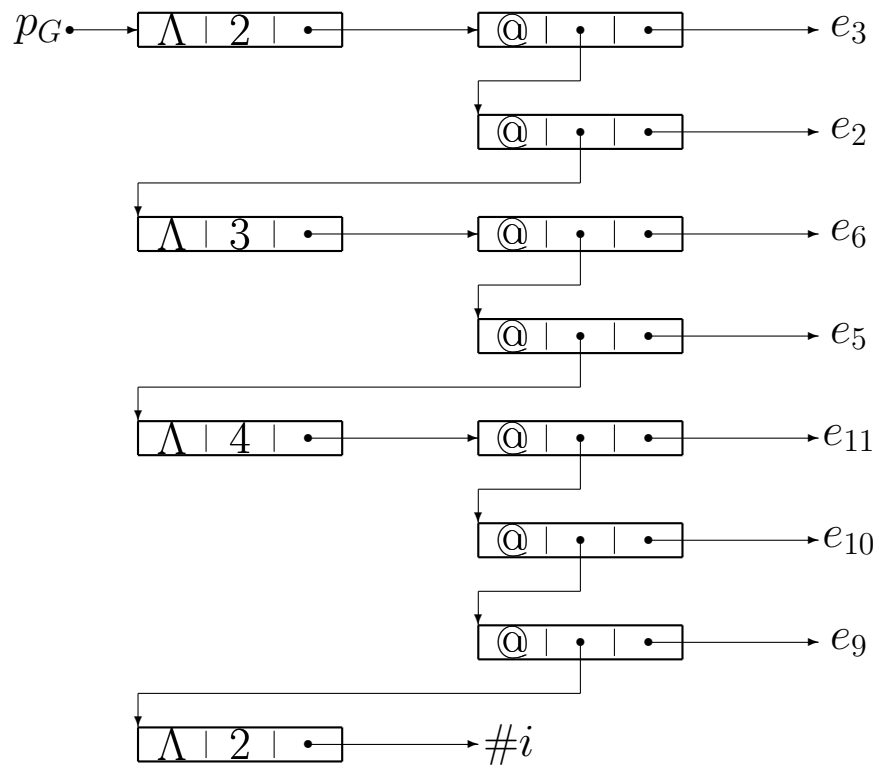
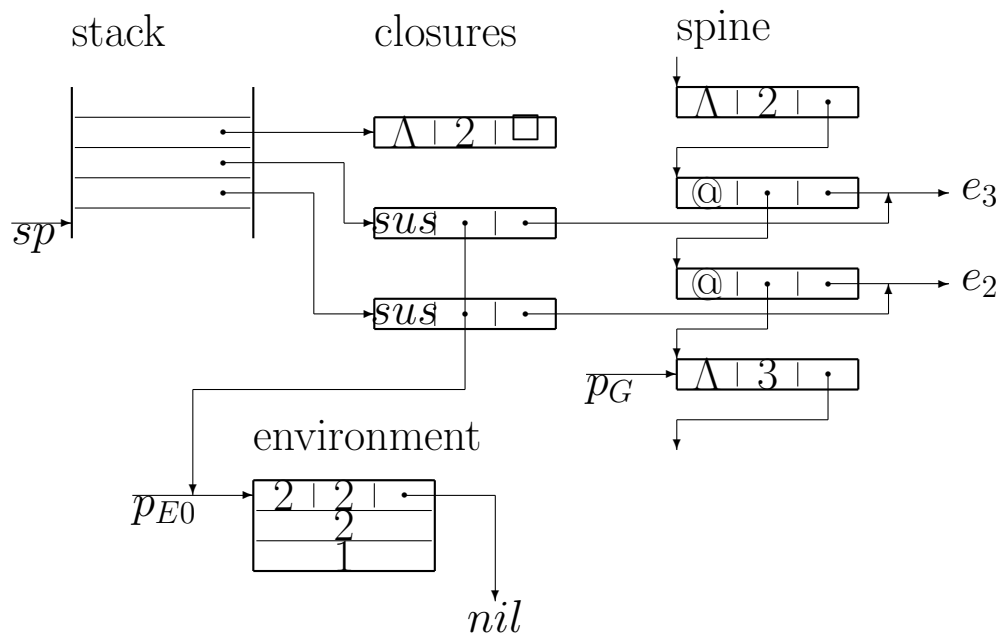


