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Confidence Intevals

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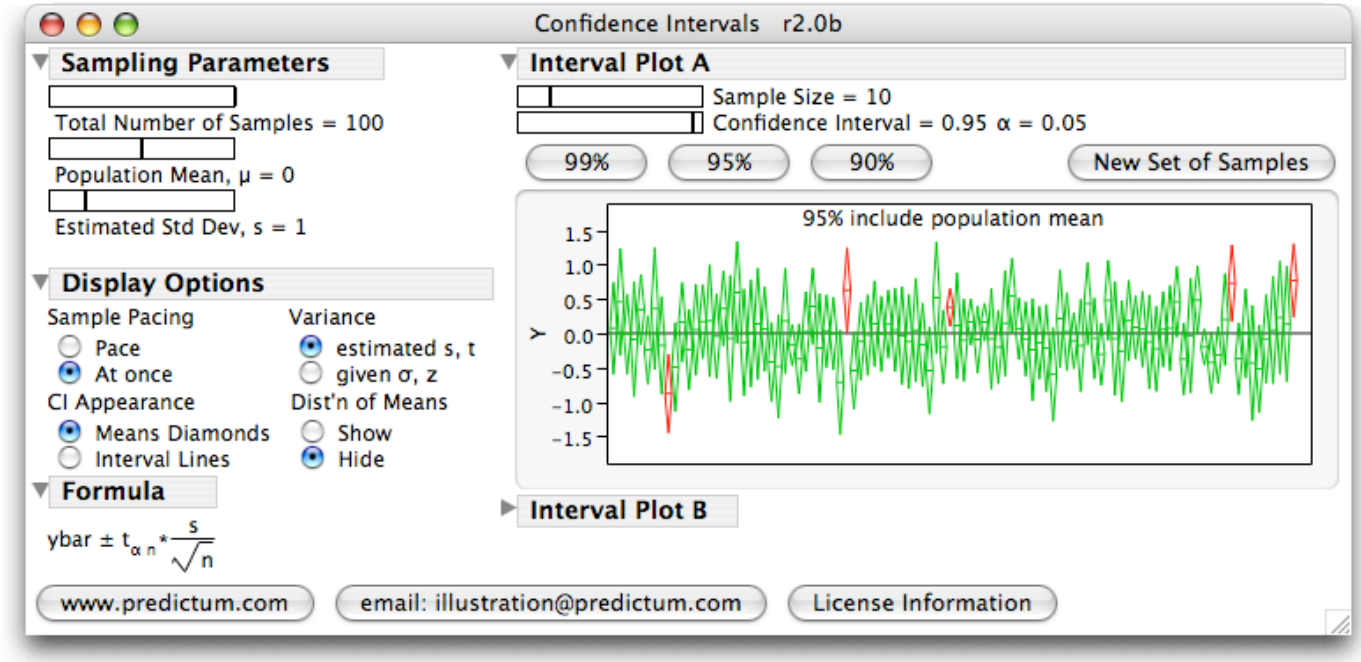
minimum requirements:
JMP v 7.02 + curiosity

Learning Objectives

- •Explore Type I Errors
- Determine the proportion of Confidence Intervals that miss the true average
- Understand the effect sample size, n, has on proportion of Confidence intervals that miss the true average
- Appreciate the effect α has on the proportion missing the true average
- Realize the need to employ multiple comparison techniques (e.g. Tukey HSD) with more than 2 group, N-way ANOVA
- Compare t versus z-based confidence intervals
- Understand the effect sample size, n, has on variation in sample means



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From making simple comparisons to identifying significant variables in multiple regression Confidence Intervals are fundamental to a large number of statistical methods. This dynamic illustration makes it easy to explore and apply confidence intervals.

