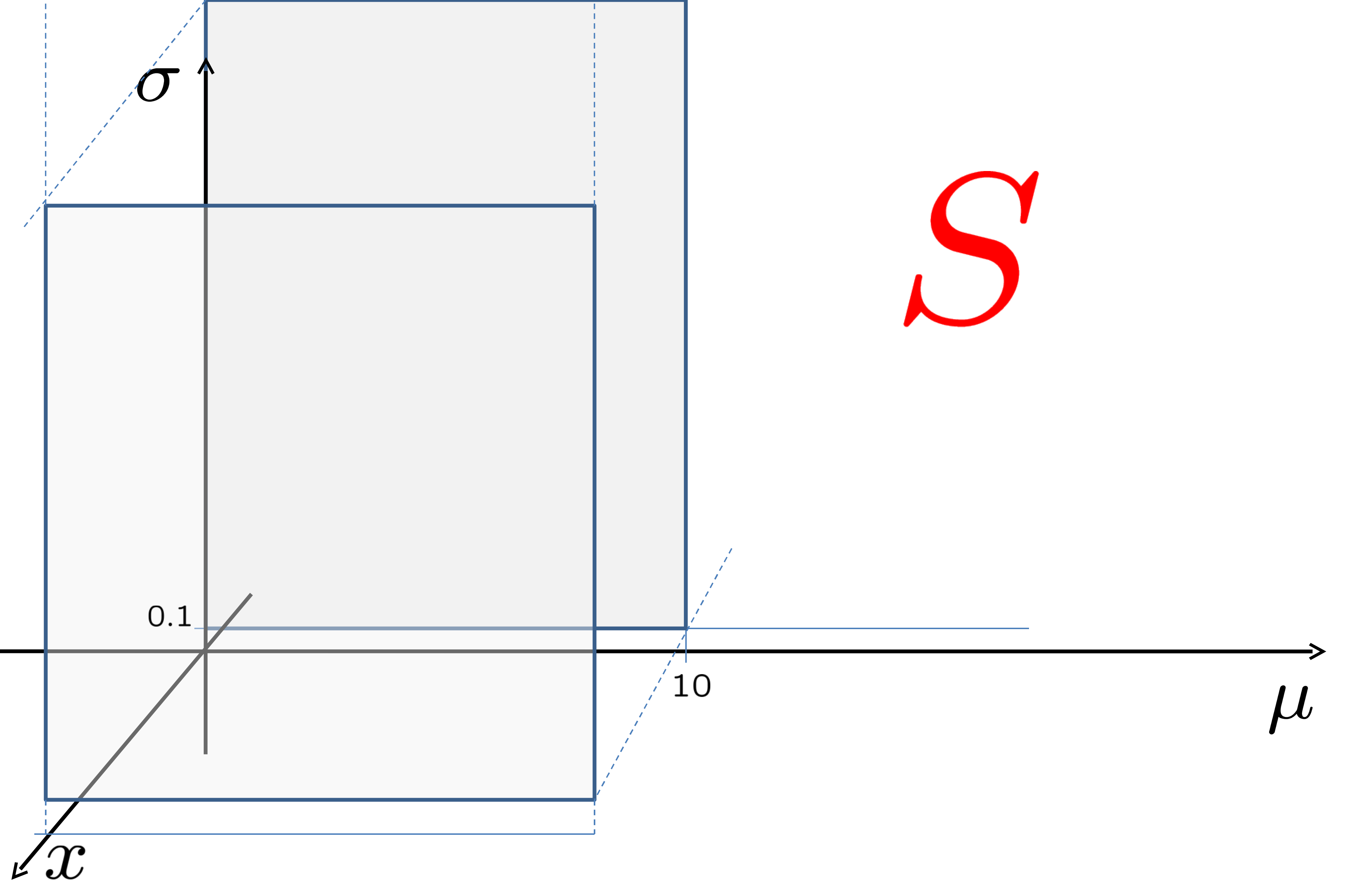

Inference



$$R \times \Theta = (-\infty, \infty) \times (0, 10) \times (0.1, \infty)$$

MLE fails

$$n = 1, x_1 = x$$

$$\log p(x|\theta) = -\frac{(x-\mu)^2}{2\sigma^2} - \log \sigma - \log \sqrt{2\pi}$$