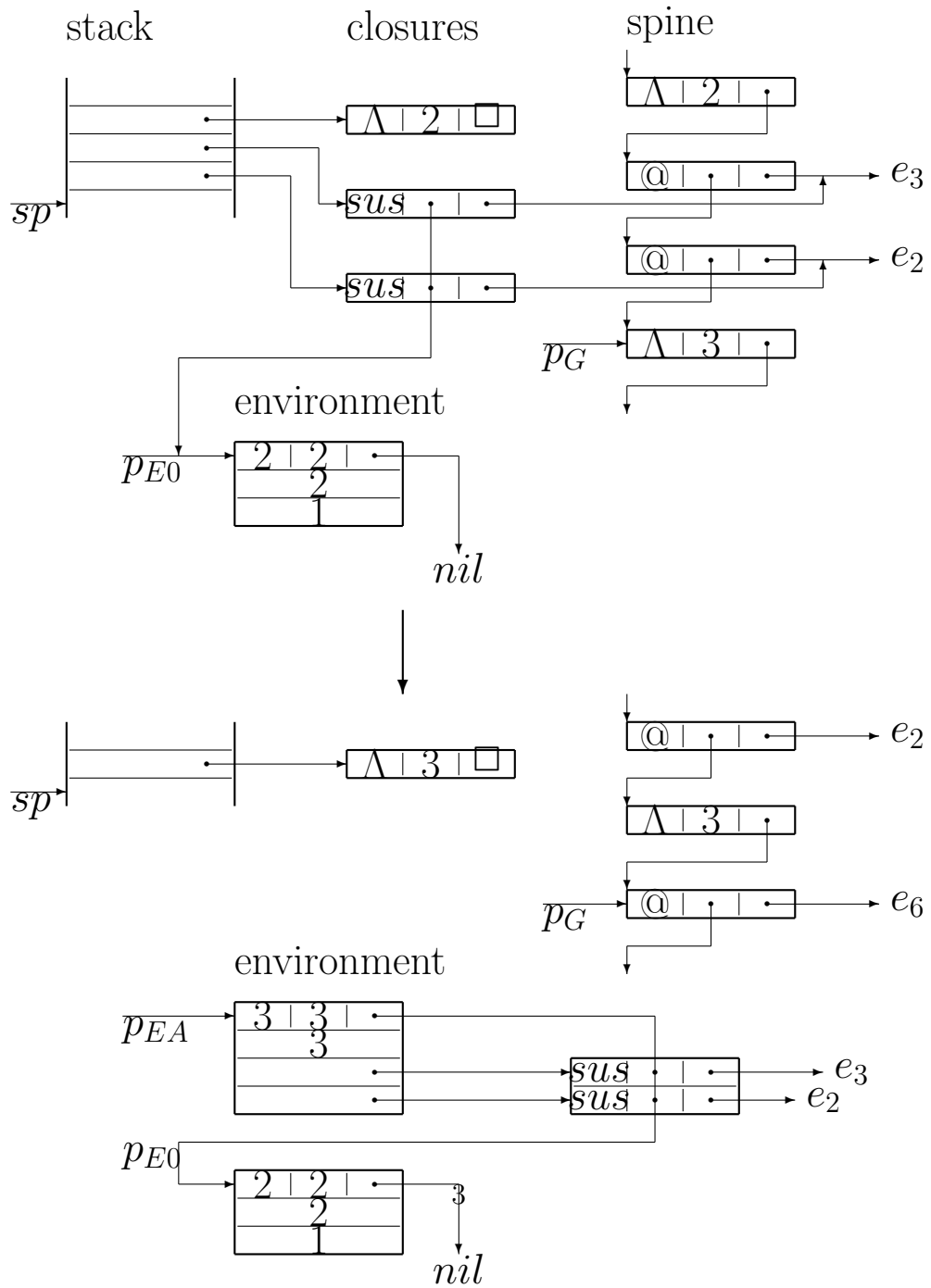
Graph representation of our initial head form



