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Equivalence Testing

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minimum requirements:
JMP v 7.02 + curiosity
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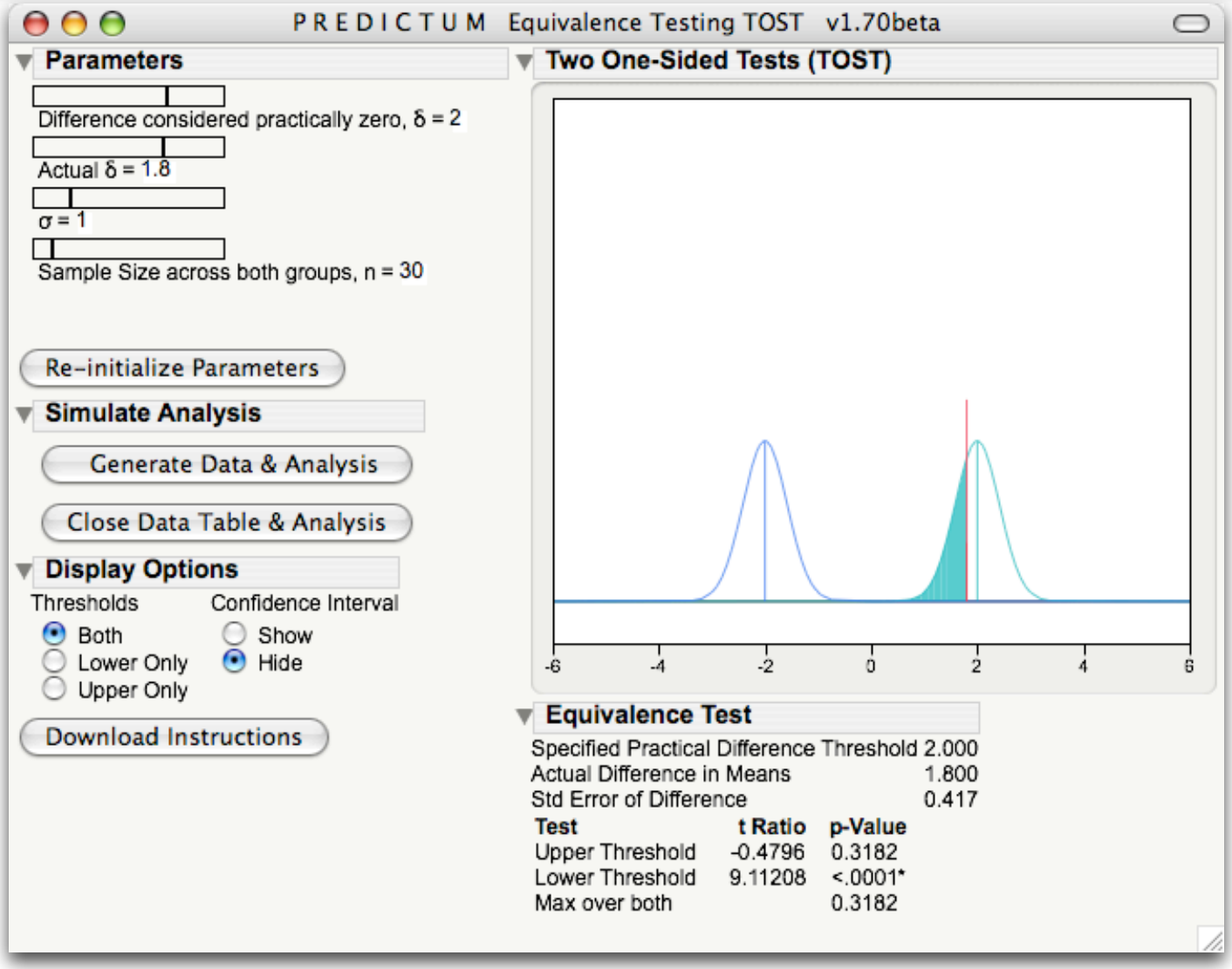
Learning Objectives

Difference between statistically significant differences and practical differences

Conducting and interpreting Equivalence tests

The effects of alpha, sample size, variability and difference on Equivalence tests

The meaning of Two One-sided tests (TOST).