$$0 < \mu < 10$$

$$\sigma > 0.1$$

$$\hat{\theta} = (\hat{\mu}, \hat{\sigma}) = (x, 0.1), \text{ if } 0 < x < 10$$ overfits!

no error bars!

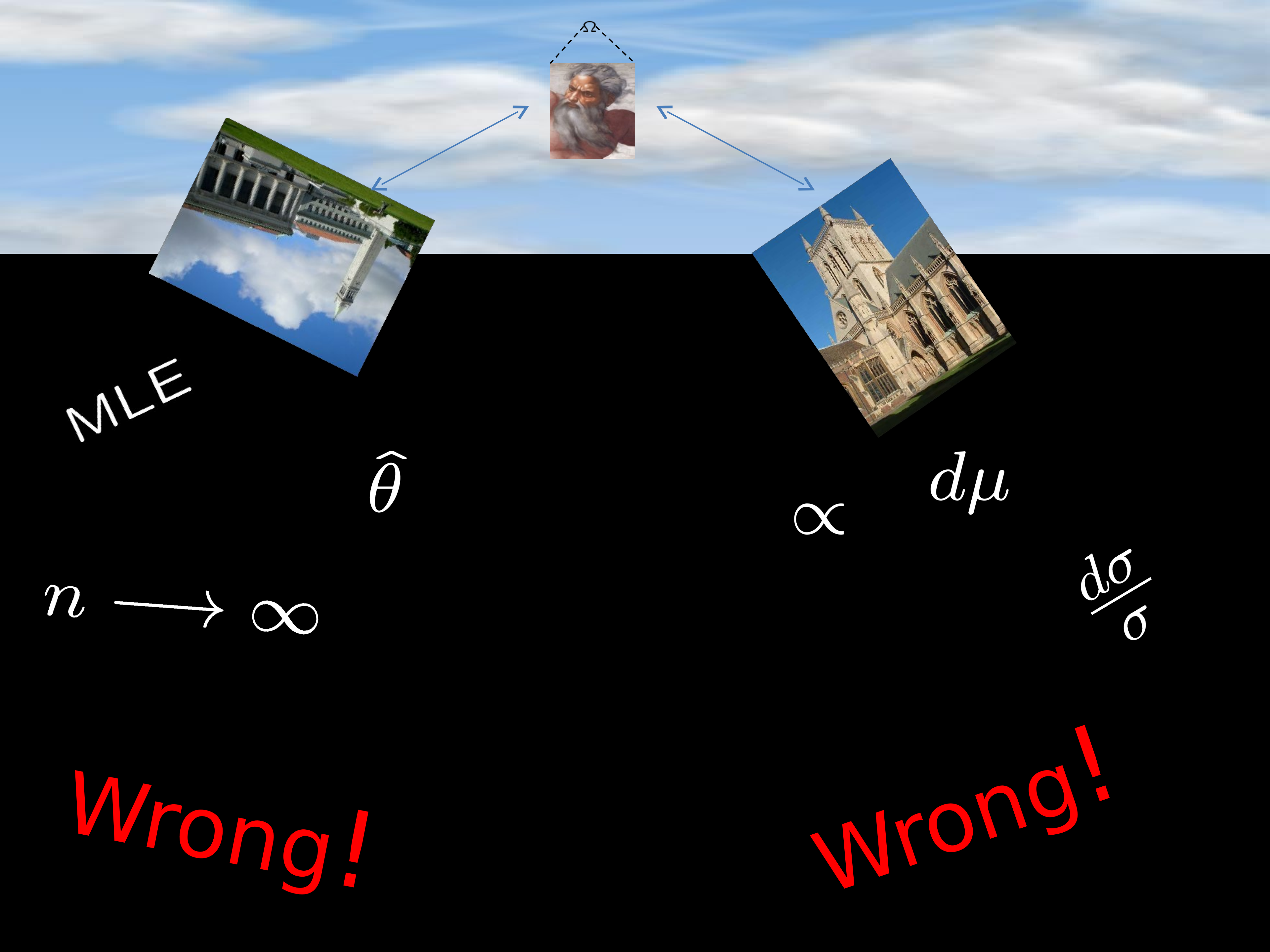
Bayesian recipe fails

$$p(\theta)\, d\theta \propto d\mu \cdot \frac{d\sigma}{\sigma}$$