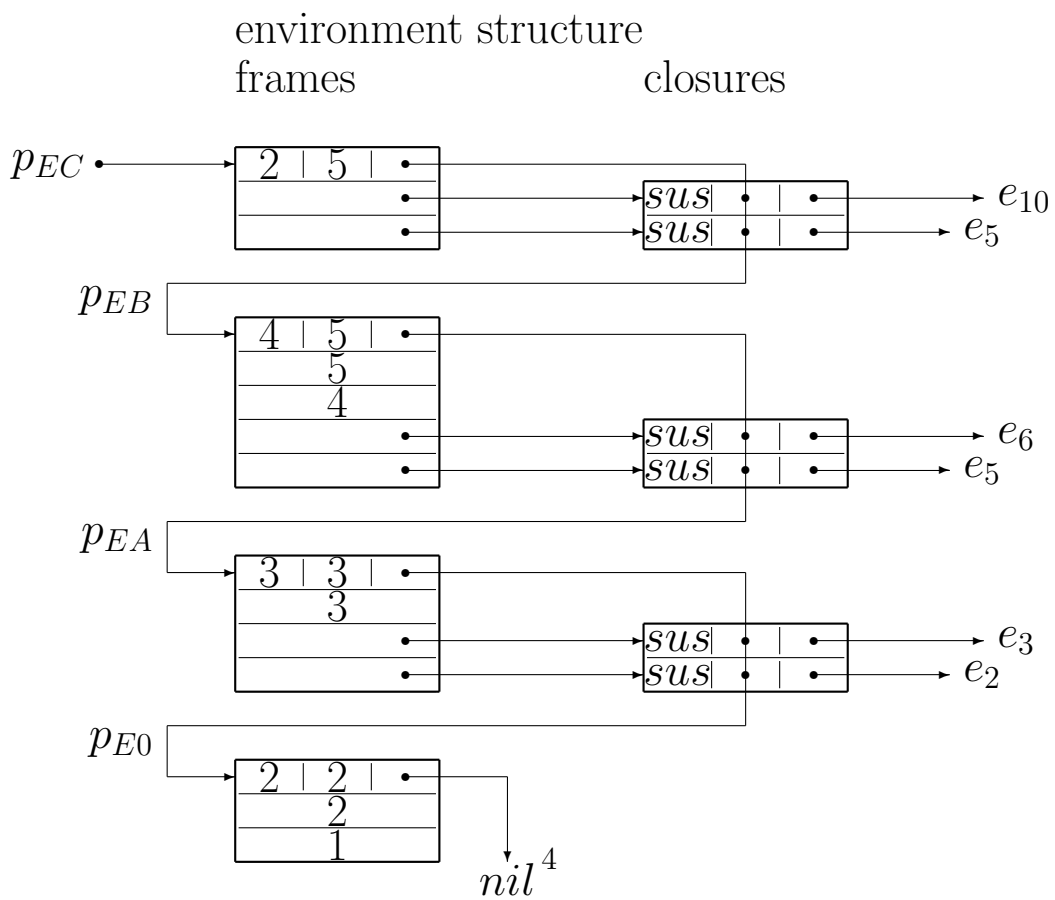
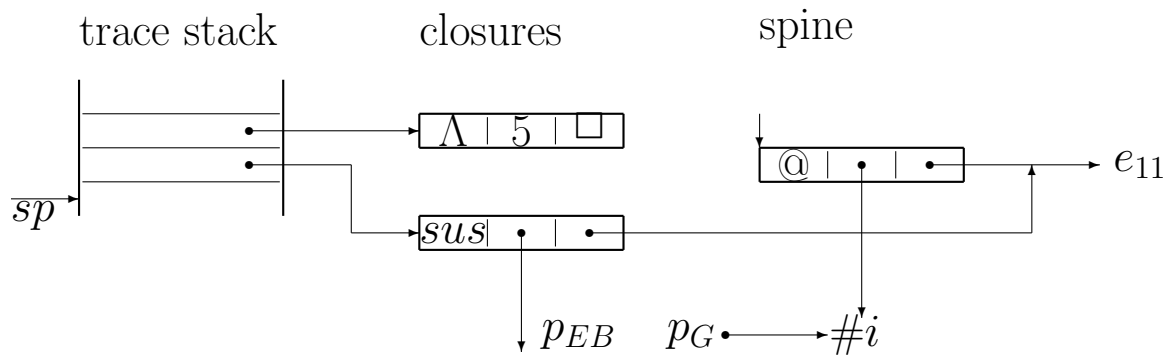
Two steps of distributing *apps* – *lambs* corners while going down the spine