With enough data, any difference, no matter how small, can be found to be statistically significant with a conventional t-test. Equivalence tests are an alternative to the conventional t-test that investigates *practical* differences.

EQUIVALENCE TESTS (TOST): Instructions

Enter the minimum, practical difference via the slider

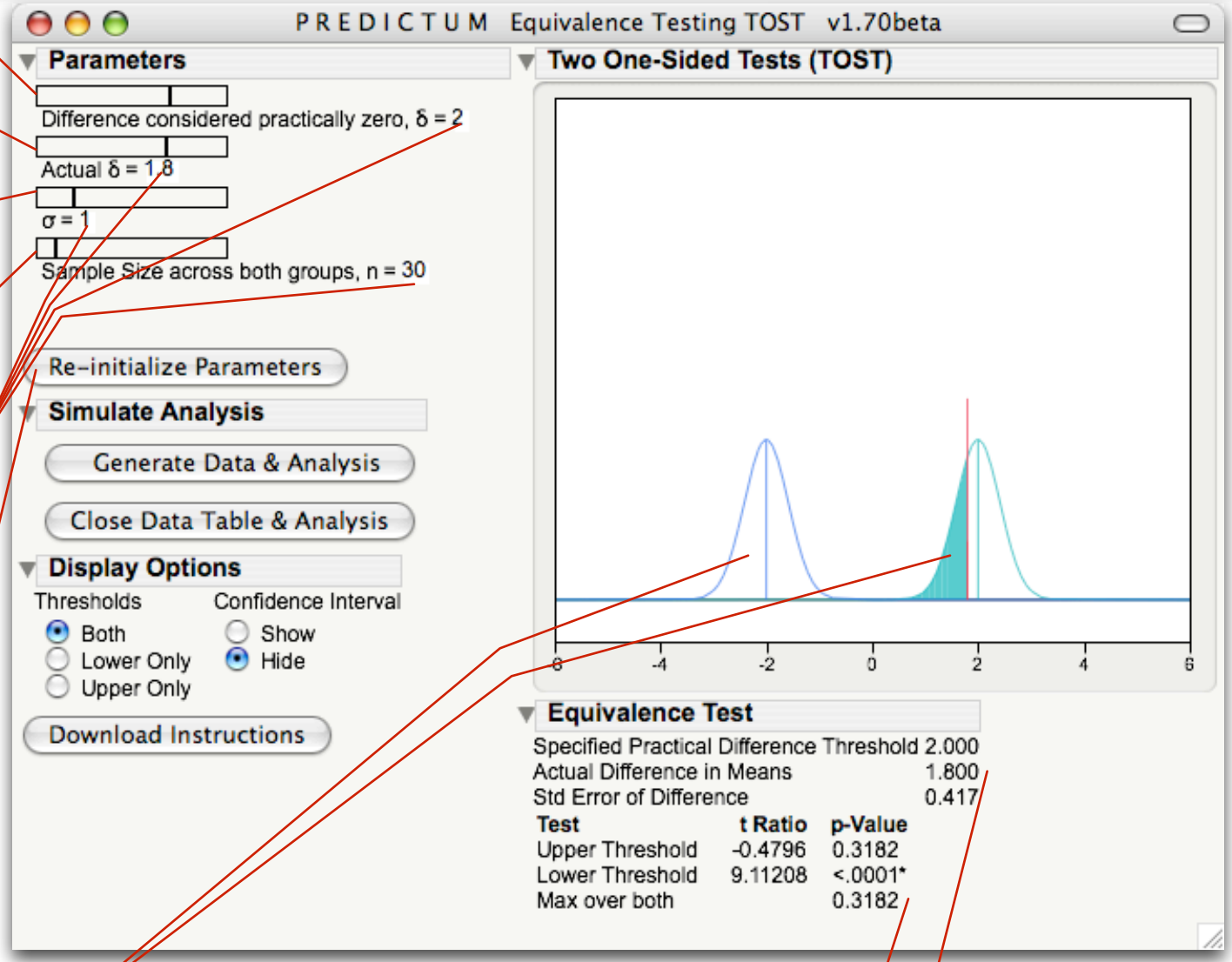
Simulate an "actual difference" with this slider

Adjust sigma, the variability, in the data via this slider

See how having more or less data affects the power of the analysis here

Note that each of these parameters can be edited directly by simply clicking and editing the number to the right.

