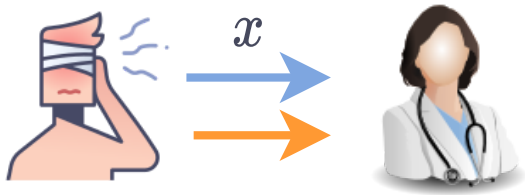

Observed Expert's Label

$$Y_h = f_h(x, ?) = c$$

No

in $\psi \in \Psi$?

Yes

Sampling Noise

$$U = (U_\psi)_{\psi \in \Psi}$$

$$\forall c \in \mathcal{Y} : U_{\psi,c} \sim \underbrace{Gumbel(0,1)}_{\text{Prior}}$$

$$U_\psi \sim P^{\mathcal{M}(\Psi)|X=x,Z=\{h\},\mathbf{Y}=c;\, do[Z=\{h'\}]}(U_\psi)$$

sample from the noise posterior
e.g. via rejection sampling

$h' \in \mathcal{H}$

$$Y_{h'} = f_{h'}(x, U_{\psi(h')})$$

Counterfactual Label Sample
for estimating the distribution