$$\int_{\Theta} \frac{d\mu\, d\sigma}{\sigma} = 10 \int_{0.1}^{\infty} \frac{d\sigma}{\sigma} = \infty$$ improper!

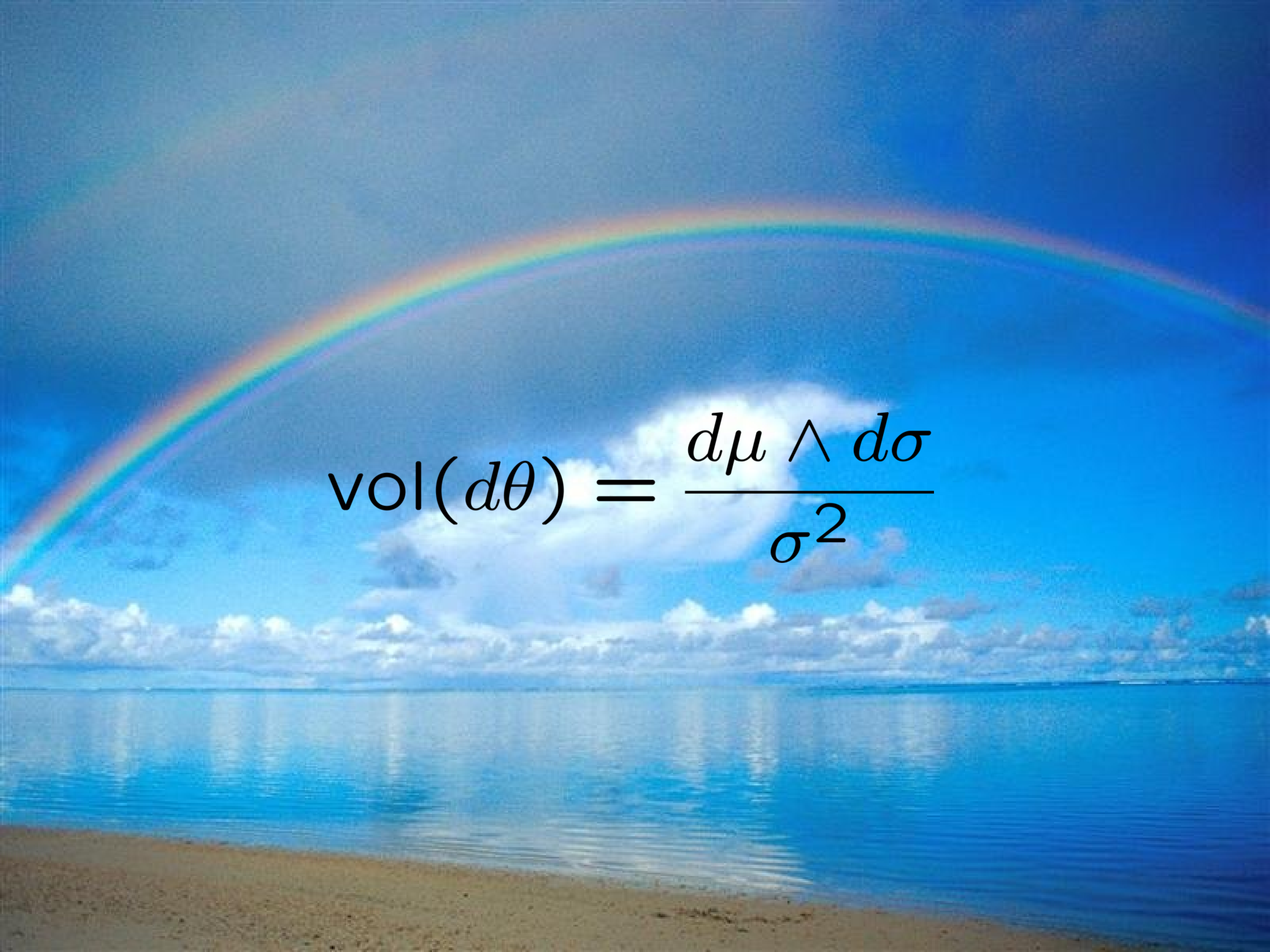
$$p(\theta|x) \propto \frac{1}{\sigma}\varphi\left(\frac{\mu - x}{\sigma}\right) \cdot \frac{1}{\sigma}$$

