

$$\begin{array}{ccc}
 FI & \xrightarrow{Fcata_\phi} & FA \\
 \downarrow in & & \downarrow \phi \\
 I & \xrightarrow{cata_\phi} & A
 \end{array}$$

$$\phi \circ Fcata_\phi = cata_\phi \circ in$$

$$\begin{array}{ccc}
 FI & \xrightarrow{Fcata_\phi} & FA \\
 \uparrow in^{-1} & & \downarrow \phi \\
 I & \xrightarrow{cata_\phi} & A
 \end{array}$$

$$cata_\phi = \phi \circ Fcata_\phi \circ in^{-1}$$