## Intuition about Bayes Risk

• All  $\mathscr{P}_{ heta}$  are the same  $\Longrightarrow$  Can't say anything about heta from x

• Need to capture how different  $\mathscr{P}_{ heta}$  are

One way to capture:



• If  $\mathscr{P}_{\theta}$  are close to some Q on average, then  $I(\mathscr{P},w)$  is small

 $I(\mathcal{P}, w) = \inf E_{\theta \sim w}[d_{\mathsf{KL}}(\mathcal{P}_{\theta} \parallel Q)]$ 

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## Bayes Risk Lower Bounds