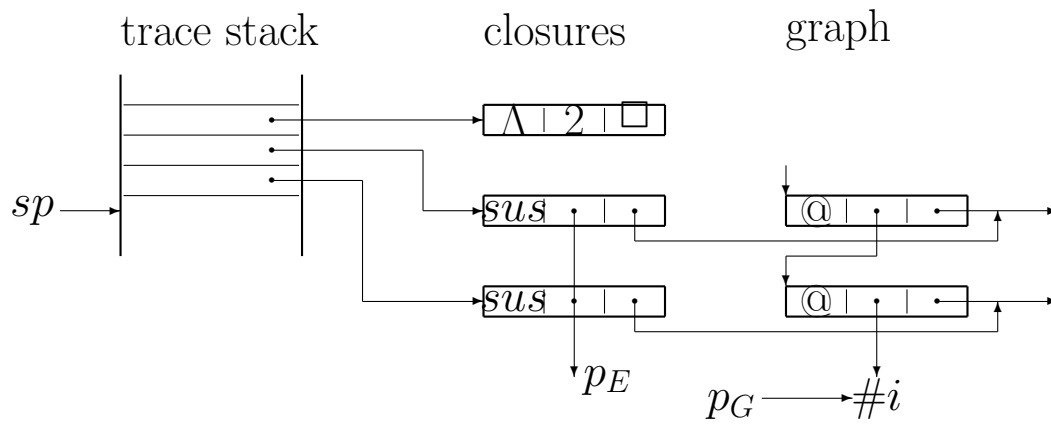
Two steps of distributing *apps* – *lambs* corners while going down the spine



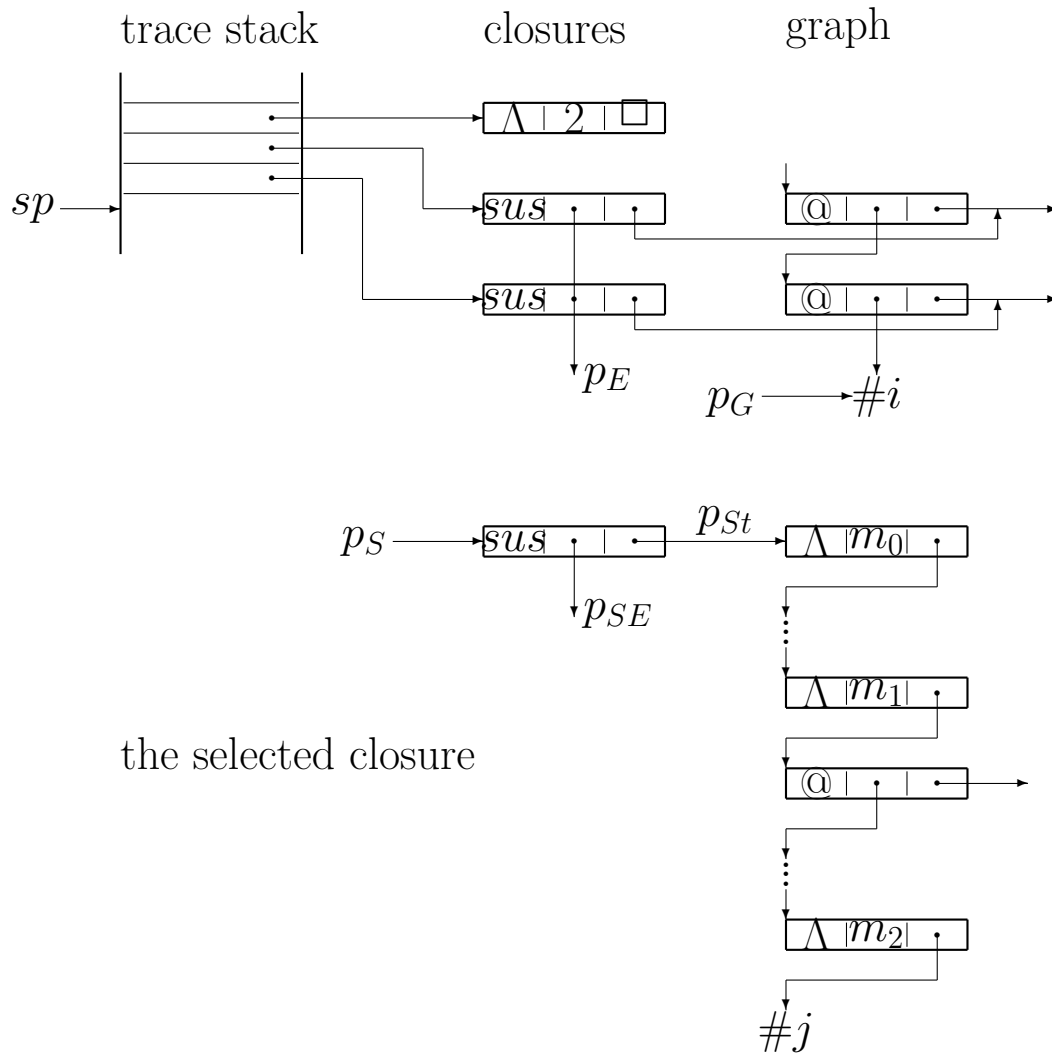
## Trace stack and environment after arrival at the head



