## 0.1 Natural Transformations

$$C \stackrel{F}{\underset{G}{\longrightarrow}} \mathcal{D}$$

 $\mathcal{C} \xrightarrow{G \atop G} \mathcal{D}$   $\eta$  is a natural transformation  $\forall C \in obj(\mathcal{C})$  we have a morphism

$$F(C) \xrightarrow{\eta_C} G(C)$$

such that given  $f:A\to B$  in  $\mathcal C$ 

$$F(A) \xrightarrow{\eta_A} G(A)$$

$$F(f) \downarrow \qquad \qquad \downarrow G(f)$$

$$F(B) \xrightarrow{\eta_B} G(B)$$

We also have the identity:  $C \xrightarrow{F} D$ Composition and communityity work here too!

Exponential of Categories of Categories:  $\mathcal{D}^{\mathcal{C}}$  -wow-