$$\int_{0.1}^{\infty} p(\theta|x)\, d\sigma \propto \frac{\Phi(-5|\mu - x|)}{|\mu - x|}$$ improper!



Ω
MLE
$\hat{\theta}$
$n \longrightarrow \infty$
Wrong!
$\propto$
$d\mu$
$\frac{d\sigma}{\sigma}$
Wrong!

The honest answer

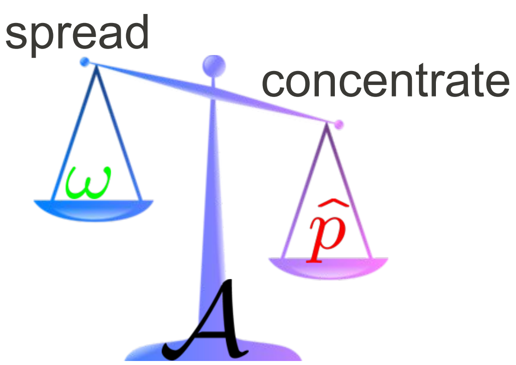


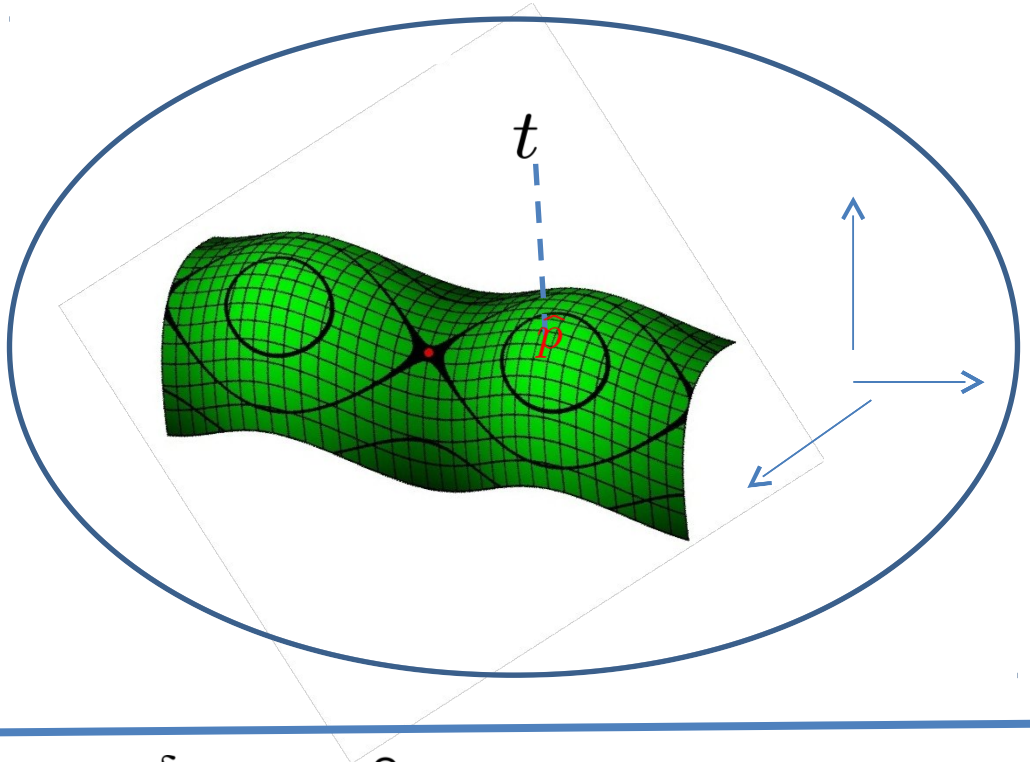
$$\mathrm{vol}(d\theta) = \frac{d\mu \wedge d\sigma}{\sigma^2}$$

