$$F :: (a \to b) \to \mathrm{SG}a \to \mathrm{SG}b$$
$$F = \lambda fm . \{\lambda r . f (\alpha r) \mid \alpha \in m\}$$

$$H :: (a \to b) \to \mathrm{GS}a \to \mathrm{GS}b$$
$$H = \lambda fmr . \{f x \mid x \in m r\}$$

$$\varepsilon :: \mathrm{SG}a \to \mathrm{GS}a$$
$$\varepsilon = \lambda mr . \{\alpha r \mid \alpha \in m\}$$

$$
\begin{array}{ccc}
\mathrm{SG}a & \xrightarrow{\ F f\ } & \mathrm{SG}b \\
\Big\downarrow{\scriptstyle \varepsilon} & & \Big\downarrow{\scriptstyle \varepsilon} \\
\mathrm{GS}a & \xrightarrow{\ H f\ } & \mathrm{GS}b
\end{array}
$$

$$
\begin{aligned}
\varepsilon \circ F f &= \lambda m . \varepsilon (F f m) \\
&= \lambda m . \varepsilon \{\lambda r . f (\alpha r) \mid \alpha \in m\} \\
&= \lambda mr . \{\beta r \mid \beta \in \{\lambda r . f (\alpha r) \mid \alpha \in m\}\} \\
&= \lambda mr . \{f (\alpha r) \mid \alpha \in m\}
\end{aligned}
$$

$$
\begin{aligned}
H f \circ \varepsilon &= \lambda m . H f (\varepsilon m) \\
&= \lambda m . H f (\lambda r . \{\alpha r \mid \alpha \in m\}) \\
&= \lambda mr . \{f x \mid x \in \{\alpha r \mid \alpha \in m\}\} \\
&= \lambda mr . \{f (\alpha r) \mid \alpha \in m\}
\end{aligned}
$$