

**Definition** (Semigroup left action (preliminary version)). A *semigroup **left** action* of a semigroup **S** onto a set **A** is a map

$$\text{Covact} : \mathbf{S} \times \mathbf{A} \rightarrow \mathbf{A}$$

such that, for all  $a \in \mathbf{A}$ ,

$$\text{Covact}(x, \text{Covact}(y, a)) = \text{Covact}(x \circ_{\mathbf{S}} y, a).$$