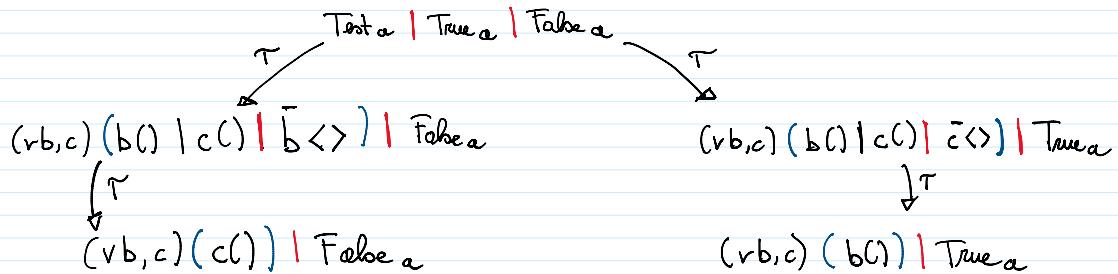


$$\text{S-CON} \quad [\text{True}_a | (\bar{a} < b, c) . (b().P | c().a)] \rightarrow \bar{b} < | b().P | c().Q$$

$$\text{S-EXT} \quad (\forall b, c)[\bar{a} < b, c) . (b().P | c().a) | \text{True}_a] \rightarrow (\forall b)[b().P | c().Q | \bar{b} <]$$

$$\text{Test}(P; Q) | \text{True}_a \rightarrow (\forall b)[b().P | c().Q | \bar{b} <]$$



2)

$$T_u = []$$

$$T_b = [[]]$$

$$T_x = [[[]]]$$

$$T_y = [[]]$$

$$T_a = [[[[]]], [[]]]$$

$$P = a(x, y). Q$$

$$Q = (\forall b) R$$

$$R = (\bar{x} < b) | !y(w). \bar{b} < w)$$

$$\frac{\Gamma(b) = T_b \quad [T_w] \quad \Gamma(u) = T_w \quad \Gamma \vdash O}{\Gamma(y) = T_y = [T_w] \quad \Gamma, u: T_w \vdash \bar{b} < w}$$

$$\Gamma(x) = T_x = [T_b] \quad \Gamma(b) = T_b$$

$$\Gamma \vdash O$$

$$\Gamma \vdash \bar{x} < b$$

$$\Gamma \vdash y(w). \bar{b} < w$$

$$\Gamma \vdash !y(w). \bar{b} < w$$

$$\underline{\exists T_b : \Gamma, b : T_b \vdash R}$$

$$\Gamma(w) = T_a$$

$$\Gamma, x : T_x, y : T_y \vdash Q$$

$$\underline{\Gamma \vdash P}$$

3)

$$f_m(\emptyset) = \emptyset$$

$$f_m(P_1 P_2) = f_m(P_1) \cup f_m(P_2)$$

$$f_m(\bar{a} < b . P) = \{a, b\} \cup f_m(P)$$

$$f_m(a(x)P) = \{a\} \cup (f_m(P) / \{x\})$$

$$f_m(v a P) = f_m(P) / \{a\}$$

$$f_m(\neg P) = f_m(P)$$

$$f_m([a=a]P) = f_m(P)$$

Proof: that if $P \xrightarrow{\alpha} P'$ then it may be possible that $f_m(P') \not\subseteq f_m(P)$

Let $(\forall b) \bar{a} < b . b(x) \xrightarrow{P} b(x) \underbrace{\qquad}_{P'}$

$b \notin f_m(P)$ and $b \in f_m(P')$

i) $\frac{E\text{-Historical}}{a(\alpha).P \mid \bar{a} < p . a} (\beta \in V \text{ and } p \in N) \text{ or } (p \in V \text{ and } \alpha \in N)$

E-RES $\frac{P \uparrow}{(\forall a) P \uparrow}$

E-PAR $\frac{P \uparrow}{P \mid a \uparrow}$

E-SUPER $\frac{P \uparrow \quad P \sqsupseteq Q}{Q \uparrow}$