# What makes these samplers different?

Basically the transition proposal distribution

$$P(\theta_{i+1} \mid \theta_i)$$

$$\downarrow$$

$$\theta_1 \to \theta_2 \to \theta_3 \to \theta_4 \to \cdots$$
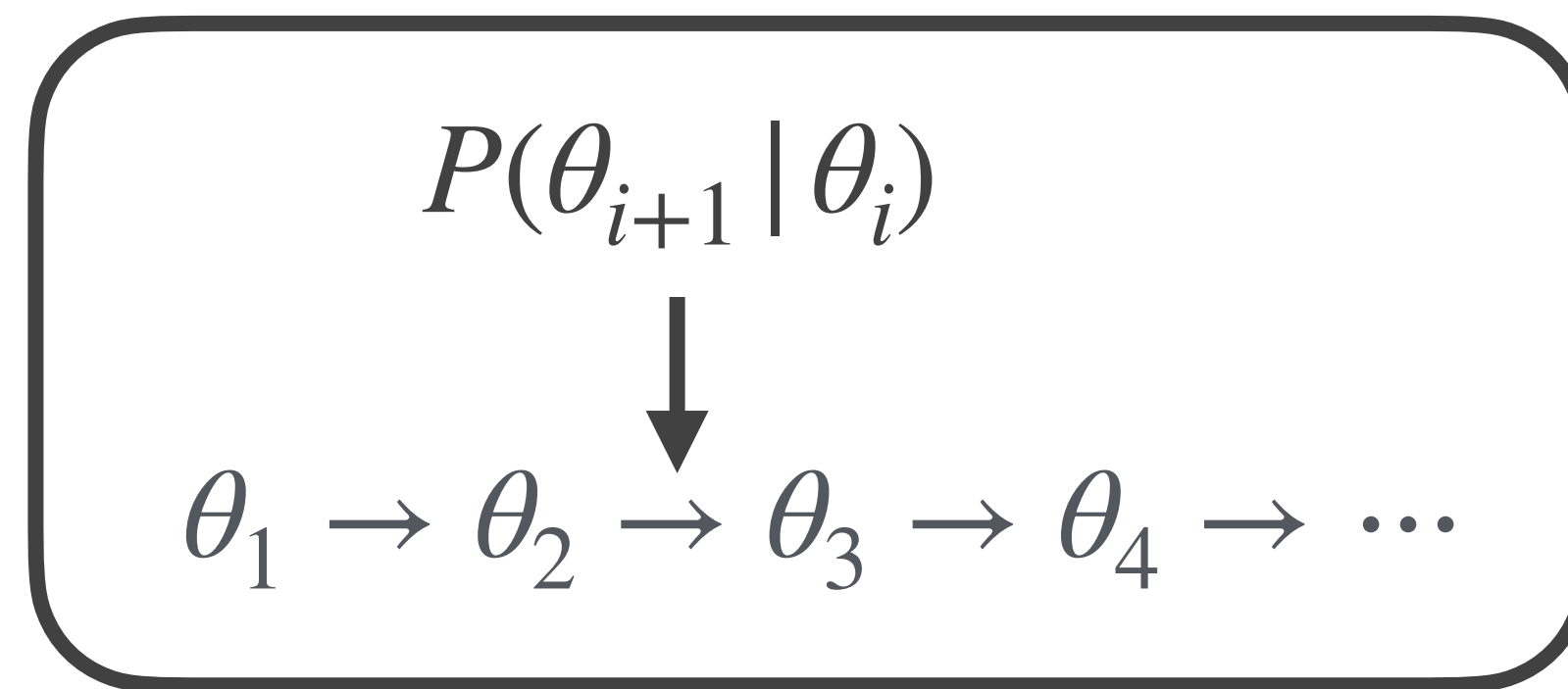
We can visualize what is going on with different samplers:

https://chi-feng.github.io/mcmc-demo/app.html

# Our standard model

All the ingredients for a computational fit

$$y_i \sim Normal(\mu_i, \sigma)$$

$$\mu_i = \alpha + \beta x_i$$

$$\alpha \sim Normal(0, 20)$$

$$\beta \sim lognormal(0, 1)$$

$$\sigma \sim Exponential(1)$$

```r
# Data
library(rethinking)
d2 <- Howell1[ Howell1$age >= 18 , ]

# Model
ulam(alist(
  y ~ normal(mu, sigma),
  mu <- a + b * x,
  a ~ normal(0, 20),
  b ~ lognormal(0, 1),
  sigma ~ exponential(1)),
  data = list(y = d2$height,
              x = d2$weight),
  iter = 1000, chains = 4, cores = 4)
```