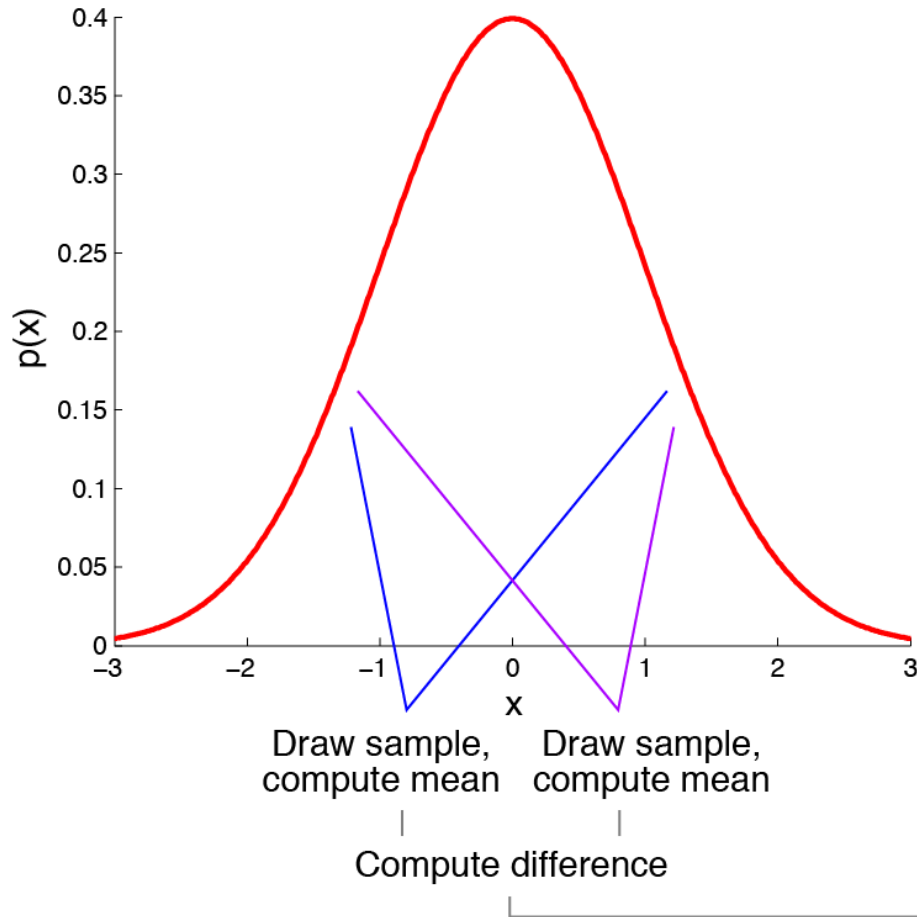


# **Statistics and Data Analysis in MATLAB**

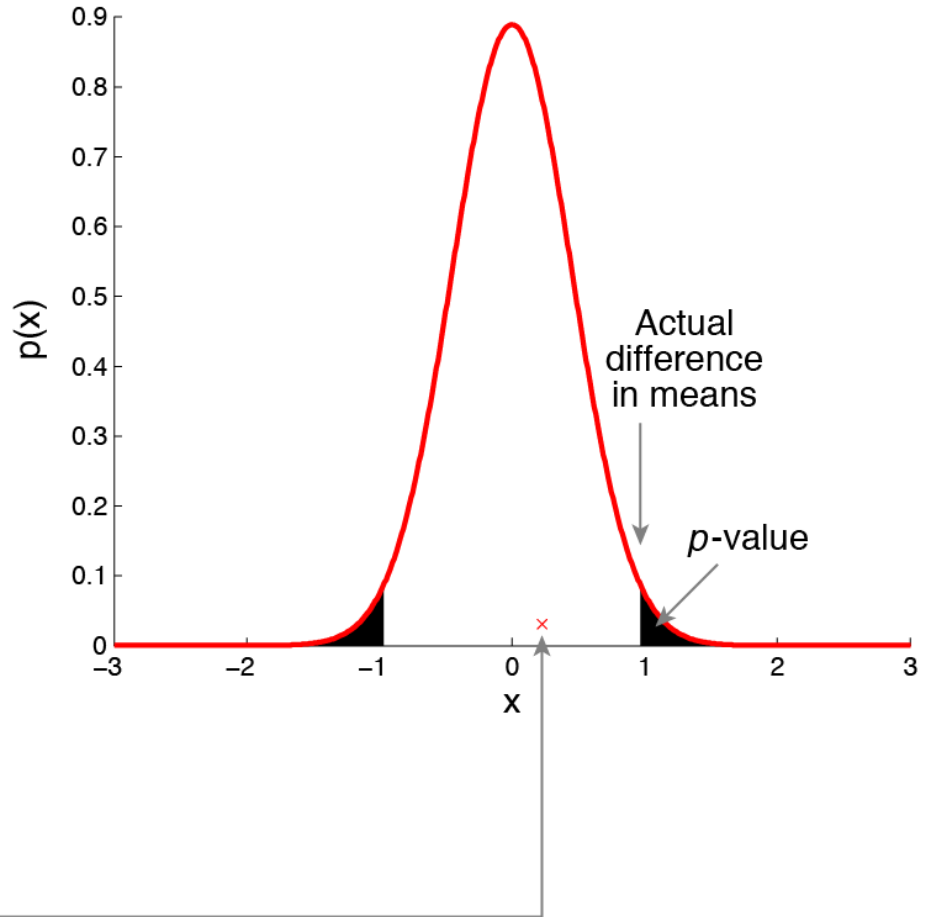
## **Lecture 2: Hypothesis testing and correlation**

