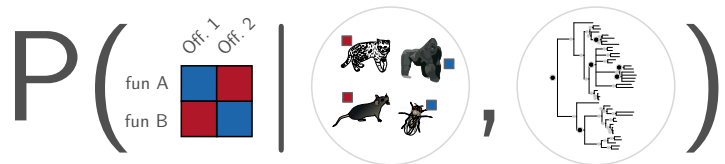
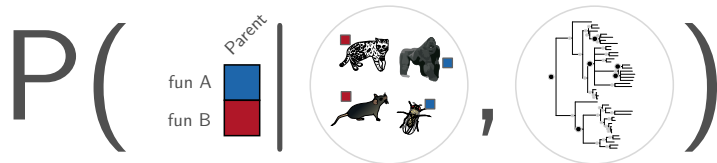
Gene state
given the data



It's parent state
given the data



$$\mathbb{P}\left(\mathbf{x}^p = \mathbf{x} \,\middle|\, \tilde{D}\right) = \underbrace{\left\{\prod_{m \in \mathbf{O}(p)} \mathbb{P}\left(\tilde{D}_m \,\middle|\, x_m\right)\right\}}_{\text{Everything below } \mathbf{x}^p} \underbrace{\sum_{x_p} \mathbb{P}\left(x_p \,\middle|\, \tilde{D}\right) \frac{\mathbb{P}\left(\mathbf{x}^p = \mathbf{x} \mid x_p\right)}{\mathbb{P}\left(\tilde{D}_p \,\middle|\, x_p\right)}}_{\text{Everything above } \mathbf{x}^p}$$