

$$\begin{array}{ccc}
 \mathrm{Hom}_L(V_L, W) & \xrightarrow{F_1(f)} & \mathrm{Hom}_L(V_L, W') \\
 \beta_W \downarrow & & \downarrow \beta_{W'} \\
 \mathrm{Hom}_k(V, W) & \xrightarrow{F_2(f)} & \mathrm{Hom}_k(V, W')
 \end{array}$$