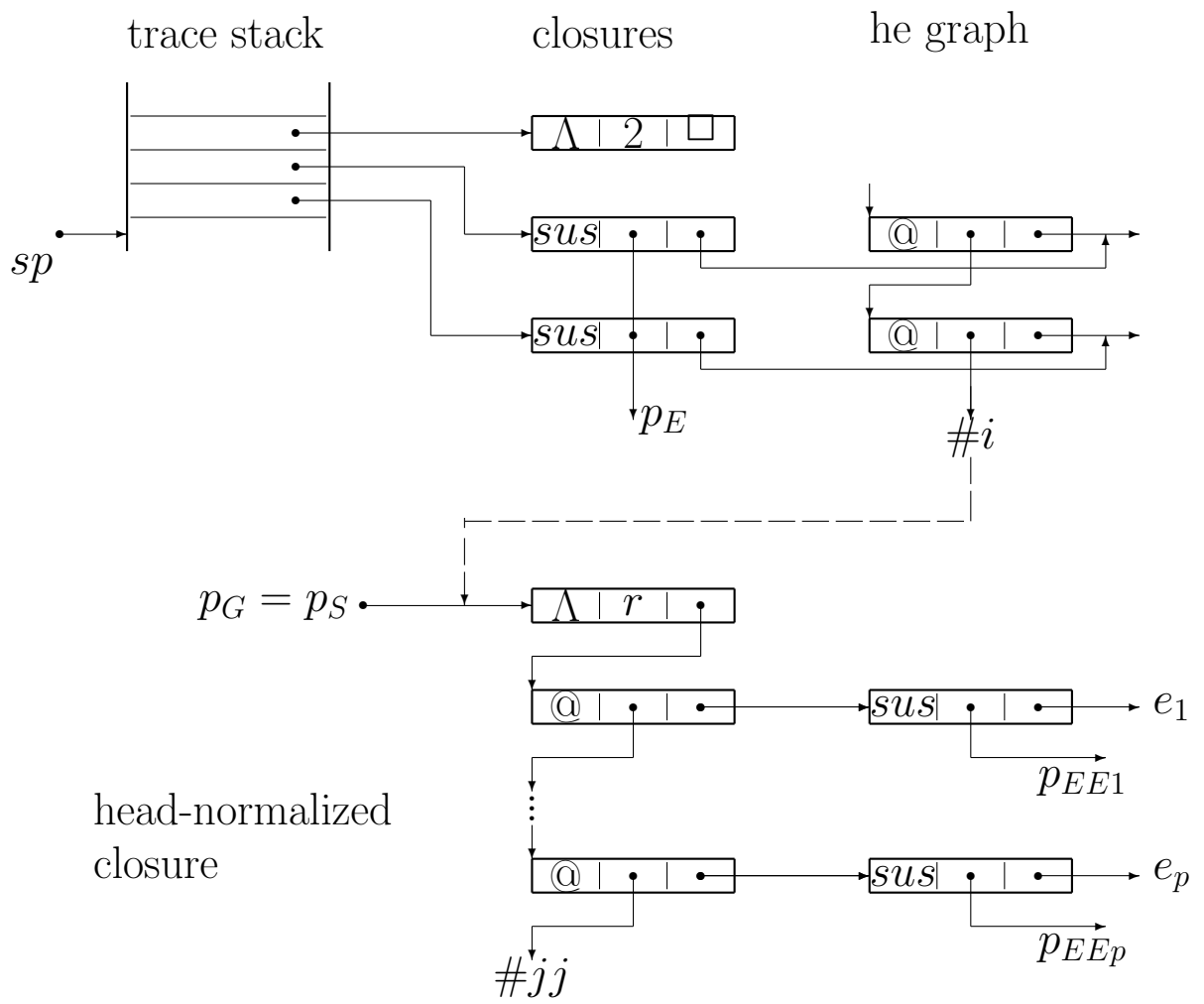
## Continuing with reductions in the head

