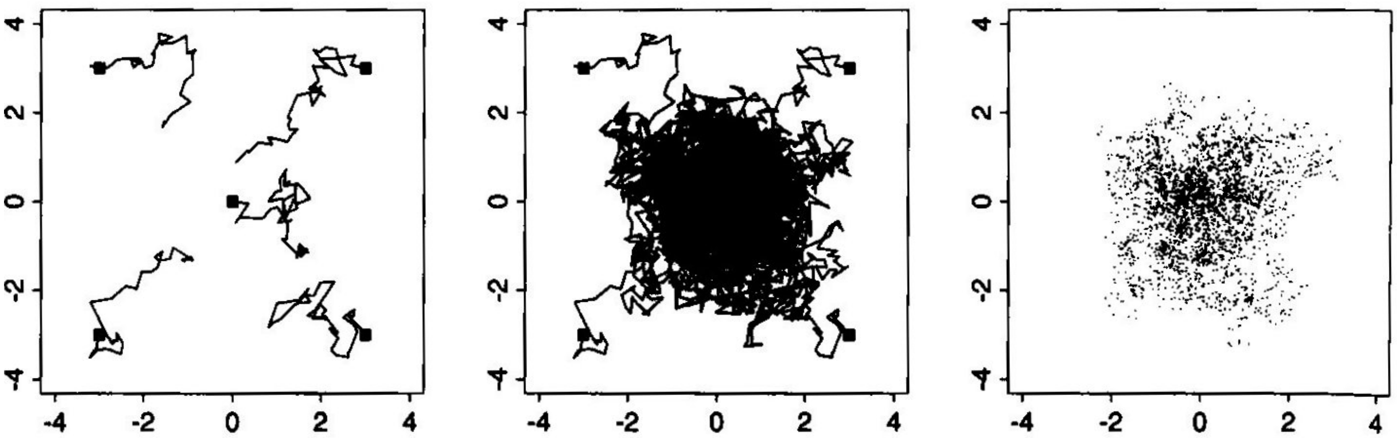
Markov Chain Monte Carlo

Simulation for bi-variate standard normal distribution

$$P\left(\theta^t \middle| \theta^{t-1}\right) = N\left(\theta^{t-1}, 0.2^2 I\right)$$

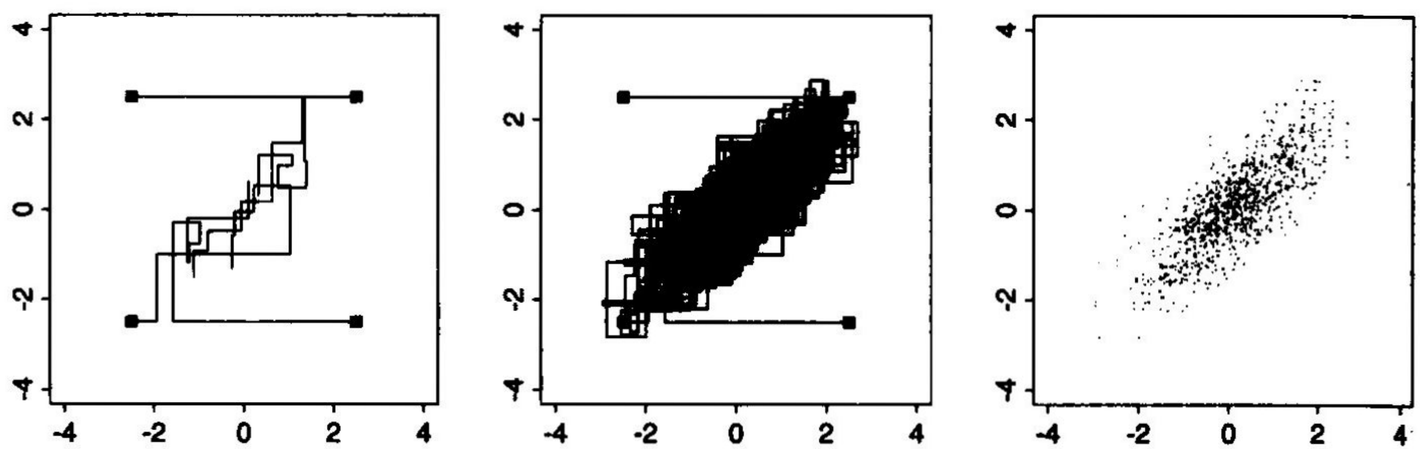
50 iterations | **1000 iterations** | **last 500 samples**



Number of iterations	95% intervals and $\widehat{R}$ for ... θ_1	θ_2	$\log p(\theta_1, \theta_2 \mid y)$
50	$[-2.14, 3.74]$, 12.3	$[-1.83, 2.70]$, 6.1	$[-8.71, -0.17]$, 6.1
500	$[-3.17, 1.74]$, 1.3	$[-2.17, 2.09]$, 1.7	$[-5.23, -0.07]$, 1.3
2000	$[-1.83, 2.24]$, 1.2	$[-1.74, 2.09]$, 1.03	$[-4.07, -0.03]$, 1.10
5000	$[-2.09, 1.98]$, 1.02	$[-1.90, 1.95]$, 1.03	$[-3.70, -0.03]$, 1.00
∞	$[-1.96, 1.96]$, 1	$[-1.96, 1.96]$, 1	$[-3.69, -0.03]$, 1

Gibbs for normal distribution ρ=0.8, (y_1,y_2)=(0,0)

10 iterations | **500 iterations** | **last 250 samples**



Hierarchical Normal Model

Congulation time (seconds) for randomly drawn blood

Diet	Measurements
A	62, 60, 63, 59
B	63, 67, 71, 64, 65, 66
C	68, 66, 71, 67, 68, 68
D	56, 62, 60, 61, 63, 64, 63, 59

Posterior from 10 Gibbs sequences of length 100

Estimand	Posterior quantiles					$\widehat{R}$
	2.5%	25%	median	75%	97.5%	
θ_1	58.9	60.6	61.3	62.1	63.5	1.01
θ_2	63.9	65.3	65.9	66.6	67.7	1.01
θ_3	66.0	67.1	67.8	68.5	69.5	1.01
θ_4	59.5	60.6	61.1	61.7	62.8	1.01
μ	56.9	62.2	63.9	65.5	73.4	1.04
σ	1.8	2.2	2.4	2.6	3.3	1.00
τ	2.1	3.6	4.9	7.6	26.6	1.05
$\log p(\mu, \log\sigma, \log\tau \mid y)$	−67.6	−64.3	−63.4	−62.6	−62.0	1.02
$\log p(\theta, \mu, \log\sigma, \log\tau \mid y)$	−70.6	−66.5	−65.1	−64.0	−62.4	1.01