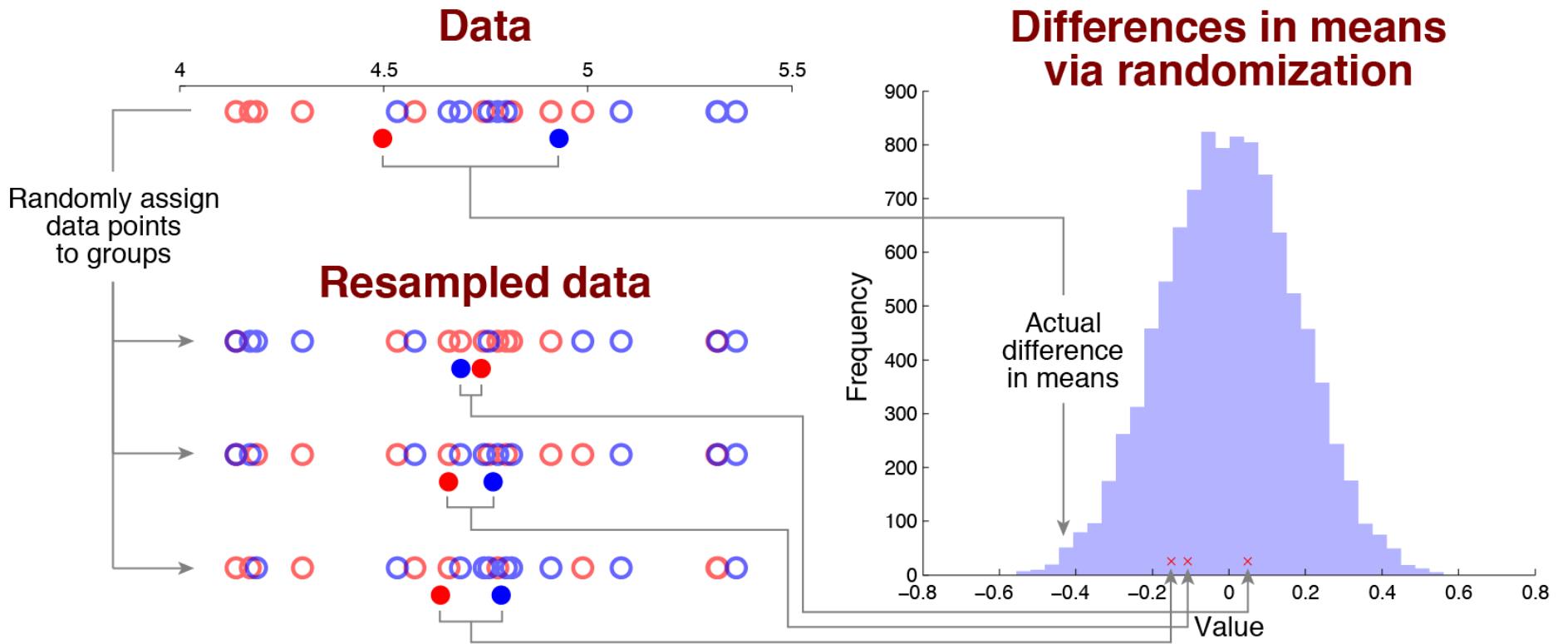
Kendrick Kay  
Washington University in St. Louis  
February 3, 2014