$$\mathcal{A} = \alpha I_\delta(p\pi : t\pi) + I_{1-\nu}(\omega : \pi)$$

(x, p) independent!

Ignorance = Independence & Uniformity



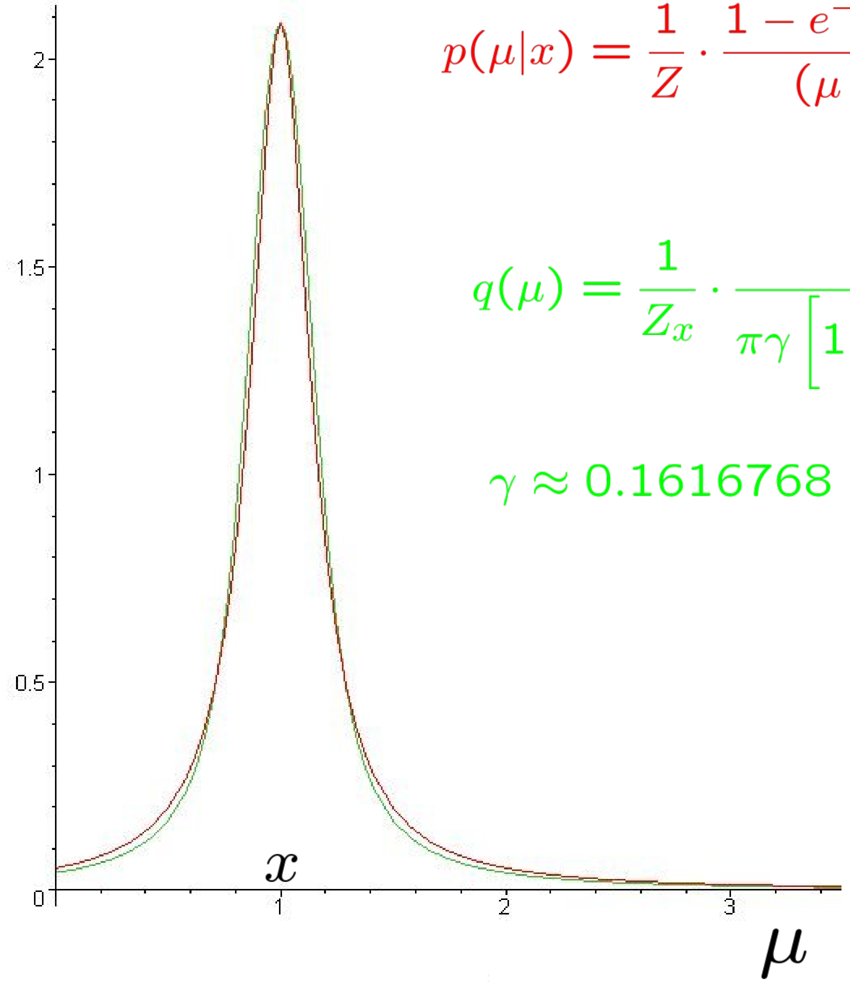


Special case: $\delta = \nu = 0$

$$\alpha \langle I_0 \rangle = I\left(t^\alpha \pi : p^\alpha \pi\right) \geq I(t^\alpha \delta_{\widehat{p}} : \widehat{p}^\alpha \delta_{\widehat{p}})$$