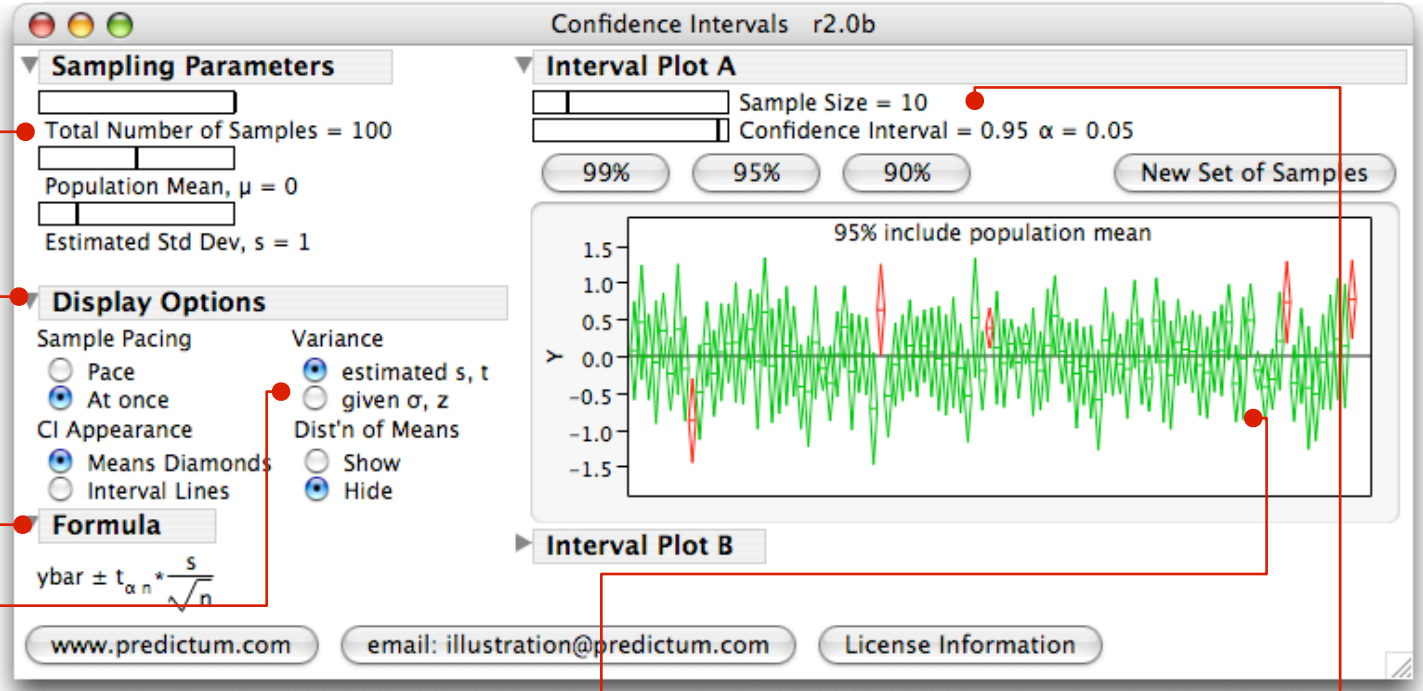
The illustration calculates confidence intervals from samples drawn repeatedly from a population with a specified mean and variance.

CONFIDENCE INTERVAL: Instructions

Adjust the number of samples (confidence intervals), standard deviation and mean

A variety of display options allowing you to pace the addition of samples, how intervals should be represented, choose between t and z and show the distribution of means.

Formula changes to according to the Variance radio button.



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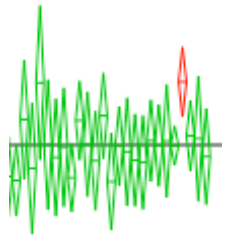
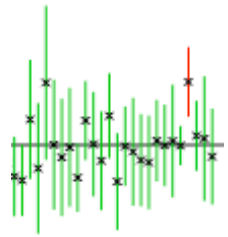
Confidence Intervals - those in red indicate Type I errors.

Select sample, *n*, size and **α**.