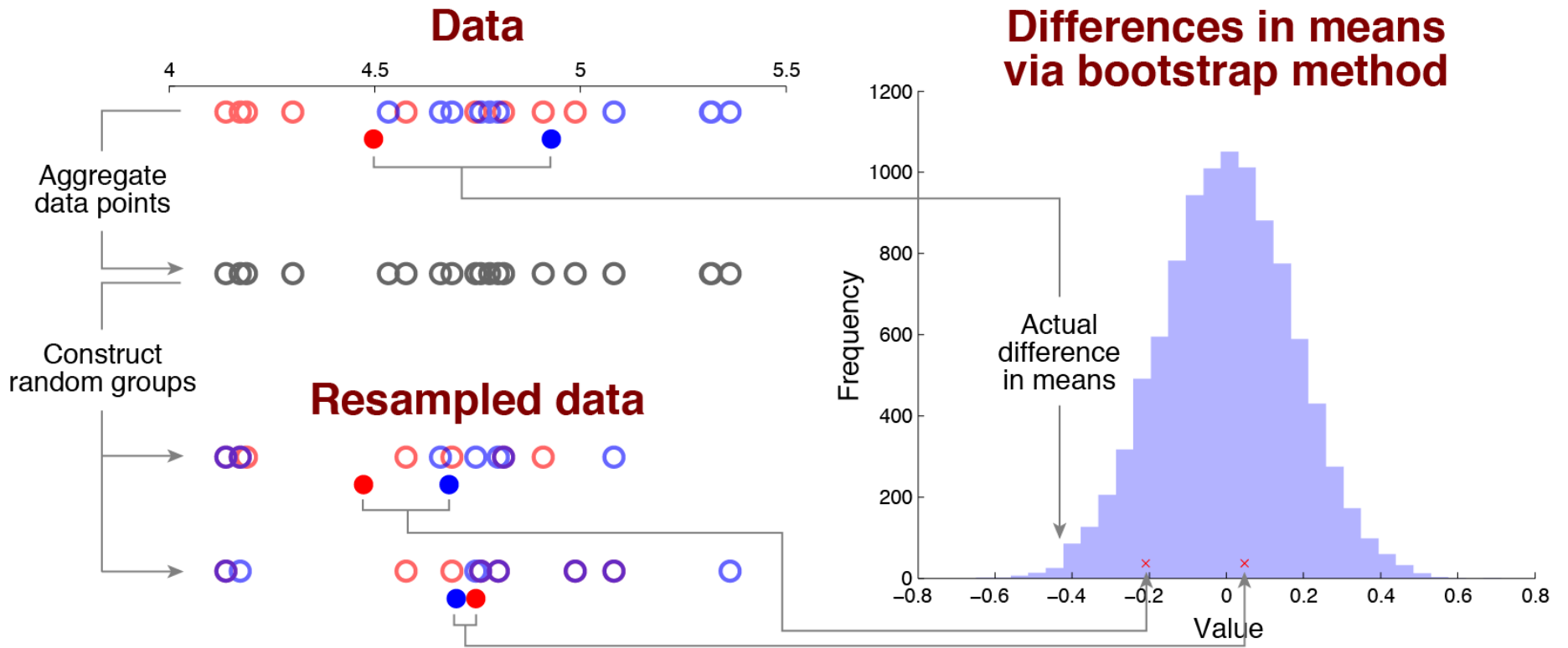
## Distribution under null