

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