

$$\begin{aligned}
 (\mathbf{br}_{\mathcal{U}_U, \mathcal{U}_Y} \circ (f \otimes g))(x, z) &= \langle \uparrow\{z\}, \uparrow\{x\} \rangle \circ (f \otimes g) \\
 &= \left\langle \bigcup_{z' \in \uparrow\{z\}} g(z'), \bigcup_{x' \in \uparrow\{x\}} f(x') \right\rangle.
 \end{aligned}$$