hypothesis

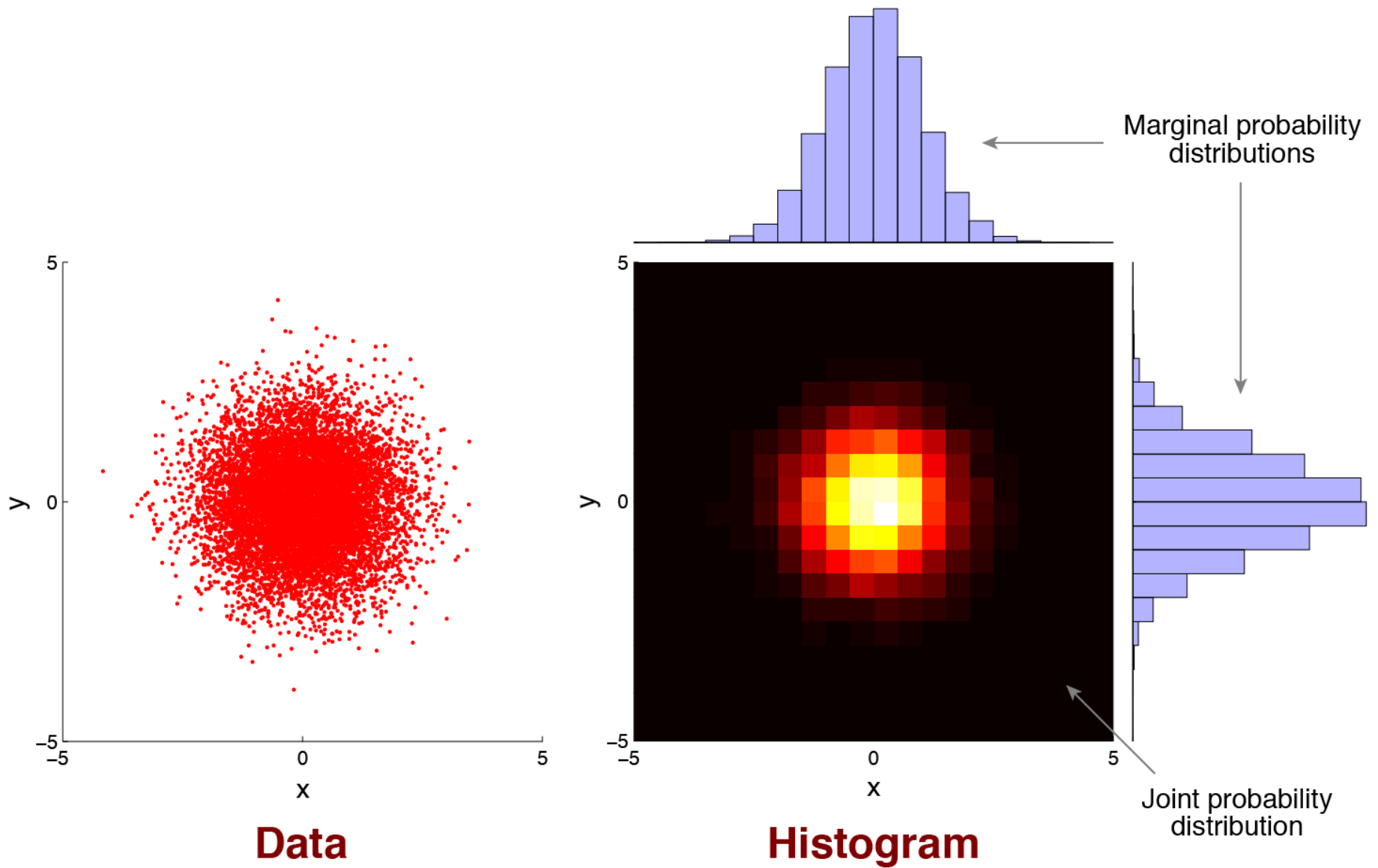


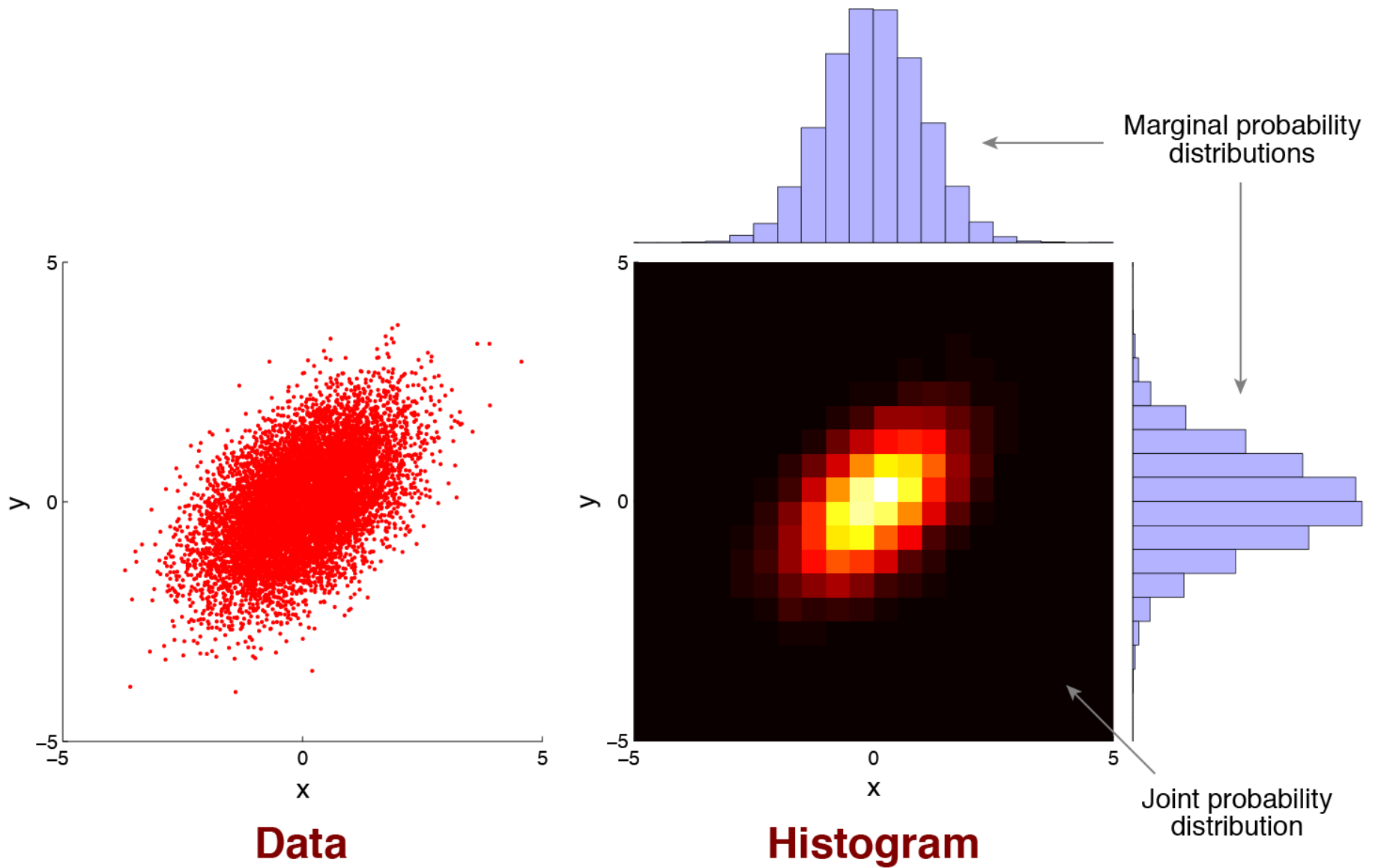
## Sampling distribution of difference in means





