

$$\begin{array}{c}
\frac{[B \& A]^z}{A} (\&E_r) \quad \frac{[B \& A]^z}{B} (\&E_l) \\
\frac{\frac{A \& B}{(B \& A) \rightarrow (A \& B)} (\rightarrow I^z) \quad \frac{[B]^y \quad [A]^x}{B \& A} (\&I)}{A \& B} (\rightarrow E) \\
\Downarrow \\
\frac{\frac{[B]^y \quad [A]^x}{B \& A} (\&I) \quad \frac{[B]^y \quad [A]^x}{B \& A} (\&I)}{\frac{A}{\frac{B \& A}{A} (\&E_r)} (\&E_r) \quad \frac{B}{\frac{B \& A}{B} (\&E_l)} (\&E_l)} (\&I) \\
\Downarrow \\
\frac{[A]^x \quad [B]^y}{A \& B} (\&I)
\end{array}$$