

$$\begin{array}{ccccc}
 G & & R[G] & \xrightarrow{\psi_G^*} & S[G] \\
 \downarrow \varphi & & \downarrow R(\varphi) & & \downarrow S(\varphi) \\
 H & & R[H] & \xrightarrow{\psi_H^*} & S[H]
 \end{array}$$

$$\begin{array}{ccc}
 \sum_{g \in G} a_g g & \longmapsto & \sum_{g \in G} \psi(a_g) g \\
 \downarrow & & \downarrow \\
 \sum_{g \in G} a_g \varphi(g) & \longmapsto & \sum_{g \in G} \psi(a_g) \varphi(g)
 \end{array}$$