

causally-op-related^{11,40}

$e.P(e) \rightarrow_{\text{op}} e'.Q(e')$ with R
 $\equiv_{\text{def}} \exists f: \{e: \mathbb{E} \mid P(e)\} \rightarrow \{e: \mathbb{E} \mid Q(e)\}$
 $((e.P(e) \rightarrow_a f(a) \rightarrow e'.Q(e')) \text{ with } R \ \& \ e.f(e) \text{ is } c < \text{ preserving on } e.P(e))$

clarification:

causally-op-related($es; e.P(e); e'.Q(e'); R$)
 $\equiv_{\text{def}} \exists f: \{e: \text{es-}\mathbb{E}(es) \mid P(e)\} \rightarrow \{e: \text{es-}\mathbb{E}(es) \mid Q(e)\}$
 $(\text{causal-bijection}(es; a.f(a); e.P(e); e'.Q(e'); R)$
 $\ \& \ \text{causal-order-preserving}(es; e.f(e); e.P(e)))$