Click here to reset the parameters.



Thresholds indicate the practical differences on both sides.

The actual difference. If this difference is "the same" (ie: no practical difference) as one of the thresholds, the Max p-value is non-significant.

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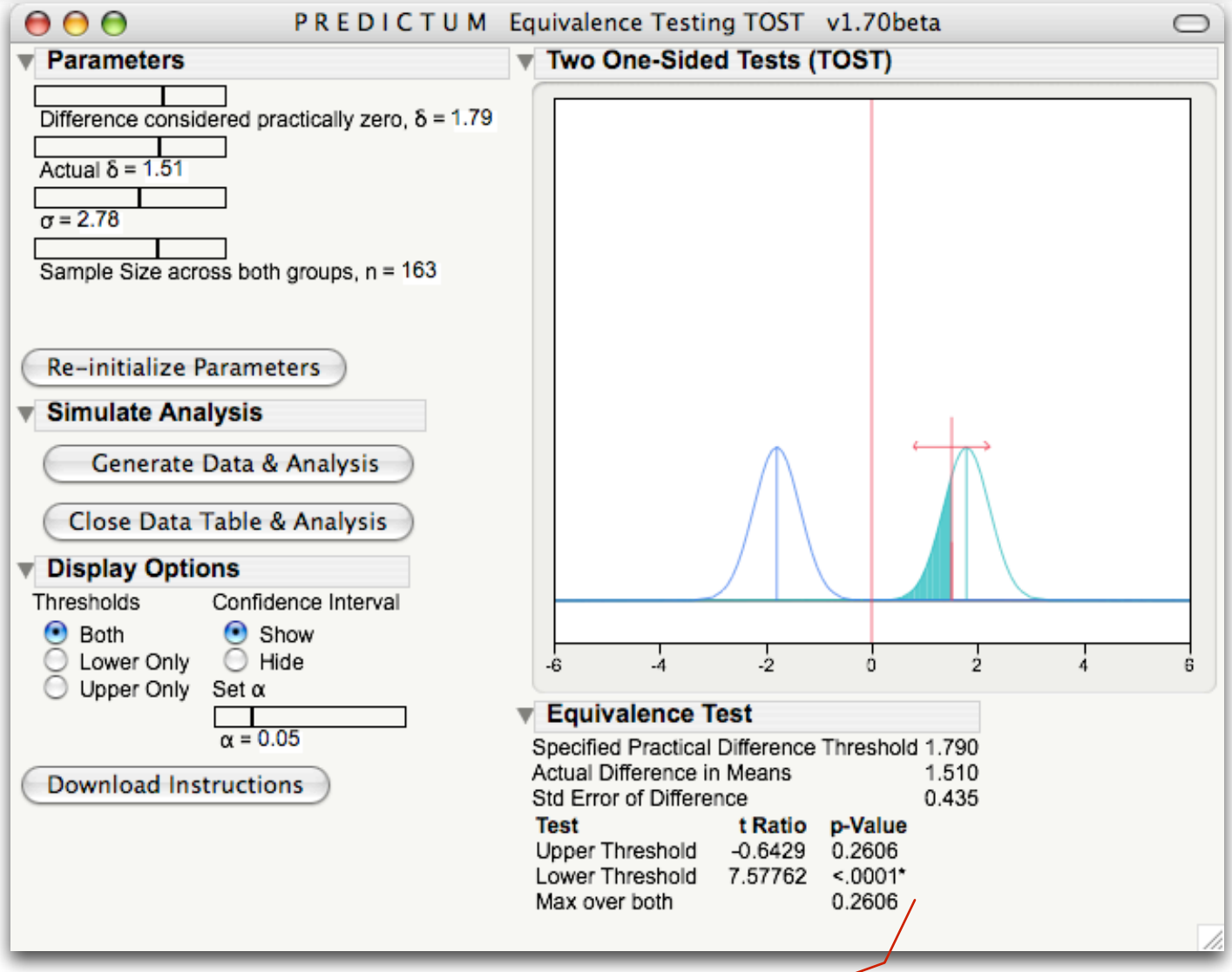

Here, the difference is practically significant because the actual difference (vertical red line) is not significantly different than one of the thresholds.

