Definition (Union of design problems). Given two design problems $f : A \nrightarrow B$ and $g : A \nrightarrow B$, their *union* $f \vee g : A \nrightarrow B$ is defined by

$$(f \vee g) : A^{\mathrm{op}} \times B \xrightarrow{}_{\mathbf{Pos}} \mathbf{Bool}$$

$$\langle a^*, b \rangle \mapsto f(a^*, b) \vee g(a^*, b).$$