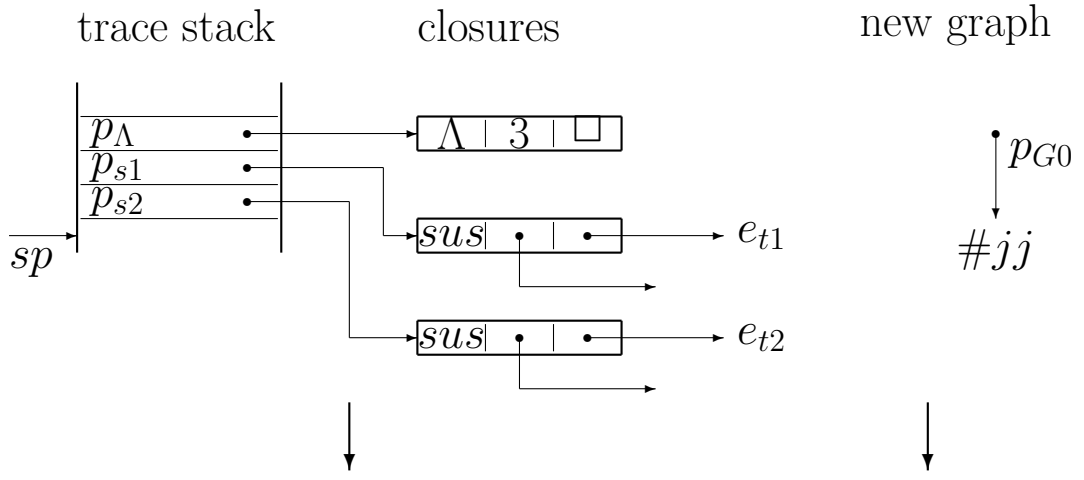


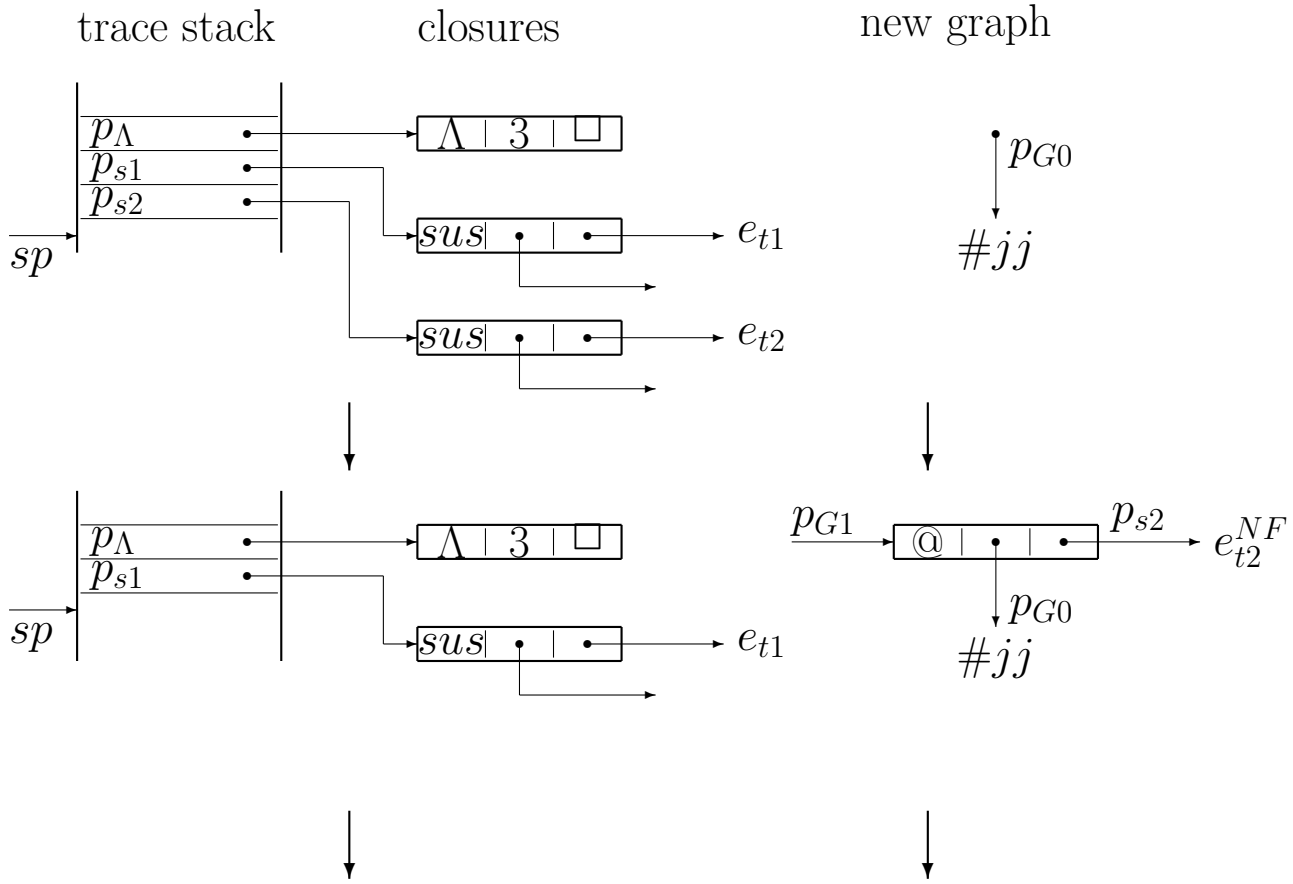
## Continuing with reductions in the head

