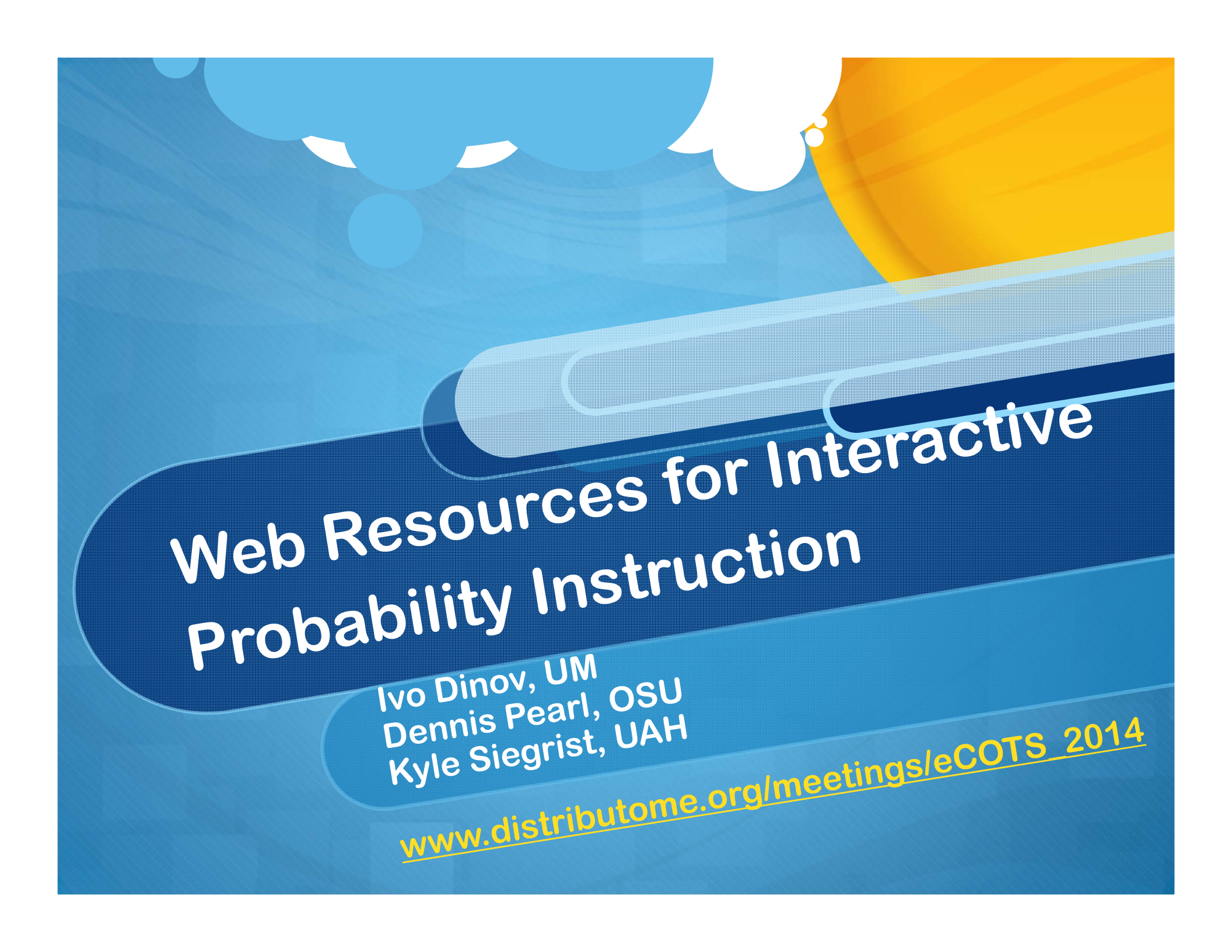


**We teach probability the old
fashioned way. We urn it.**



Web Resources for Interactive Probability Instruction

Ivo Dinov, UM
Dennis Pearl, OSU
Kyle Siegrist, UAH

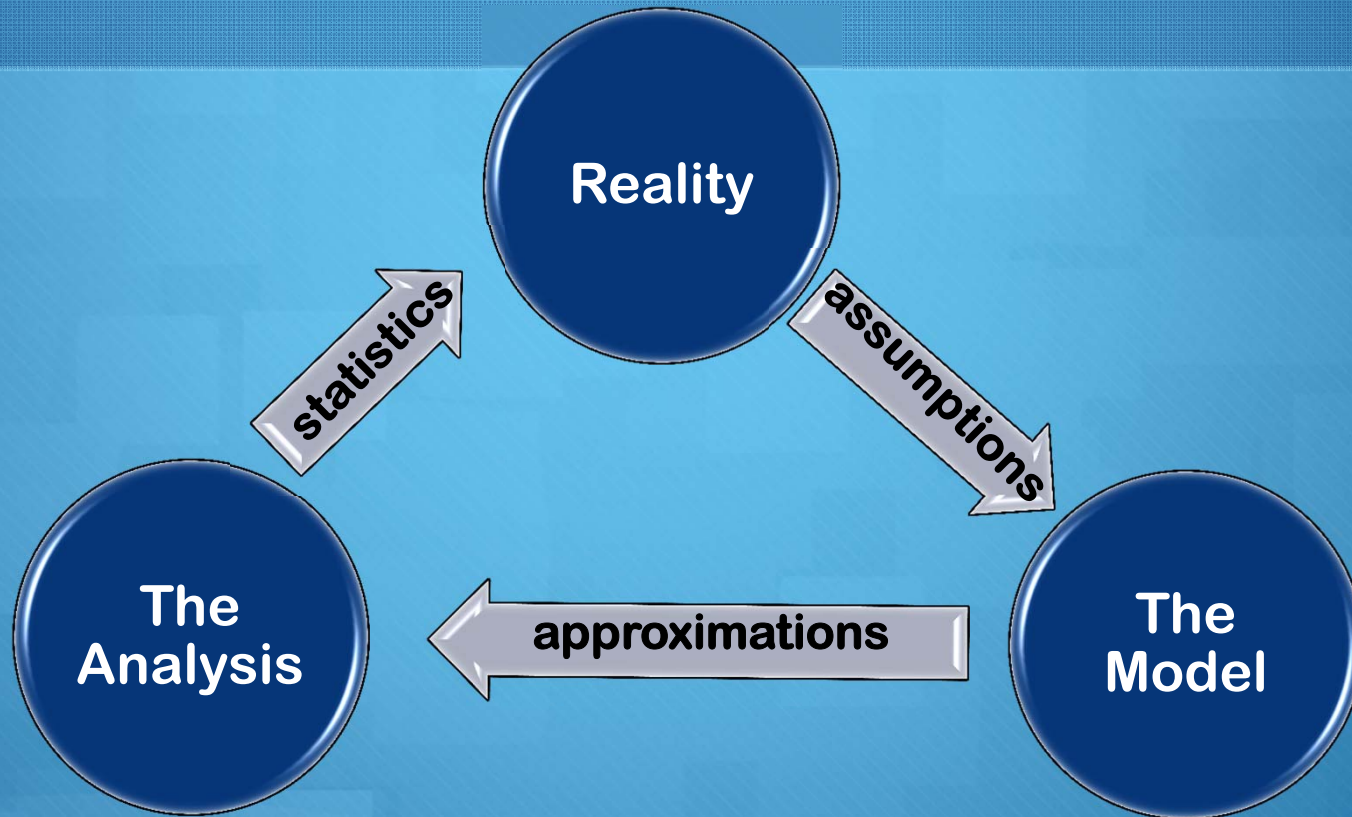
www.distributome.org/meetings/eCOTS_2014




The Distributome Project

- Open Source resources for Teaching and Learning Probability
- Advisory Board
 - Lang Moore, Duke University & Math DL
 - Bob Dobrow, Carleton College & Probability Web
 - David Aldous, U.C. Berkeley


A Paradigm





Questions to ask (to understand how well probability statements reflect reality)

- What assumptions are being made? Are they realistic?
- Can model deviations from reality be quantified?
- What approximations are being made?
- Are they accurate? Are they necessary?
- Do data agree with model predictions?
- Does the model need to be refined or simplified?



An Active In-class Review: The Jigsaw

- Teams work together on solving a set of problems. For example – problems in assigning models to real situations from the game database
- New teams are formed taking one member from each original team.
- Members of the solving team must explain the solution to their problems to their new team.

What's the distribution? A

- X = how much ice will be used in the drinks on the next full Southwest Airline flight from Denver, CO to Raleigh/Durham, NC.
- X = how long until the next 2001 Toyota Prius hybrid goes through a toll booth on the Golden Gate Bridge.
- X = how many randomly chosen people will it take to find 10 who are left-handed.
- X = how many randomly chosen people will it take to find one who is left-handed.

What's the distribution? B

- X = the number of red-flowering plants in 100 crosses between pink flowering plants
- X = the position (degrees clockwise from you) of a fish swimming in a cylindrical tank.
- X = median position of the same fish wrt the first person visiting the aquarium each day this week.
