

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