

# AR(1) models and Random walks

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# Learning outcomes

- ▶ Understand AR(1) and random walk processes
- ▶ Learn how to fit some appropriate models

# The AR(1) model

-AR(what?) An AR(p) process can be modelled

$$X_t = c + \sum_{i=1}^p \rho_i X_{t-i} + \epsilon_t$$

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

## A slide with a formula and a pic

*An essay towards solving a problem on the doctrine of chances*  
(1763)

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

## Simple example in JAGS

In later modules we will start using JAGS to fit models like this.  
The code is much simpler than the previous R version:

```
library(rjags)
modelstring = '
  model {
    # Likelihood
    x ~ dnorm(theta,1/pow(0.8,2))
    # Prior
    theta ~ dnorm(2.3,1/pow(0.5,2))
  }
'

# Set up data
data=list(x=3.1)

# Run jags
model=jags.model(textConnection(modelstring), data=data)
output=coda.samples(model=model,variable.names=c("theta"),
# Plot output
plot(density(output[[1]]))
```