(x, p) independent!

$$\mathcal{A} = I\left(t^\alpha \pi : p^\alpha \omega\right)$$



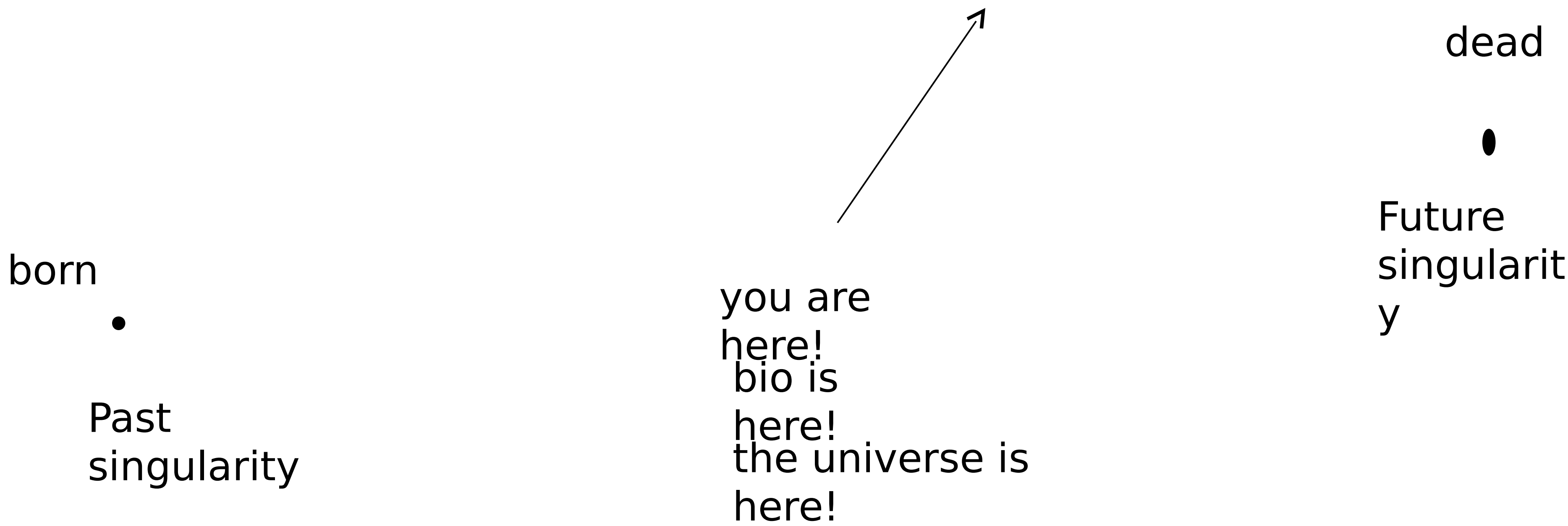
$$p(\mu|x) = \frac{1}{Z} \cdot \frac{1 - e^{-50(\mu - x)^2}}{(\mu - x)^2}$$

$$0 < \mu < 10$$

$$q(\mu) = \frac{1}{Z_x} \cdot \frac{1}{\pi\gamma\left[1 + \left(\frac{\mu - x}{\gamma}\right)^2\right]}$$

$$\gamma \approx 0.1616768$$

Info


dead
born
Future singularity
you are here!
bio is here!
the universe is here!
Past singularity


Inference