The p-value for the Upper Threshold is not significant. The "Max over both" is the higher of the two p-values. If it is above alpha, the difference is practically significant.

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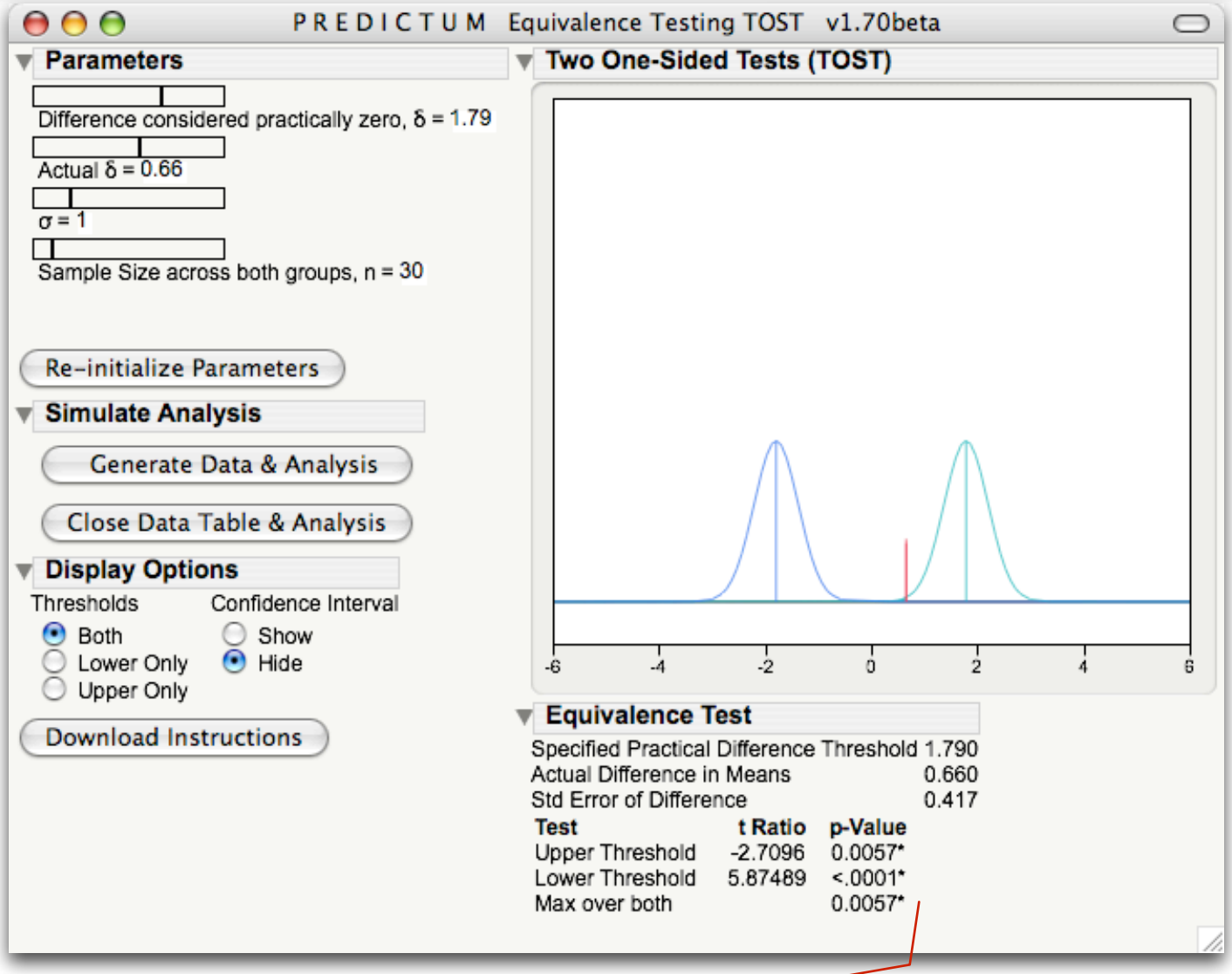

Here, the difference is not practical. The actual difference is significantly different than either of the thresholds.

