

# Teaching Introductory Statistics with Simulations in JMP Statistical Discovery™ Software\*

William M. Duckworth, Creighton University

Amy G. Froelich, Iowa State University

Brian McFarlane, Predictum Management Sciences, Inc.

Wayne Levin, Predictum Management Sciences, Inc.

---

## Planned JMP Scripts for Teaching Concepts in Introductory Statistics:

- Exploring Distributions
  - Probability and Percentile Distribution Calculator
  - Normal Quantile Plots
  - Regression
    - Residual Plots
    - Outliers and Influential Points
  - Sampling Distributions for
    - Sample Proportion
    - Sample Mean
    - Regression Slope and Intercept
  - Central Limit Theorem
  - Confidence Intervals
    - Variability
    - Relationship Between Sample Size and Width of CI
    - Connection Between Coverage Rates and Confidence Level
  - Hypothesis Testing
    - Type I Error Rate and Connection to Rejection Rates
    - Power Rates and Connection to
      - Sample Size
      - Type I Error Rates
      - Difference Between True and Hypothesized Parameter Values
- 

## Advantages of JMP Scripts over Java applets available on web:

- One commercial tool for statistical concepts and data analysis.
  - Use as classroom demonstration tool or student-lead discovery activities.
  - Script output in similar format as JMP data analysis output.
  - Same interactive JMP graphics.
  - Connection between statistical concepts and data analysis.
  - Integrated scripts for many concepts in introductory statistics.
  - No notation used: Applicable to any introductory statistics textbook.
  - Internet access with web browser not required.
-

# Sampling Distribution for Sample Proportion

## Script Options Set By User:

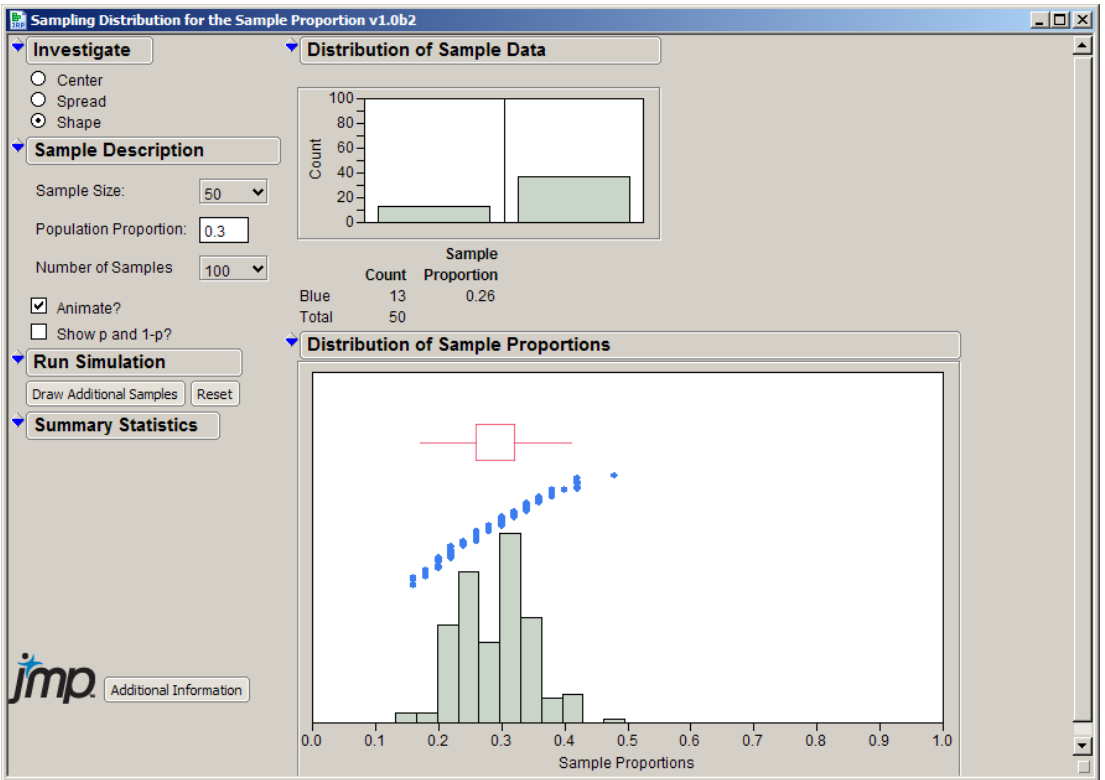
Investigation (Center, Spread, Shape)

Population Proportion Value

Number of Samples (1, 10, 100, 1000)

Sample Size

Animation (On, Off)



## Features of Script Output:

Separate investigations of Center, Spread and Shape of Distribution.