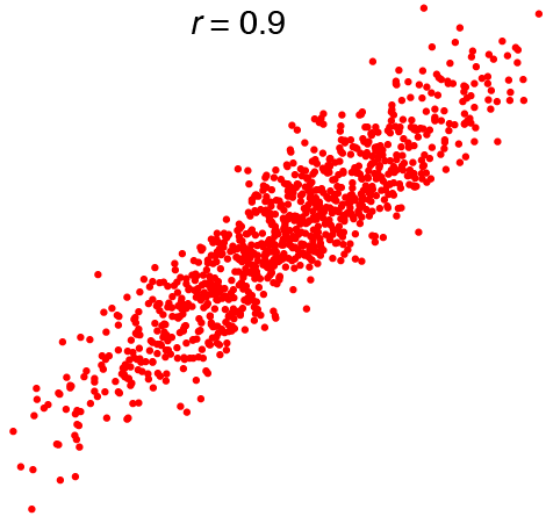




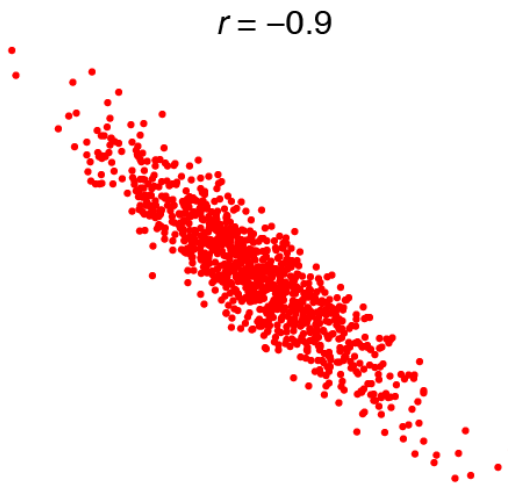


## Example correlation values

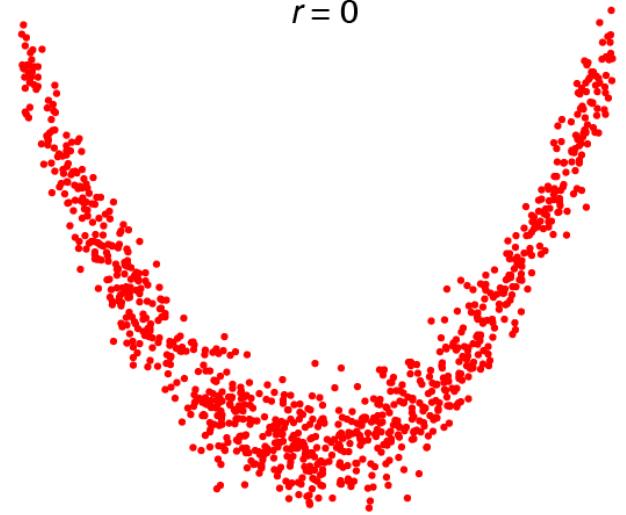
$r = 0.9$



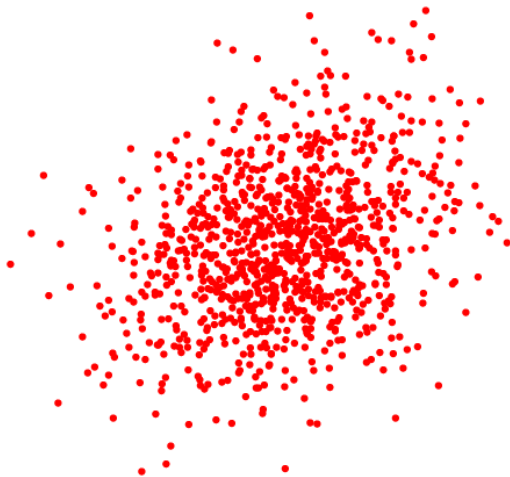
$r = -0.9$



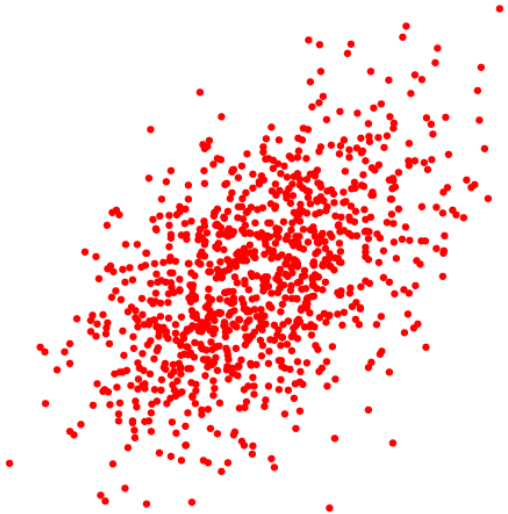
$r = 0$



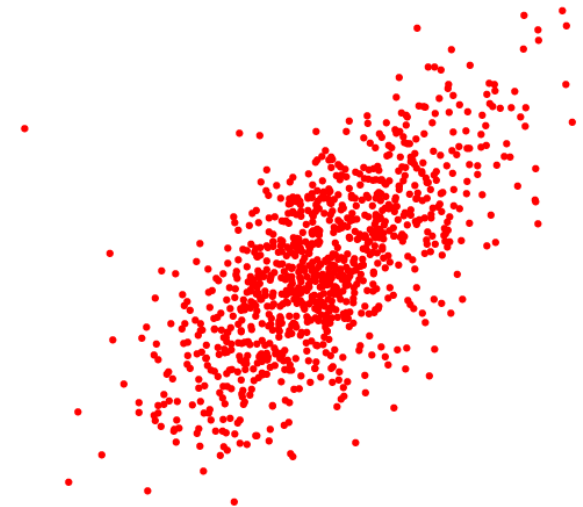