The p-value for the Upper Threshold is not significant. The "Max over both" is the higher of the two p-values. If it is above alpha, the difference is practically significant.

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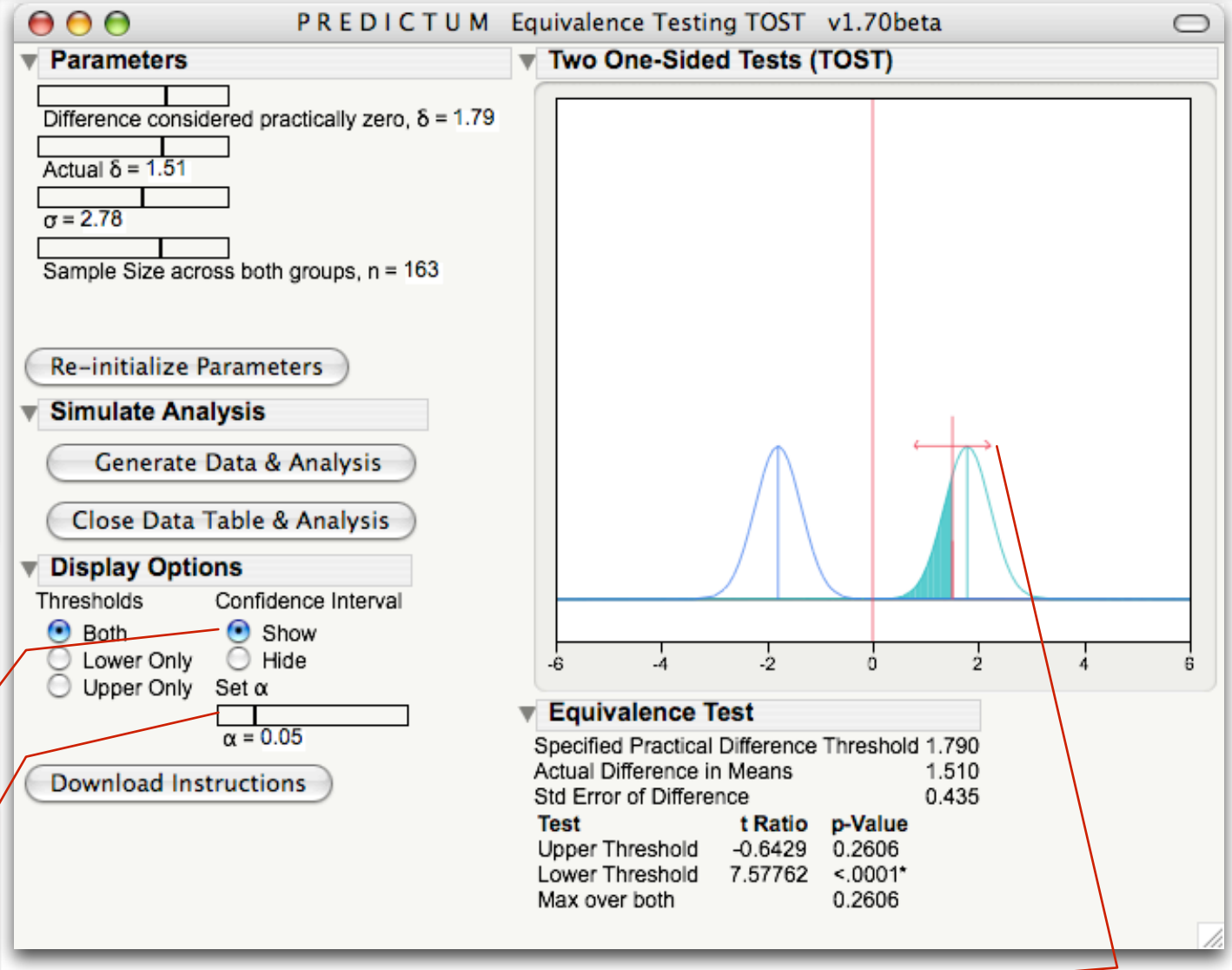

Reveal and conceal the confidence interval with these radio buttons

When the confidence interval is revealed, a slider appears to adjust alpha

Power is an important consideration. Here, there is a practical difference and the confidence interval suggests that the analysis was sufficiently powerful.