- X = the average amount of time that a sample of 500 regular subscribers to the New York Times spend on the Sunday crossword puzzle.



What's the distribution? C

- X = how many 2001 Toyota Prius hybrids go across the Golden Gate bridge tomorrow.
- X = the average age of the quarters in the pockets of 100 men at a NY Yankees baseball game.
- Four participants in this workshop will be picked to form the first team for a “jigsaw review”. X = how many graduate students are on that team.
- X = In a sample of just one person – how many favor imposing a uniform sales tax on internet purchases.

What's the distribution? D

- X = how many hours until the next diet coke is purchased from a vending machine.
- X = how many hours until five separate people purchase a diet coke from a vending machine.
- X = how many of the next ten parties that a waiter serves will leave a tip of more than 20% of the bill.
- X = the birth month of the next person to board a plane from Honolulu to Los Angeles.



Follow-up Activities

- Follow in-class Jigsaw review with a follow-up activity using Distributome; SOCR; or Virtual Lab tools
- Example for group A - Worldwide 11% of people are left-handed. Are the students in our class unusual in this regard?



Follow-ups

- **A:** Worldwide 11% of people are left-handed. Are the workshop participants unusual in this regard?
- **B:** An ichthyologist suggests that fish will tend to shy away from the visitor. What median angles would give strong evidence for this theory?
- **C:** Is the number of grad students in your team unusual? What about the highest number in any team?
- **D:** Do you think it's likely to have at least two months with no birthdays for the people in the room?
- **ALL GROUPS:** suggest your own follow-up that can be investigated by students



Distributome games

- Out-of-class Activity
- Learning Objectives
 - Develop probability models for real situations
 - Recognize the relationship between data histograms and the density they were sampled from.
 - Know the shapes of important probability densities