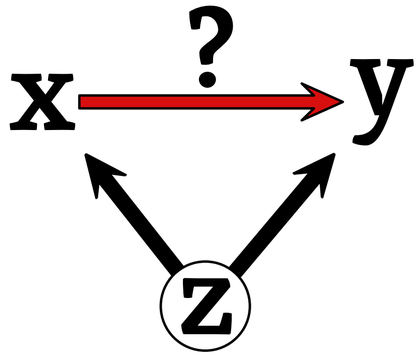
SIMULATING THE EFFECT OF A FORK

Math

$$y \sim Normal(\alpha_y + \beta_{yx}x + \beta_{yz}z, \sigma_y)$$

$$x \sim Normal(\alpha_x + \beta_{xz}z, \sigma_x)$$

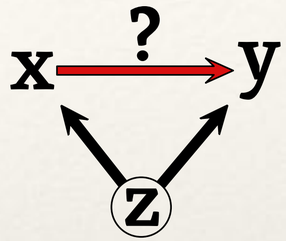
$$z \sim Normal(\alpha_z, \sigma_z)$$



R Code

```
N = 100
z = rnorm(N)                # z ~ normal(0, 1)
x = rnorm(N, 1 + z)         # x ~ normal(1 + z, 1)
y = rnorm(N, 1 + x + z) # y ~ normal(1 + x + z, 1)
```

STATISTICAL MODEL WITHOUT THE CONFOUNDER Z



Math

x → y

$$y \sim Normal(\mu, \sigma)$$
$$\mu = a + bx$$
$$a \sim Normal(0,0.3)$$
$$b \sim Normal(0,0.3)$$
$$\sigma \sim Exponential(1)$$

Rethinking Code

x → y

```
m1 = ulam(alist(
    y ~ normal(mu, sigma),
    mu = a + bx*x,
    a ~ normal(0, 0.3),
    bx ~ normal(0, 0.3),
    sigma ~ exponential(1)
), data = list(y = y, x = x))
```