Overview of Semantics and Axioms

$$a \xrightarrow{a} \surd$$

$$\frac{p \xrightarrow{a} \surd}{p + q \xrightarrow{a} \surd} \qquad \frac{p \xrightarrow{a} p'}{p + q \xrightarrow{a} p'} \qquad \frac{q \xrightarrow{a} \surd}{p + q \xrightarrow{a} \surd} \qquad \frac{q \xrightarrow{a} q'}{p + q \xrightarrow{v} q'}$$

$$\frac{p \xrightarrow{a} \surd}{p \cdot q \xrightarrow{a} q} \qquad \frac{p \xrightarrow{a} p'}{p \cdot q \xrightarrow{a} p' \cdot q} \qquad \frac{p \xrightarrow{a} \surd \quad \gamma(a) \neq \delta}{p \mathbin{\lfloor\!\lfloor} q \xrightarrow{a} q} \qquad \frac{p \xrightarrow{a} p' \quad \gamma(a) \neq \delta}{p \mathbin{\lfloor\!\lfloor} q \xrightarrow{a} p' \parallel q}$$

$$\frac{p \xrightarrow{a} \surd \quad q \xrightarrow{b} \surd \quad \gamma(a,b) \neq \delta}{p \mid q \xrightarrow{\gamma(a,b)} \surd} \qquad \frac{p \xrightarrow{a} \surd \quad q \xrightarrow{b} q' \quad \gamma(a,b) \neq \delta}{p \mid q \xrightarrow{\gamma(a,b)} q'}$$

$$\frac{p \xrightarrow{a} p' \quad q \xrightarrow{b} \surd \quad \gamma(a,b) \neq \delta}{p \mid q \xrightarrow{\gamma(a,b)} p'} \qquad \frac{p \xrightarrow{a} p' \quad q \xrightarrow{b} q' \quad \gamma(a,b) \neq \delta}{p \mid q \xrightarrow{\gamma(a,b)} p' \parallel q'}$$

$$\frac{p \xrightarrow{a} \surd \quad \gamma(a) \neq \delta}{p \parallel q \xrightarrow{a} q} \qquad \frac{q \xrightarrow{a} \surd \quad \gamma(a) \neq \delta}{p \parallel q \xrightarrow{a} p} \qquad \frac{p \xrightarrow{a} p' \quad \gamma(a) \neq \delta}{p \parallel q \xrightarrow{a} p' \parallel q} \qquad \frac{q \xrightarrow{a} q' \quad \gamma(a) \neq \delta}{p \parallel q \xrightarrow{a} p \parallel q'}$$

$$\frac{p \xrightarrow{a} \surd \quad q \xrightarrow{b} \surd \quad \gamma(a,b) \neq \delta}{p \parallel q \xrightarrow{\gamma(a,b)} \surd} \qquad \frac{p \xrightarrow{a} \surd \quad q \xrightarrow{b} q' \quad \gamma(a,b) \neq \delta}{p \parallel q \xrightarrow{\gamma(a,b)} q'}$$

$$\frac{p \xrightarrow{a} p' \quad q \xrightarrow{b} \surd \quad \gamma(a,b) \neq \delta}{p \parallel q \xrightarrow{\gamma(a,b)} p'} \qquad \frac{p \xrightarrow{a} p' \quad q \xrightarrow{b} q' \quad \gamma(a,b) \neq \delta}{p \parallel q \xrightarrow{\gamma(a,b)} p' \parallel q'}$$

$$\frac{X = p \quad p \xrightarrow{a} \surd}{X \xrightarrow{a} \surd} \qquad \frac{X = p \quad p \xrightarrow{a} p'}{X \xrightarrow{a} p'} \qquad \frac{p \xrightarrow{a} \surd \quad a \notin H}{\partial_H(p) \xrightarrow{a} \surd} \qquad \frac{p \xrightarrow{a} p' \quad a \notin H}{\partial_H(p) \xrightarrow{a} \partial_H(p')}$$

$$\gamma(a) = \begin{cases} \delta & \text{, if } a = \mathsf{wait} \\ a & \text{, otherwise} \end{cases} \qquad \gamma(a,b) = \begin{cases} \tau & \text{, if } \exists c.\ \{a,b\} = \{c!, c?\} \\ \mathsf{wait} & \text{, if } \{a,b\} = \{\mathsf{wait}\} \\ \delta & \text{, otherwise} \end{cases}$$

$$\begin{aligned} p + q &= q + p \\ (p + q) + r &= p + (q + r) \\ p + p &= p \\ (p + q) \cdot r &= p \cdot r + q \cdot r \\ (p \cdot q) \cdot r &= p \cdot (q \cdot r) \\ p + \delta &= p \\ \delta \cdot p &= \delta \end{aligned}$$

$$\begin{aligned} \partial_H(a) &= a & a \notin H \\ \partial_H(a) &= \delta & a \in H \\ \partial_H(\delta) &= \delta \\ \partial_H(p + q) &= \partial_H(p) + \partial_H(q) \\ \partial_H(p \cdot q) &= \partial_H(p) \cdot \partial_H(q) \end{aligned}$$

$$\begin{aligned} p \parallel q &= p \mathbin{\lfloor\!\lfloor} q + q \mathbin{\lfloor\!\lfloor} p + p \mid q \\ p \parallel q &= q \parallel p \\ p \parallel (q \parallel r) &= (p \parallel q) \parallel r \end{aligned}$$

$$\begin{aligned} p \parallel q &= p \mathbin{\lfloor\!\lfloor} q + q \mathbin{\lfloor\!\lfloor} p + p \mid q \\ a \mathbin{\lfloor\!\lfloor} q &= \gamma(a) \cdot q \\ a \cdot p \mathbin{\lfloor\!\lfloor} q &= \gamma(a) \cdot (p \parallel q) \\ (p + q) \mathbin{\lfloor\!\lfloor} r &= p \mathbin{\lfloor\!\lfloor} r + q \mathbin{\lfloor\!\lfloor} r \\ \delta \mathbin{\lfloor\!\lfloor} p &= \delta \end{aligned}$$

$$\begin{aligned} a \mid b &= \gamma(a,b) \\ a \mid (b \cdot q) &= \gamma(a,b) \cdot q \\ (a \cdot p) \mid b &= \gamma(a,b) \cdot p \\ (a \cdot p) \mid (b \cdot q) &= \gamma(a,b) \cdot (p \parallel q) \\ (p + q) \mid r &= p \mid r + q \mid r \\ p \mid (q + r) &= p \mid q + p \mid r \\ \delta \mid p &= \delta \\ p \mid \delta &= \delta \\ p \mid q &= q \mid p \\ p \mid (q \mid r) &= (p \mid q) \mid r \end{aligned}$$