Definition (Trace of a design problem). Given a design problem $f : \mathbf{C} \times \mathbf{A} \nrightarrow \mathbf{C} \times \mathbf{B}$, we can define its *trace* $\mathrm{Tr}^{\mathbf{C}}_{\mathbf{A},\mathbf{B}}(f) : \mathbf{A} \nrightarrow \mathbf{B}$ as follows:

$$\mathrm{Tr}^{\mathbf{C}}_{\mathbf{A},\mathbf{B}}(f) : \mathbf{A}^{\mathrm{op}} \times \mathbf{B} \to_{\mathbf{Pos}} \mathbf{Bool}$$

$$\langle a^*, b \rangle \mapsto \bigvee_{c \in \mathbf{C}} f(\langle a^*, c \rangle, \langle b^*, c \rangle).$$