A situation where the confidence interval crosses over the 0 difference line indicates that there was not enough power.

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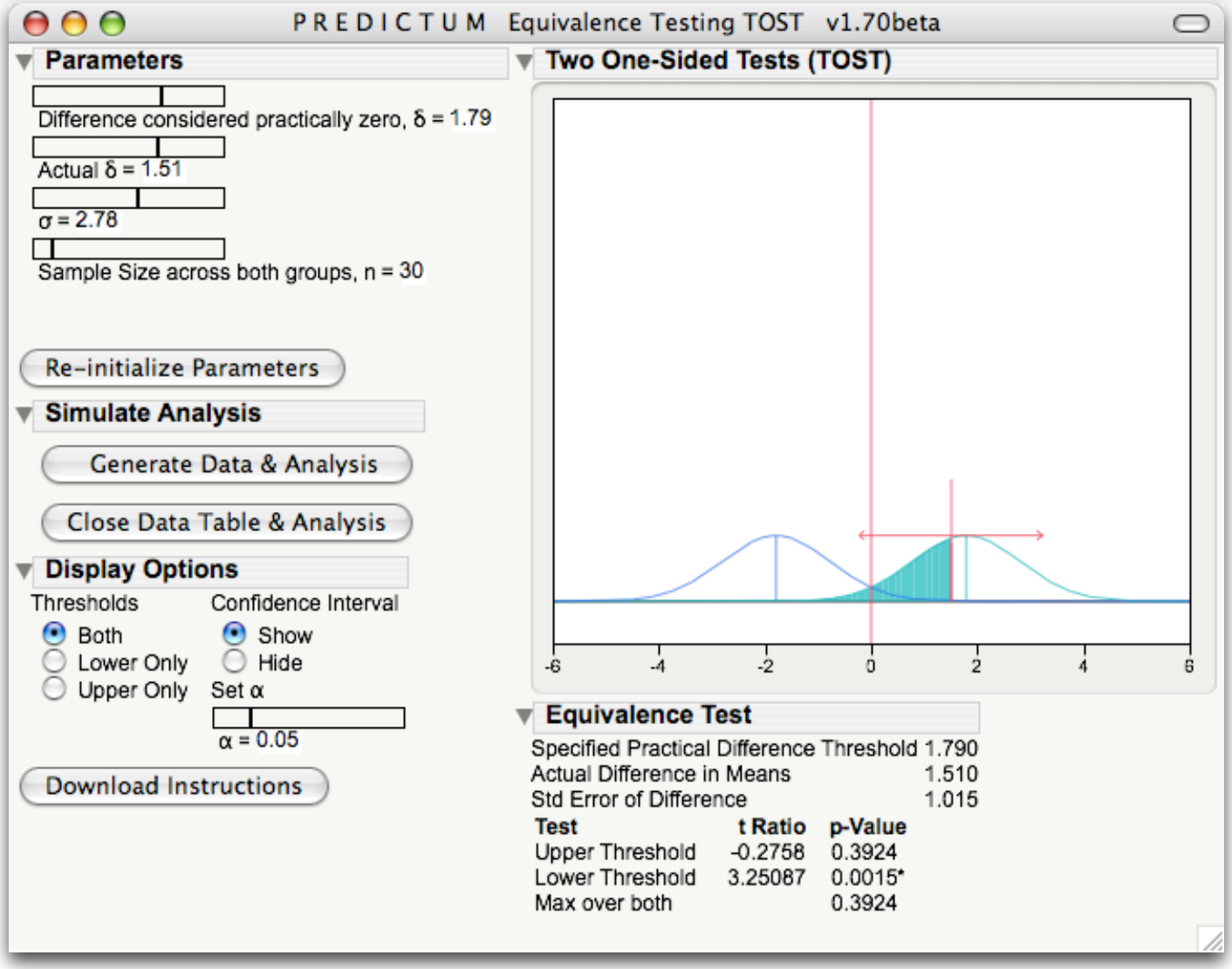

This situation is the same as on the previous page except the sample size has been greatly reduced. As a result, the distributions are much more spread as the standard error is bigger due to the drop in sample size.