Means Diamonds



Interval Lines

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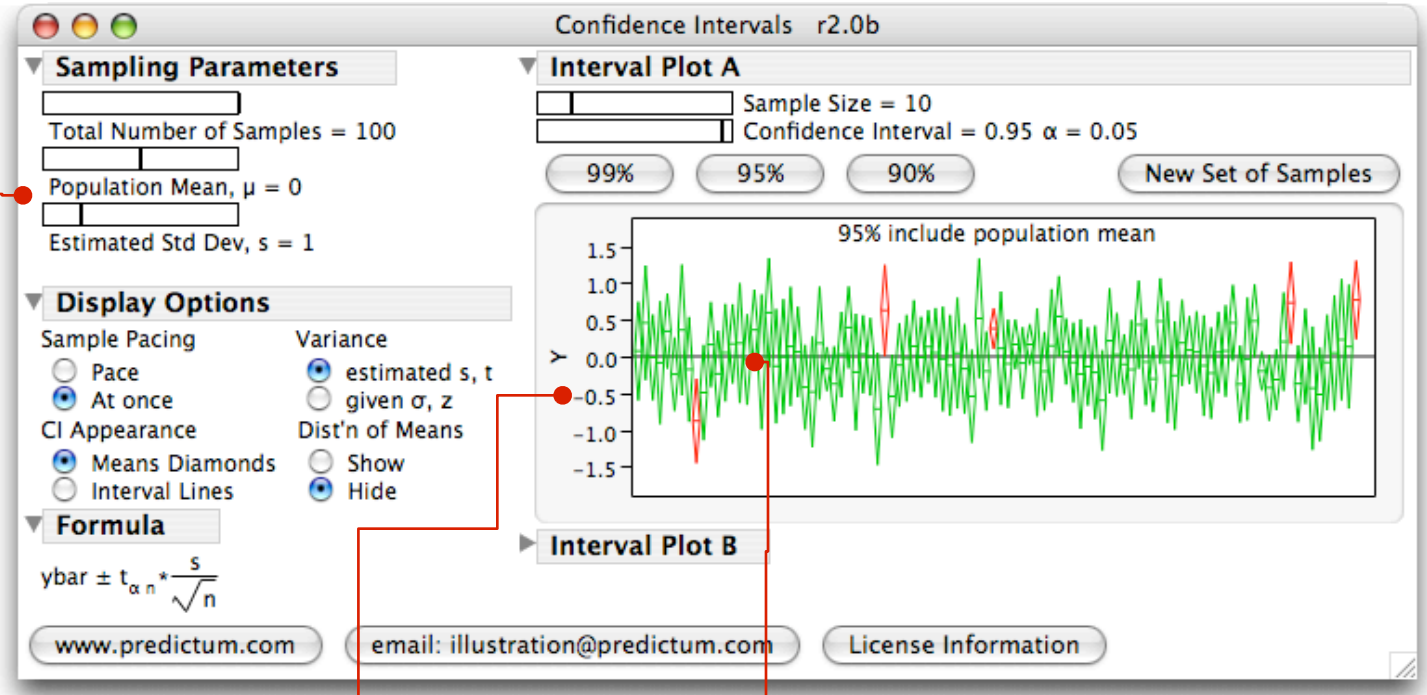
Set the Mean and Standard Deviation to reflect a situation of interest.



