Intuition about Bayes Risk

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

- Need to capture how different $\mathscr{P}_\theta$ are

- One way to capture:

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

$$I(\mathscr{P}, w) = \inf_{Q} E_{\theta \sim w}[d_{\mathsf{KL}}(\mathscr{P}_\theta \,\|\, Q)]$$

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Bayes Risk Lower Bounds