Note that although the "Max over both" p-value is not significant, the confidence interval is very wide, stretching over the 0 line.

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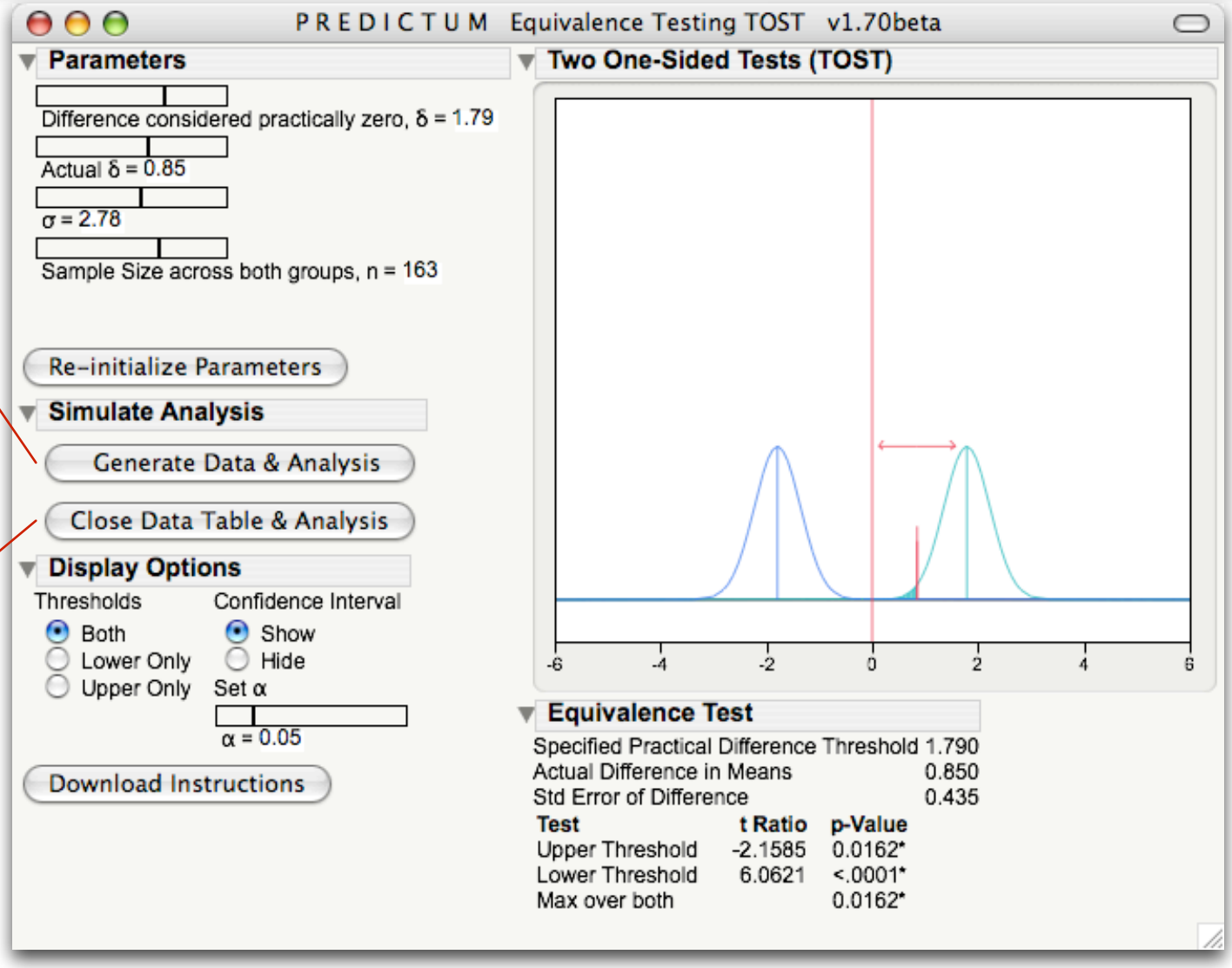
Click here to create a data table with simulated data and corresponding analysis generated using the parameters indicated here.