$r = 0.3$



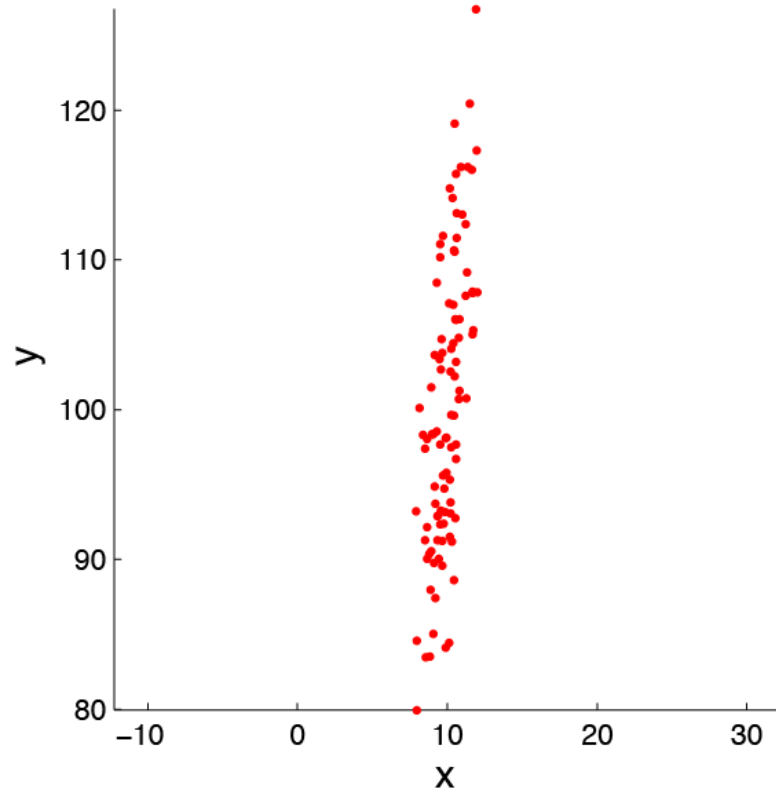
$r = 0.5$



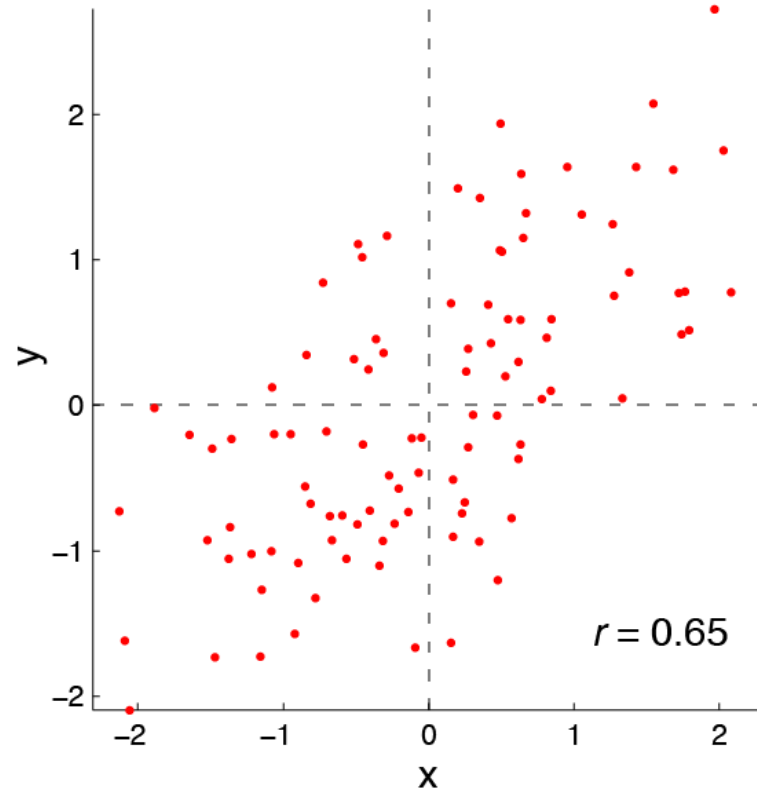
$r = 0.7$



### Data (raw)



### Data (z-scored)



$$r = \frac{\sum_{i=1}^n \left( \frac{x_i - \bar{x}}{\text{std}(x)} \right) \left( \frac{y_i - \bar{y}}{\text{std}(y)} \right)}{n}$$