Center: Mean, Histogram

Spread: Standard deviation, Histogram, Box Plot

Shape: Histogram, Box Plot, Normal Quantile Plot

Same graphical display of distribution as used for JMP data analysis.

Connection between sample data and corresponding statistic.

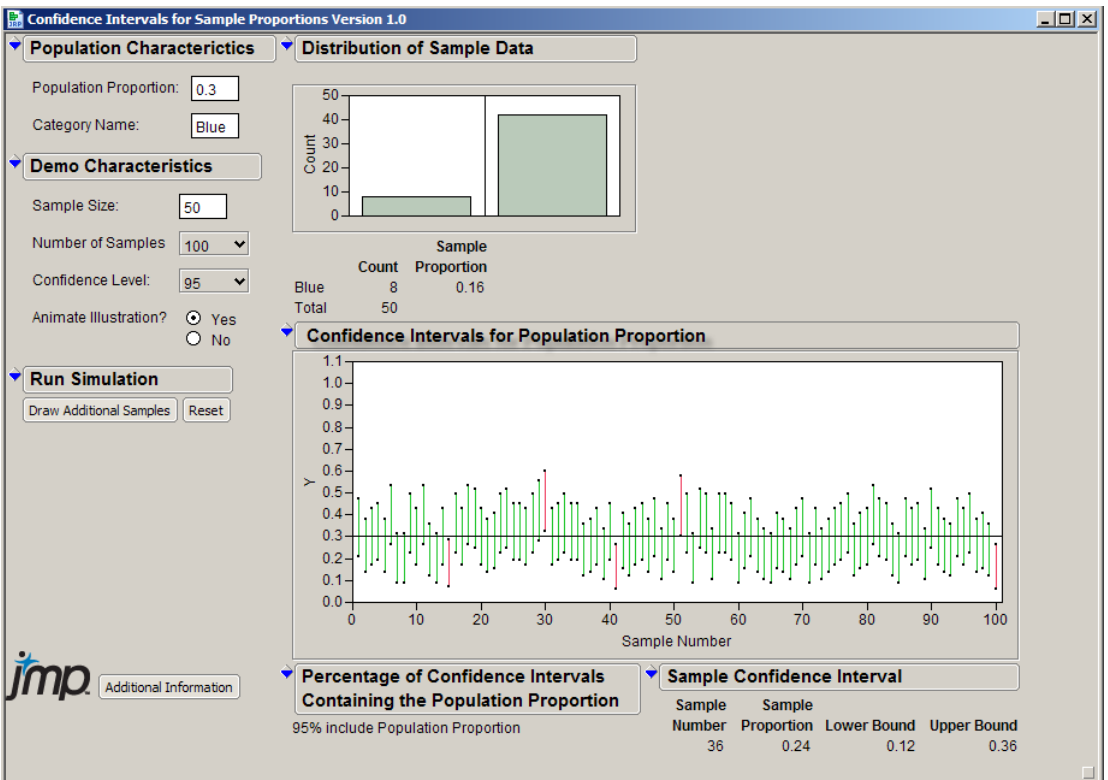
Visual display of variability in sample data and corresponding statistic.

JMP Grabber Tool can be used to adjust graphical displays.

# Confidence Interval for Population Proportion

## Script Options Set By User:

Population Proportion Value	Sample Size
Name of Category of Interest	Number of Samples (1, 10, 100, 1000)
Animation (On, Off)	Confidence Level (80, 90, 95, 99)



## Features of Script Output:

Animation shows variability in sample data and corresponding CI.

Graphical Representation of Variability in CIs.

Connection between sample data and corresponding CI.

Visual distinction between CIs containing and not containing user-specified population proportion value.

Percentage of CIs containing user-specified population proportion value.

CI bounds for any sample obtained by clicking CI in graph.

JMP Grabber Tool can be used to adjust graphical displays.