http://www.physics.smu.edu/pseudo

#### Probability (continued)

Supplementary Material for CFB3333/PHY3333 Professors John Cotton and Stephen Sekula March 21, 2012 Based on the following information on the web: http://www.physics.smu.edu/pseudo/Probability/

## The Birthday Paradox

- We act surprised when we find out that somebody we meet at a party has the same birthday as us.
- Let's try it in class.
  - We'll start people calling out their birthday (month and day only, please!) one at a time
  - Yell "Me too!" if you hear somebody else with your birthday

#### The Telephone Game

- What happens when we base our assumptions on something from "word of mouth"?
- Let's play the Telephone Game!

### The Telephone Game

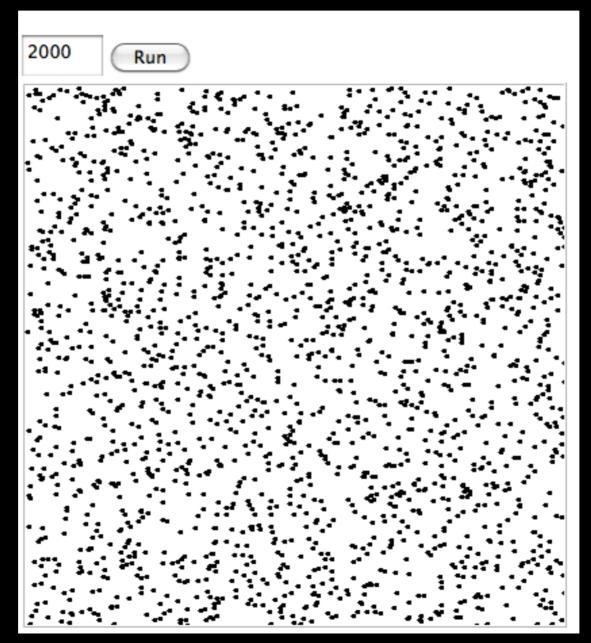
- Information has a low probability of surviving word-of-mouth transmission
- Information degradation is a huge problem!
- You can't always base assessments on what you hear.

#### The Telephone Game Story

• Here's what the passage SHOULD have said.

"A rock band was playing in a submarine The noise awakened a whale Which ordered a pizza for lunch Anchovies go well with squid." http://www.physics.smu.edu/pseudo

# The Clustering Illusion



### Simpson's Paradox

- Two or more studies may each reach a common conclusion
- But . . . when combined they reach the opposing conclusion.

#### The non-transitive paradox

- If A is better than B, and B is better than C, how is A related to C?
- C is not necessarily better than A!
- Consider rock, paper, scissors...

#### Extrapolation and Coincidence

• Extrapolation: predicting what happens next in the data based on what has happened before.

- Coincidence: when two unrelated events occur in relation to one another.
  - we often assign correlation or causality and neglect that they may just be a coincidence