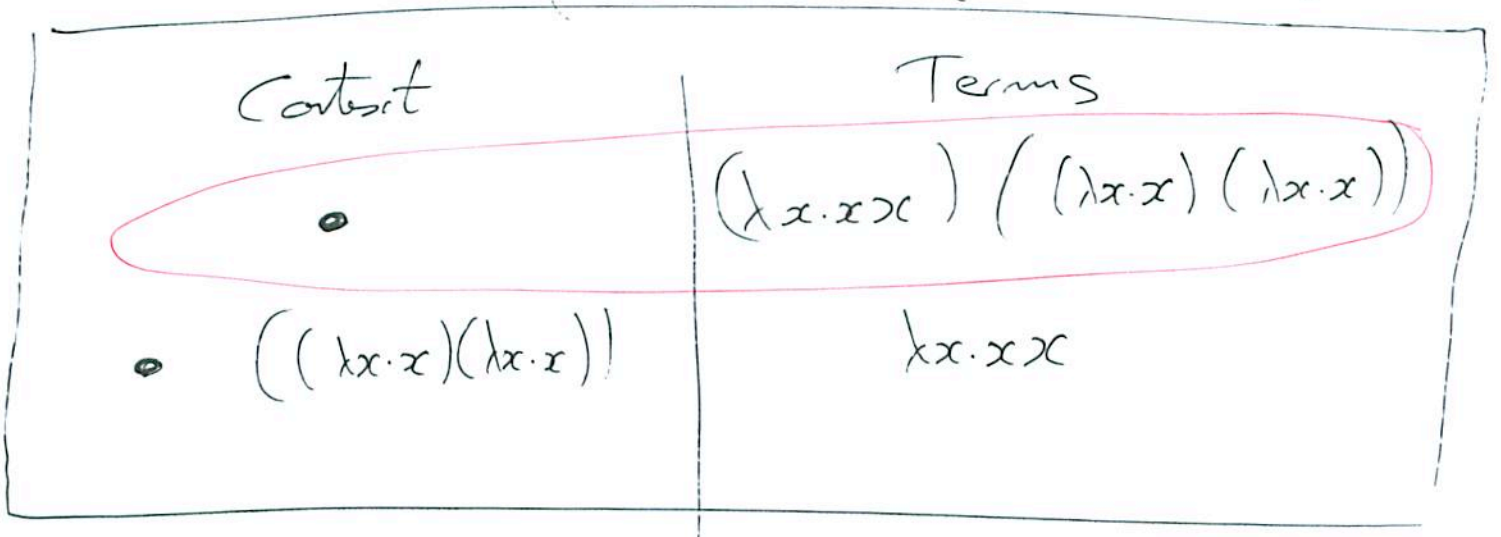
$\downarrow$

CBN

$$\Big((\lambda x.x)\ (\lambda x.(xx))\Big)\ \Big((\lambda x.x)(\lambda x.x)\Big)$$



$$(\lambda x.xx)\ \Big((\lambda x.x)(\lambda x.x)\Big)$$



$$\Big((\lambda x.x)(\lambda x.x)\Big)\ \Big((\lambda x.x)(\lambda x.x)\Big)$$

CBV

$$(\lambda x.x)\ (\lambda x.xx)\ \underline{((\lambda x.x)\ (\lambda x.x))}$$

Context	Term
•	
• $((\lambda x.x)(\lambda x.x))$	$(\lambda x.x)(\lambda x.xx)$
• $(\lambda x.xx)\ ((\lambda x.x)(\lambda x.x))$	$\lambda x.x$
$((\lambda x.x)\ \bullet\ )\ ((\lambda x.x)(\lambda x.x))$	$\lambda x.xx$

↓

$$(\lambda x.xx)\ ((\lambda x.x)(\lambda x.x))$$

Context	Term
•	$(\lambda x.xx)((\lambda x.x)(\lambda x.x))$
• $((\lambda x.x)(\lambda x.x))$	$\lambda x.xx$
$(\lambda x.xx)$ •	$(\lambda x.x)(\lambda x.x)$
$(\lambda x.xx)((\lambda x.x)\ \bullet)$	$\lambda x.x$
$(\lambda x.xx)(\bullet\ (\lambda x.x))$	$\lambda x.x$

↓

$$(\lambda x.xx)\ (\lambda x.x)$$

$$(\lambda x.x)\ \underset{1}{\uparrow}\ \Big((\lambda x.x)\ \underset{2}{\uparrow}\ \big((\lambda x.x)(\lambda x.x)\big)\ \underset{3}{\uparrow}\Big)$$

CBN ①

CBV ③

$$\Big((\lambda x.x)(\lambda x.x)\Big)\Big((\lambda x.x)(\lambda x.x)\Big)$$

$\underset{1}{\uparrow}$ $\underset{2}{\uparrow}$ $\underset{3}{\uparrow}$

CBN & CBV ①

$C[M]$ $[\![M]\!]\ (\lambda v.C[v])$

continuation

$$[\![(\lambda x.y)\ \mathit{Exit}]\!]_V(k)$$

$$= [\![\lambda x.y]\!]_V\left(\lambda m.\ [\![\mathit{Exit}]\!]_V\left(\lambda n.\ m(n,k)\right)\right)$$

$$= [\![\lambda x.y]\!]_V\left(\lambda m.\ \underline{()}\right)$$

$$= (\lambda m.()) \left(\lambda(x,k').\ [\![y]\!]_V(k')\right)$$

$$\longrightarrow\ ()$$

$$[\![(\lambda x.y)\ \mathit{Exit}]\!]_N(k)$$

$$= [\![\lambda x.y]\!]_N\left(\lambda m.\ m\left(\lambda k'.\ [\![\mathit{Exit}]\!](k'), k\right)\right)$$

$$= [\![\lambda x.y]\!]_N\left(\lambda m.\ m\left(\lambda k'.(), k\right)\right)$$

$$= \left(\lambda m.\ m(\lambda k'.(), k)\right)\left(\lambda(x,k').\ y\ k'\right)$$

$$\longrightarrow \left(\lambda(x,k').\ y\ k'\right)\left(\underline{(\lambda k'.())}, \underline{k}\right)$$

$$\longrightarrow\ y\ k$$