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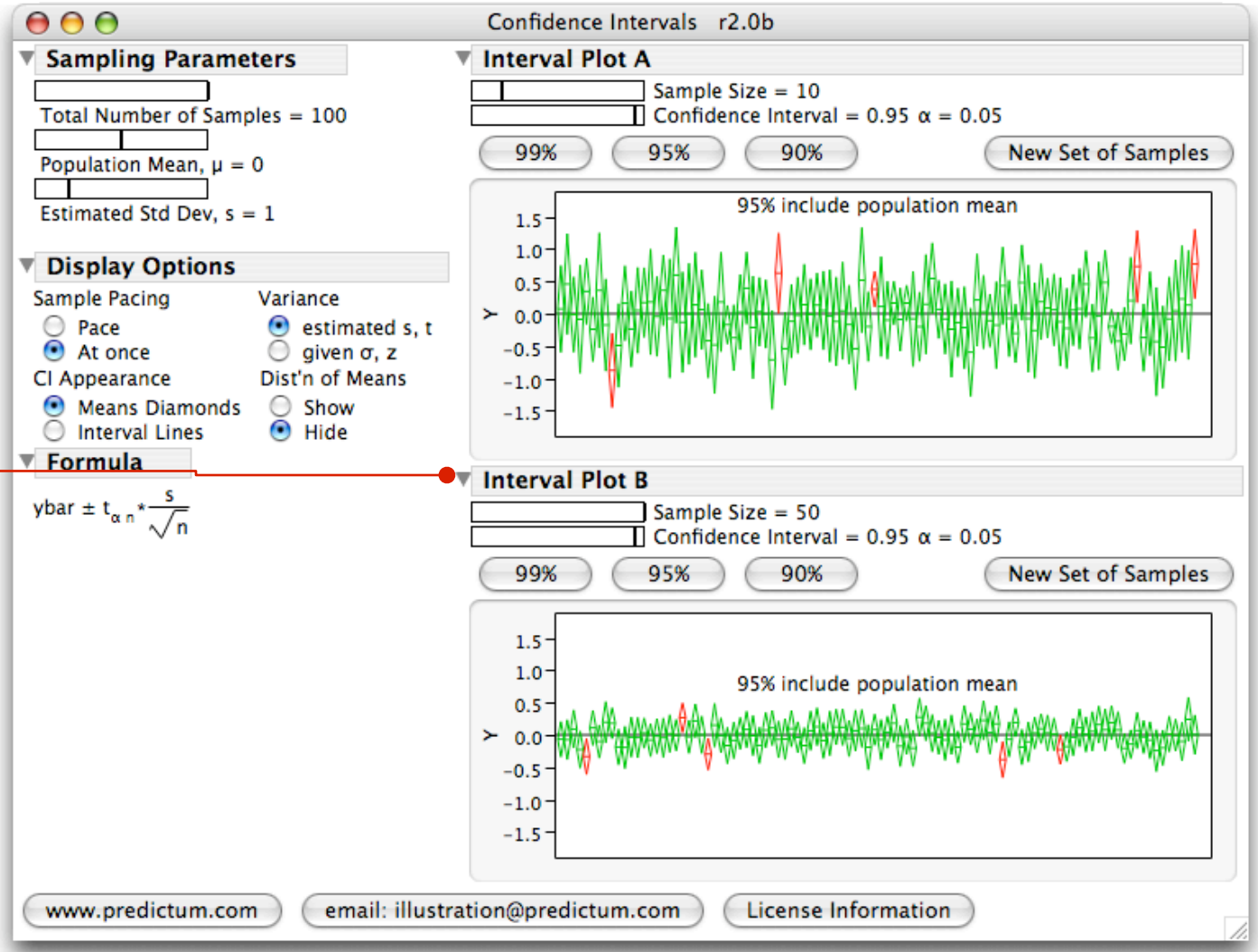
The scale automatically adjust according to the selected mean and standard deviation.

The horizontal line appears at the selected Mean.

Open the reveal icon for Interval Plot B and compare the effects of different sample sizes and **α** settings.



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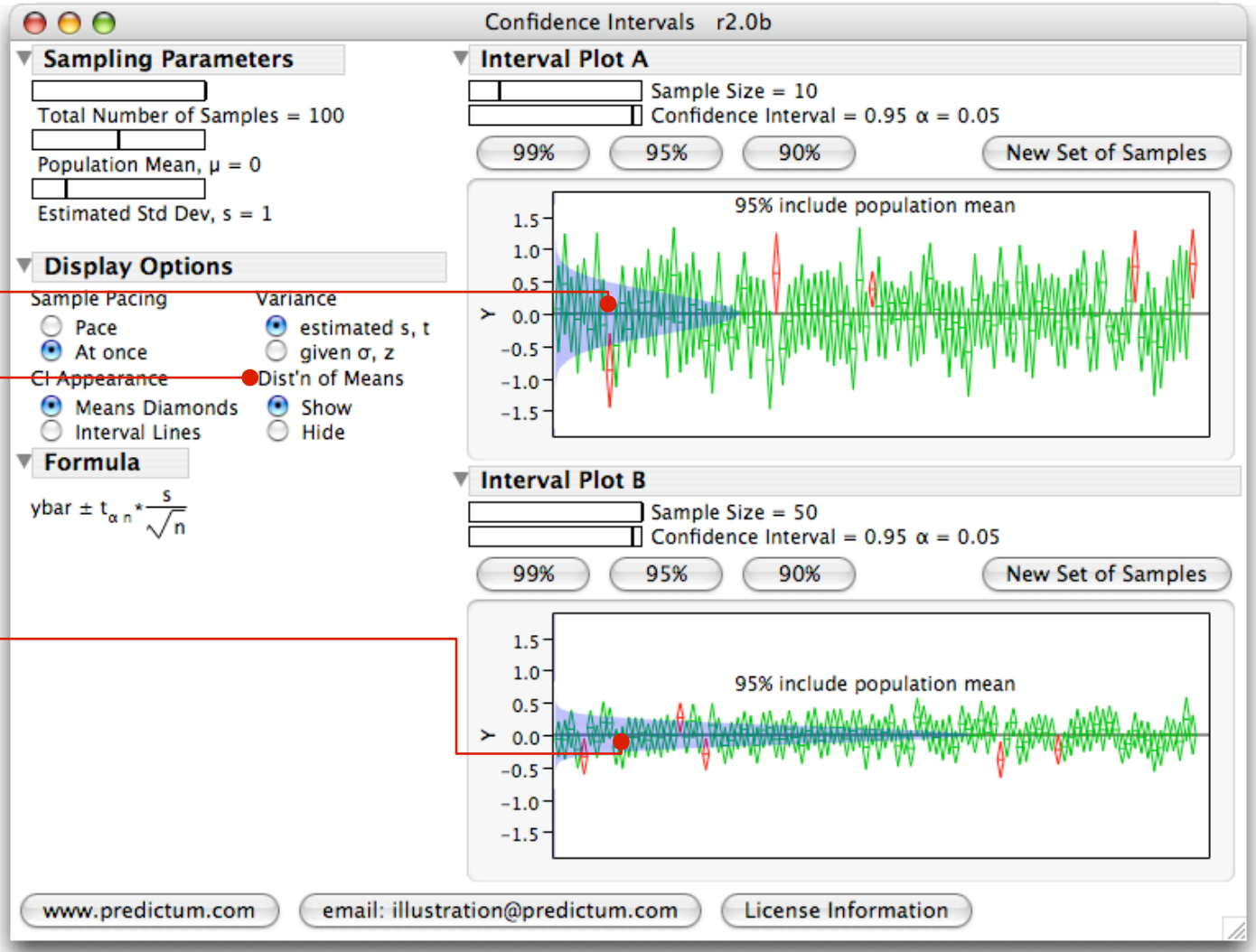
Select Show Distribution of Means

