

$$\begin{array}{ccccc}
\mathcal{H}\mathfrak{I}\mathfrak{I}(Y, A) & & & & \\
& \searrow & & \searrow^{g_*} & \\
& & \mathcal{H}\mathfrak{I}\mathfrak{I}(X, A) \times_{\mathcal{H}\mathfrak{I}\mathfrak{I}(X, B)} \mathcal{H}\mathfrak{I}\mathfrak{I}(Y, B) & \dashrightarrow & \mathcal{H}\mathfrak{I}\mathfrak{I}(Y, B) \\
& \searrow^{f^*} & \downarrow & & \downarrow f^* \\
& & \mathcal{H}\mathfrak{I}\mathfrak{I}(X, A) & \xrightarrow{g_*} & \mathcal{H}\mathfrak{I}\mathfrak{I}(X, B)
\end{array}$$