

① Hom functor sketch construction

- Assume $\underbrace{\text{Hom}(a, -)}_{\text{new symbol}} : \mathcal{U}_i$

$$\text{with } \partial \text{Hom}(a, -) : A \rightarrow \mathcal{U}_{i-1}$$

- Write $a \equiv \text{ext}(a) \Rightarrow (\partial a : \mathbf{1} \rightarrow A)$

- Write $\text{Hom}(a, a) \equiv \underbrace{\text{Hom}(a, -)}_{\text{new symbol}} \circ a$

$$\Rightarrow \partial \text{Hom}(a, a) : \mathbf{1} \rightarrow \mathcal{U}_i$$

- Write $\text{Hom}(a, a) \equiv \bar{\text{int}}(\text{Hom}(a, a))$

$$\Rightarrow \text{Hom}(a, a) : \mathcal{U}_{i-1} \mid \partial \text{Hom}(a, a) : \phi$$

- Assume $\underbrace{\text{id}_a}_{\text{new symbol}} : \mathcal{U}_{i-1}$

$$\text{with } \partial \text{id}_a : \mathbf{1} \rightarrow \text{Hom}(a, a)$$

\leadsto By Tondera, this freely constructs a hom functor that behaves as expected.