Note that the higher the sample size, *n*, the tighter the confidence intervals, for a given **α**, and the tighter the distribution of the means.



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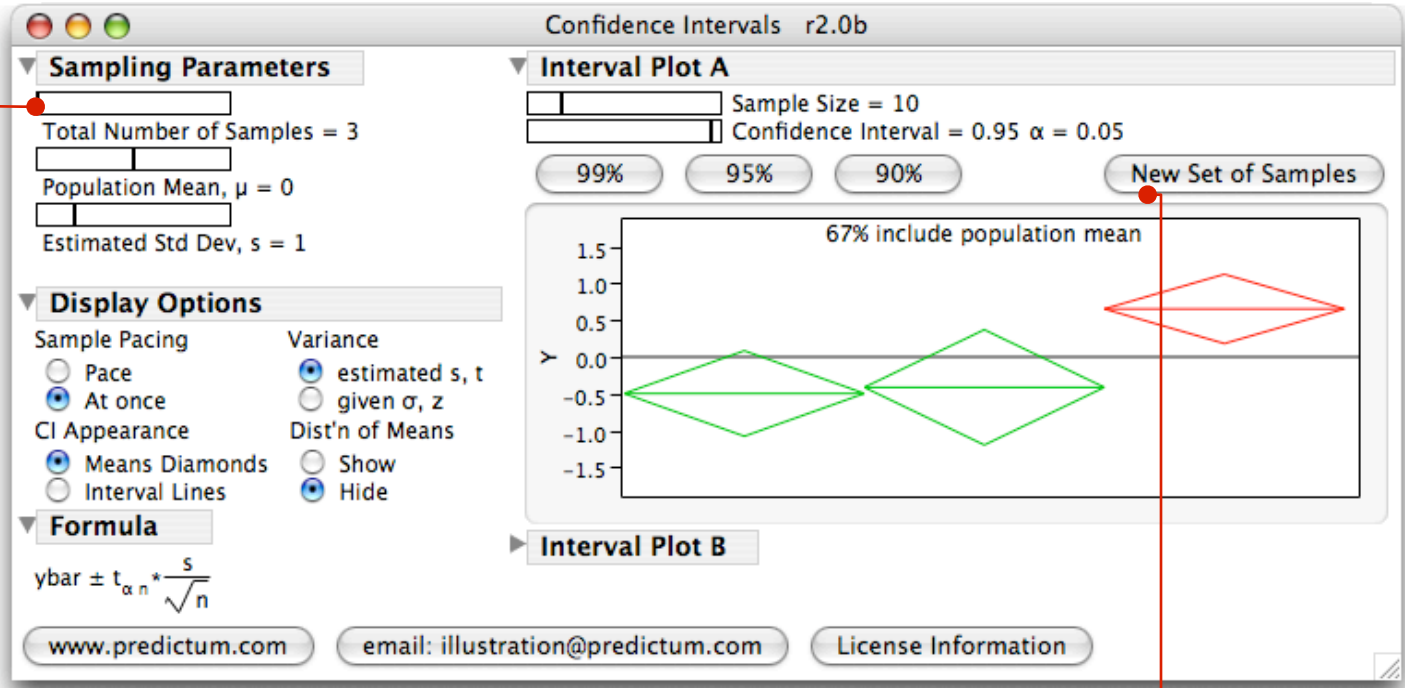
Reduce the Total Number of Samples to mimic an N-Way ANOVA



