75 Year Anniversary
NCSU Statistics Department
Perspectives from Cal Poly San Luis Obispo

October 2016

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California Polytechnic State University
San Luis Obispo
Department of Statistics
Introduction
Education/Experience

• 2003  Ph.D. Statistics, NC State
         Advisor: Dr. Roger Berger
         NCSU Preparing the Professoriate Program
         Mentor: Dr. Bill Swallow

• 2003  Assistant Professor, Cal Poly Statistics Dept.

• 2009  Associate Professor, Cal Poly Statistics Dept.

• 2014  Professor, Cal Poly Statistics Dept.
• Cal Poly is a highly ranked public univ. located in San Luis Obispo (halfway between SF and LA)
• Part of the 23 campus California State University System
• Approximately 20,000 students
• Our department is among the most well known undergraduate statistics programs in the nation
San Luis Obispo Introduction
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Cal Poly SLO Statistics Department

- College of Science and Mathematics
- Department of Statistics (1970–Present)
  - 19 tenured and tenure track professors
  - 8 lecturers
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- Strong reputation as a leader in Statistics Education
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- Talks ongoing to create master’s program

PLUG: We are hiring for a tenure-track/tenured position right now!
(Review date starts 10/31/2016)
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Recent Work (2013 to Present)
Recent Work: Textbook (2013)

*Applied Statistics for Engineers and Scientists* (3rd ed.)
Cengage, 2013
by J. Devore, N. Farnum, and J. Doi
Recent Work: Textbook (2013)

Applied Statistics for Engineers and Scientists (3rd ed.)
Cengage, 2013
by J. Devore, N. Farnum, and J. Doi

NCSU – Used for ST361
Schilling, M., and Doi, J. (2014)
“A Coverage Probability Approach to Finding an Optimal Binomial Confidence Procedure”. The American Statistician
Schilling, M., and Doi, J. (2014)  
“A Coverage Probability Approach to Finding an Optimal Binomial Confidence Procedure”. The American Statistician

Length/Coverage Optimal (LCO) Method

- Minimizes average length while maximizing coverage among all length minimizing procedures
Schilling, M., and Doi, J. (2014)  
“A Coverage Probability Approach to Finding an Optimal Binomial Confidence Procedure”. The American Statistician
Recent Work: Paper in TAS (2014)

Schilling, M., and Doi, J. (2014)
“A Coverage Probability Approach to Finding an Optimal Binomial Confidence Procedure”. The American Statistician

**Length/Coverage Optimal (LCO) Method**

- Minimizes average length while maximizing coverage among all length minimizing procedures

- Superior in important ways to existing procedures
  - Strict procedures (coverage is at least nominal)
    - Blyth-Still-Casella, Blaker, Clopper-Pearson
  - Approximate procedures (coverage can be below nominal)
    - Agresti-Coull, Wilson, Jeffreys

- *Understanding and Applying Basic Statistical Methods Using R* (Wiley, June 2016) – Section 6.7.4: Schilling-Doi Method
Technology Innovations in Statistics Education

• Shiny App Teaching Tools Collection (18 apps so far)  
  • Wide range of topics – coin flipping, random variable generator, hierarchical models, ...  
  • Just about every type of Shiny layout/widget found in our apps

• Cal Poly Shiny Site: www.statistics.calpoly.edu/shiny

• All Shiny source code available at: gist.github.com/calpolystat
Shiny app example

Longest Run of Heads or Tails

Note: Please adjust width of browser if only one column is visible.

Number of trials (n):

Mark run lengths of at least...

Change of specified run length will impact marked runs in current plot

Font Size:

Include predicted longest run and prediction interval

Click Generate to re-randomize outcomes based on current number of trials

n = 200, Longest run = 9
Marked runs of at least 5

Predicted approximate longest run = 8
Appx. 95% prediction interval for longest run = [5,11]

If a fair coin is flipped 100 times and a streak of 7 heads (or tails) in a row is observed, is that an unusual result? To answer this we can simulate tosses of a fair coin and keep track of runs of heads or tails.

This Shiny app allows you to simulate the outcomes of a fair coin flipped n times. Any runs of at least the length you specify will be marked in color, and the length of the longest run will be given. You may also choose to display the predicted approximate length of the longest run and an approximate 95% prediction interval for the length of the longest run. Details on these two estimators can be found in the first reference below.

More information on the length of the longest run can be found in the following journal articles:


Schilling, M. 'The Surprising Predictability of Long Runs' *Mathematics Magazine*, 65(2), 141-149
# Shiny

## Our Collection of Apps

<table>
<thead>
<tr>
<th>Regression</th>
<th>Correlation and Regression Game</th>
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<td>Multiple Regression Visualization</td>
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<td>T-test with diagnostics</td>
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<td>Benford's Law: Sequences</td>
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<td>Benford's Law: Data Examples (Census and Stock Exchange)</td>
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<td>Testing Violation of the Constant Variance Condition for ANOVA</td>
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<td>Chaos Game: Three Dimensions</td>
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<td>Longest Run of Heads or Tails</td>
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<td>Gambler's Ruin</td>
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<td>Sampling Distributions of Various Statistics</td>
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<td>Special Topics</td>
<td>Heaped Distribution Estimation</td>
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<td></td>
<td>Hierarchical Models</td>
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</tbody>
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2016 Sabbatical in Japan

Academic Experiences in Japan

• 2000 NSF/Monbusho Summer Research Program
  Advisor: Dr. Takashi Yanagawa (Kyushu Univ.)
  Visited Institute of Statistical Mathematics (ISM)

• 2003, 2005 Visited Dr. Yanagawa, ISM

• 2016 Foreign Visiting Researcher at ISM (June 1–30)
  → ISM Faculty Host: Dr. Satoshi Kuriki
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- 2003, 2005  Visited Dr. Yanagawa, ISM
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2016 Sabbatical in Japan: April to July
2016 Sabbatical in Japan
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Sabbatical Activities

• Presented Seminars at:
  • Institute of Statistical Mathematics, Tokyo
  • Center of Data Science Education and Research, Shiga University
  • Center for Statistics and Information, Rikkyo University
  • School of International Liberal Arts, Waseda University
  • SAS Institute, Tokyo

• Met with core members of the Japanese Inter-university Network for Statistical Education (JINSE)
  • JINSE will be organizing the upcoming 2018 International Conference on Teaching Statistics (ICOTS) at Kyoto
Final Comments

• A note for future academicians
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• Heartfelt note of thanks