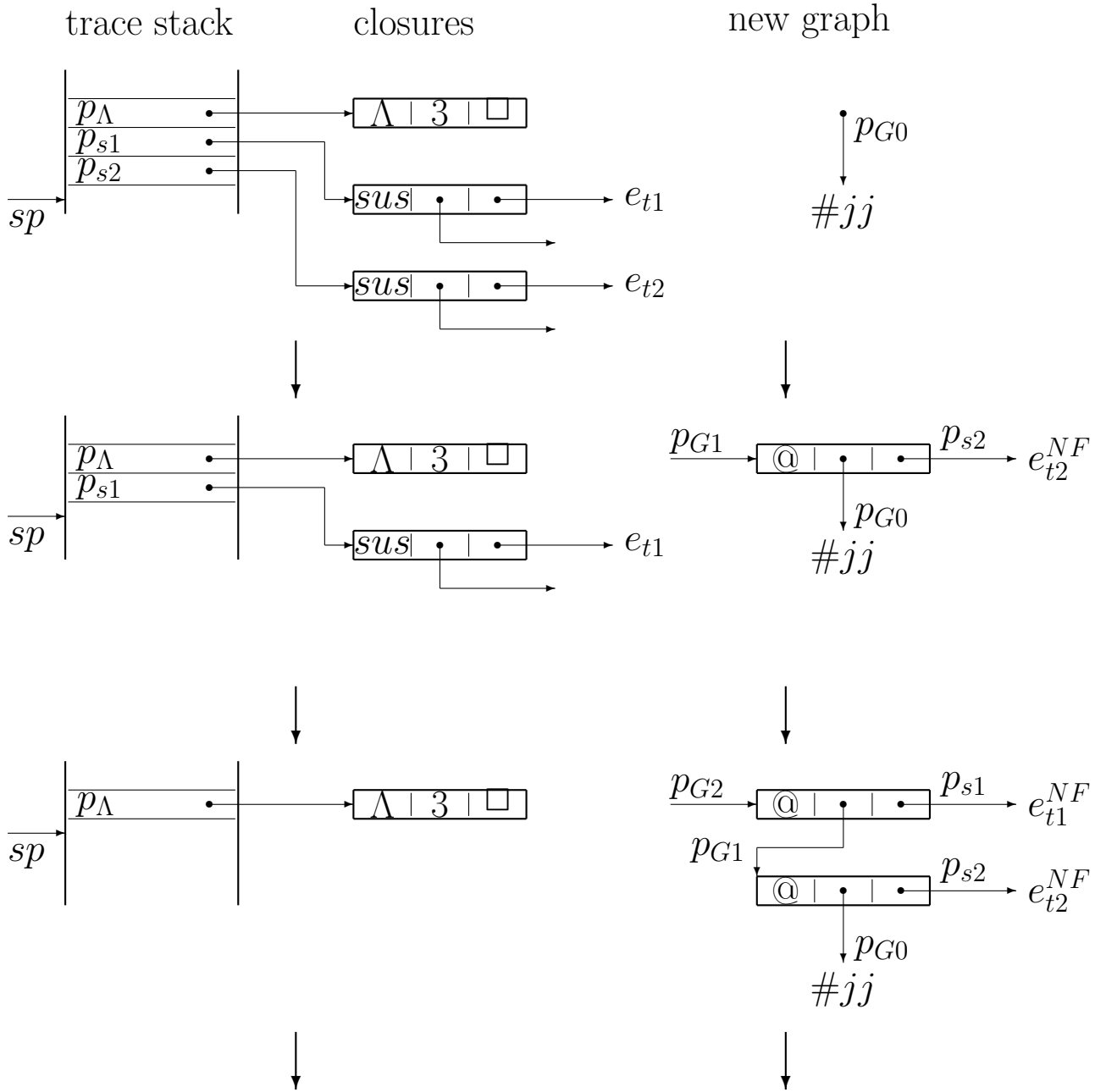


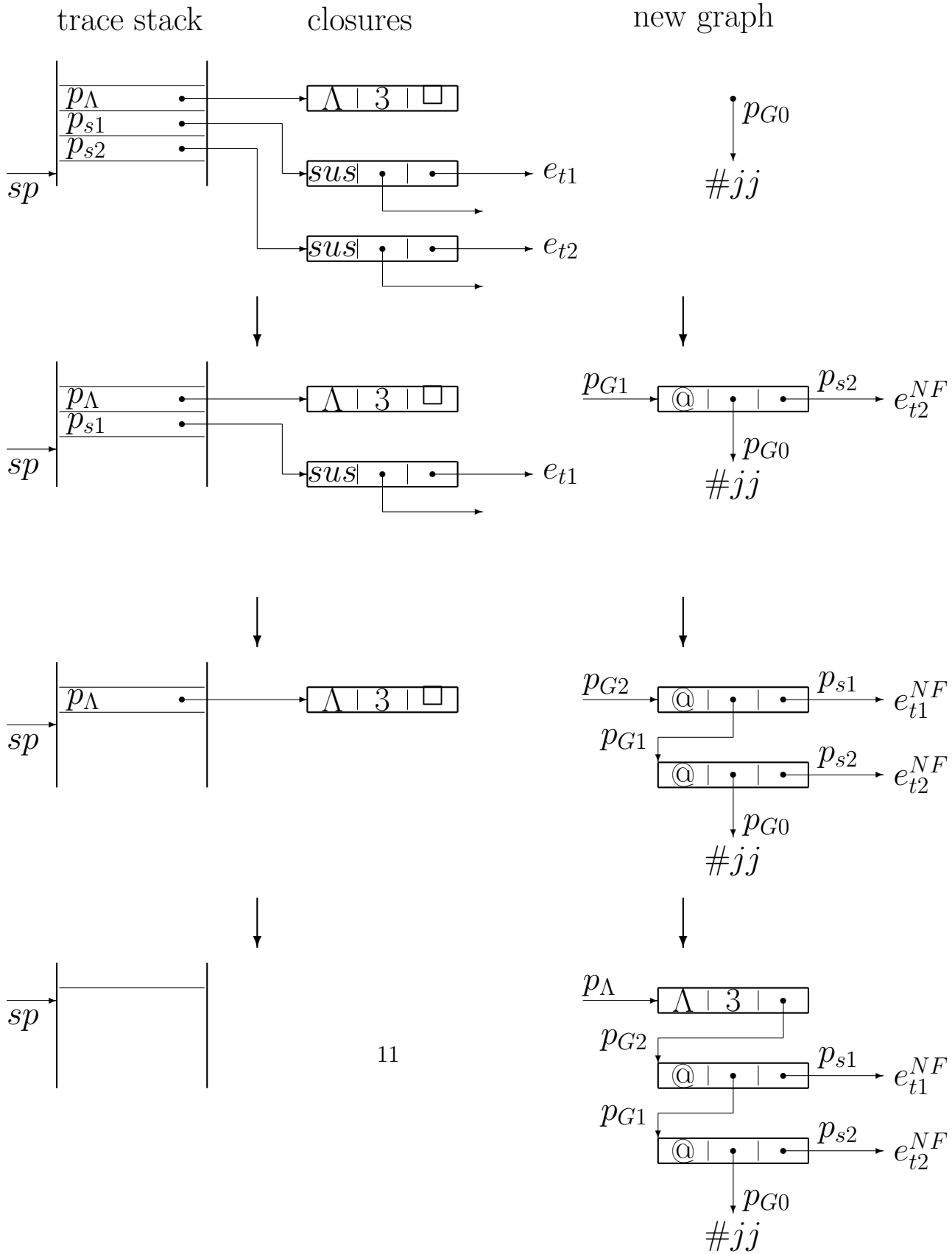
## Linking up to a head-normalized closure











## Formal specification of the head-order graph reducer

→ machine states are specified as

$$(p_G, p_E, T, H, u, dir)$$

where

→  $p_G$  pointer to the active graph cell

→  $p_E$  pointer to the current environment

→  $T$  trace stack

→  $H$  heap for graph structures

→  $u$  unapplied lambdas count  $ULC$

→  $dir \in \{ \downarrow, \uparrow, done \}$  traversal direction along the current spine

initial configuration

$$(p_G, p_E, nil, H[ p_G \rightsquigarrow (\Lambda, n, p_h), p_E \rightsquigarrow nil ], 0, \downarrow)$$

terminal configuration

$$( -, -, p_{NF} : nil, H[ p_{NF} \rightsquigarrow (\Lambda, n', p'_h ) ], -, done)$$