Click here to close the generated table so that you can change the parameters and create another data table/analysis set.



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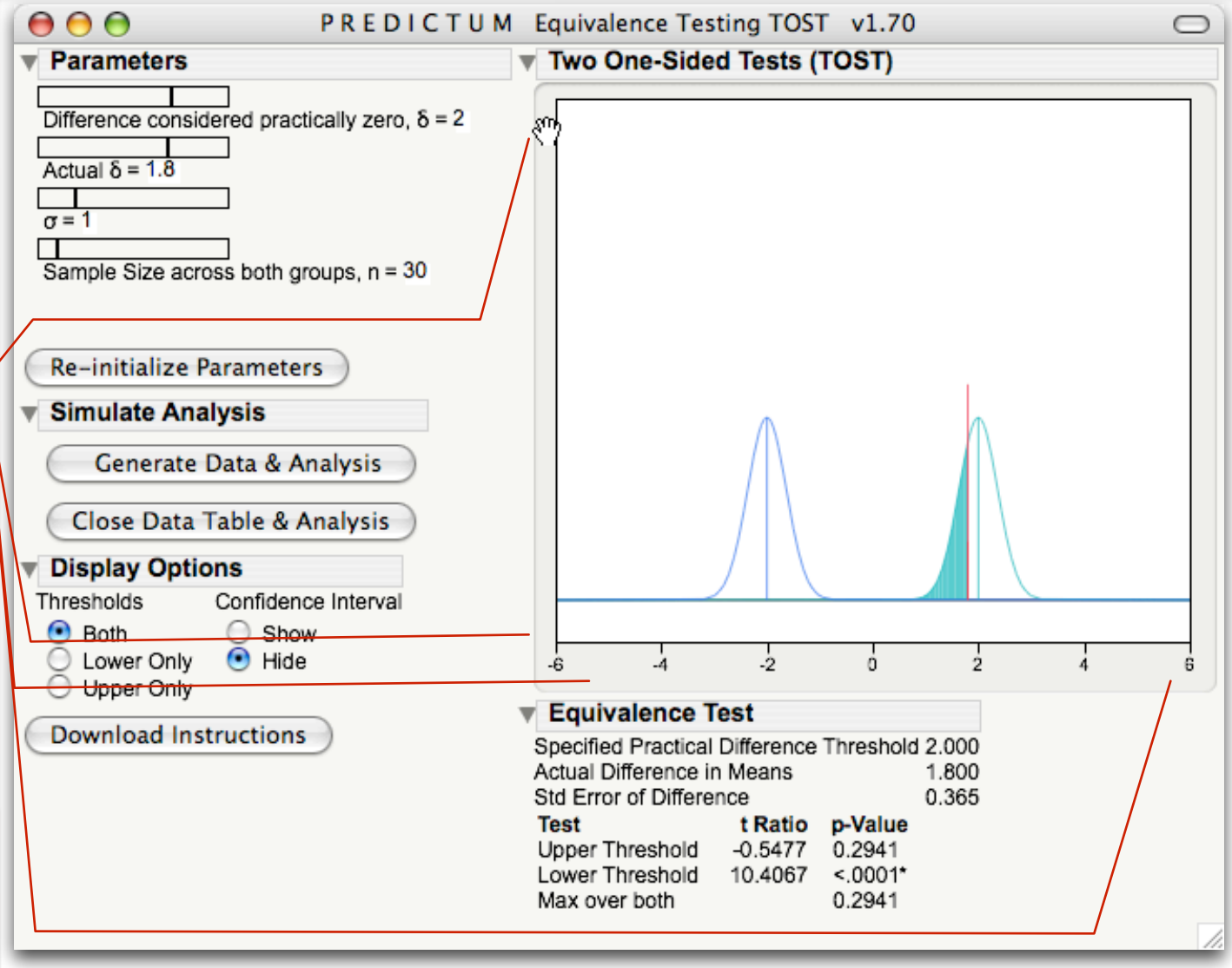
As with any JMP application, click toward either end of the axes and drag to expand or contract the scale



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