

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

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

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