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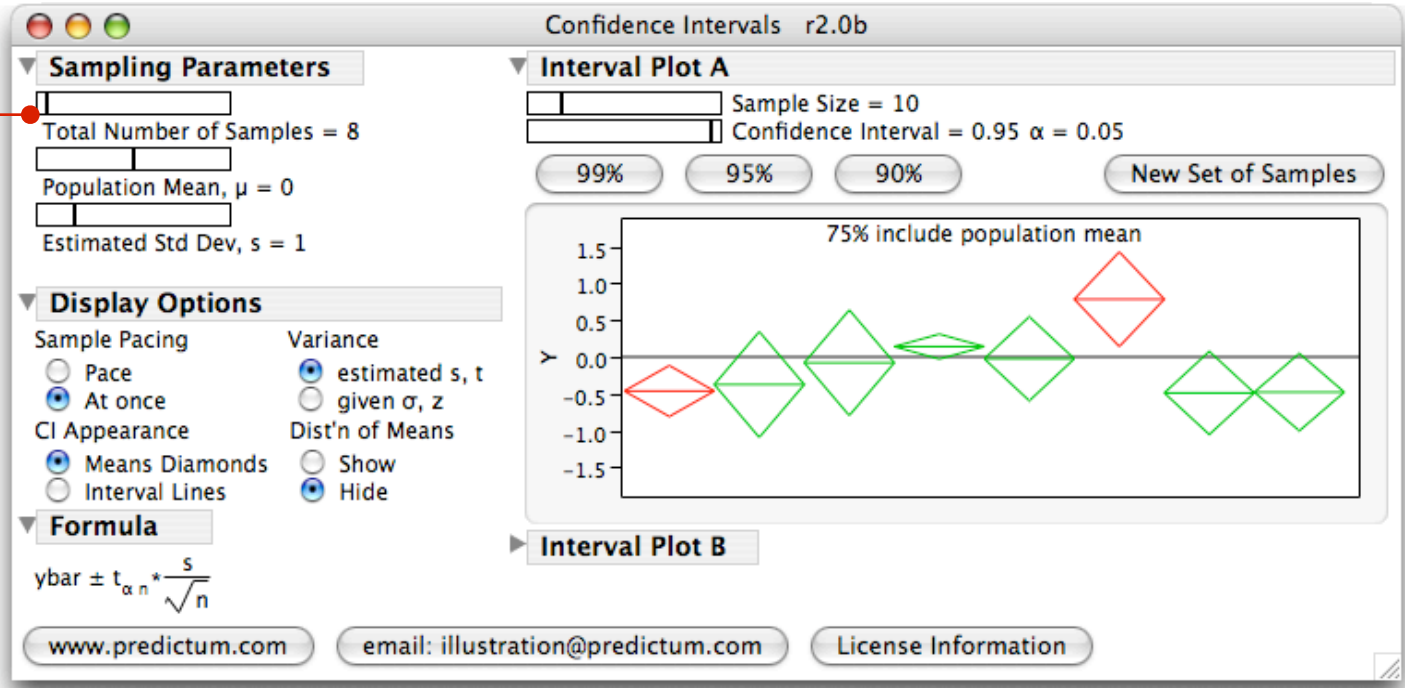
Repeated collect a New Set of Samples and note how frequently Type I errors occur. Under the null hypothesis all groups are from the same population so they should straddle the true average. That they sometimes do not indicate the occurrence of Type I errors.

Increase the number of groups in this N-way ANOVA and sample repeatedly. Note that as the number of groups increases, so too the occurrences of Type I errors motivating the need for applying multiple comparison techniques such as Tukey HSD.



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