

$$\begin{array}{c}
 A^{a_1} \times A^{a_2} \times \dots \times A^{a_n} \\
 \downarrow F(f \circ_{a_1, \dots, a_n}(g_1, \dots, g_n)) \\
 A
 \end{array}
 =
 \begin{array}{c}
 \begin{array}{cccc}
 A^{a_1} & A^{a_2} & \dots & A^{a_n} \\
 \downarrow F_{a_1}(g_1) & \downarrow & \dots & \downarrow F_{a_n}(g_n) \\
 A & \times A & \times \overbrace{\dots}^{n \text{ times}} & \times A \\
 & & \downarrow F(f) & \\
 & & A &
 \end{array}
 \end{array}$$