

# **Chapter 2: Data Presentation**

TXCL7565/PHSC7565

# What This Lecture Covers

- ▶ Numeric tables
- ▶ Bar charts
- ▶ Histograms
- ▶ Box-and-whisker plots
- ▶ Scatter plots

# A Picture is Worth 1000 Words

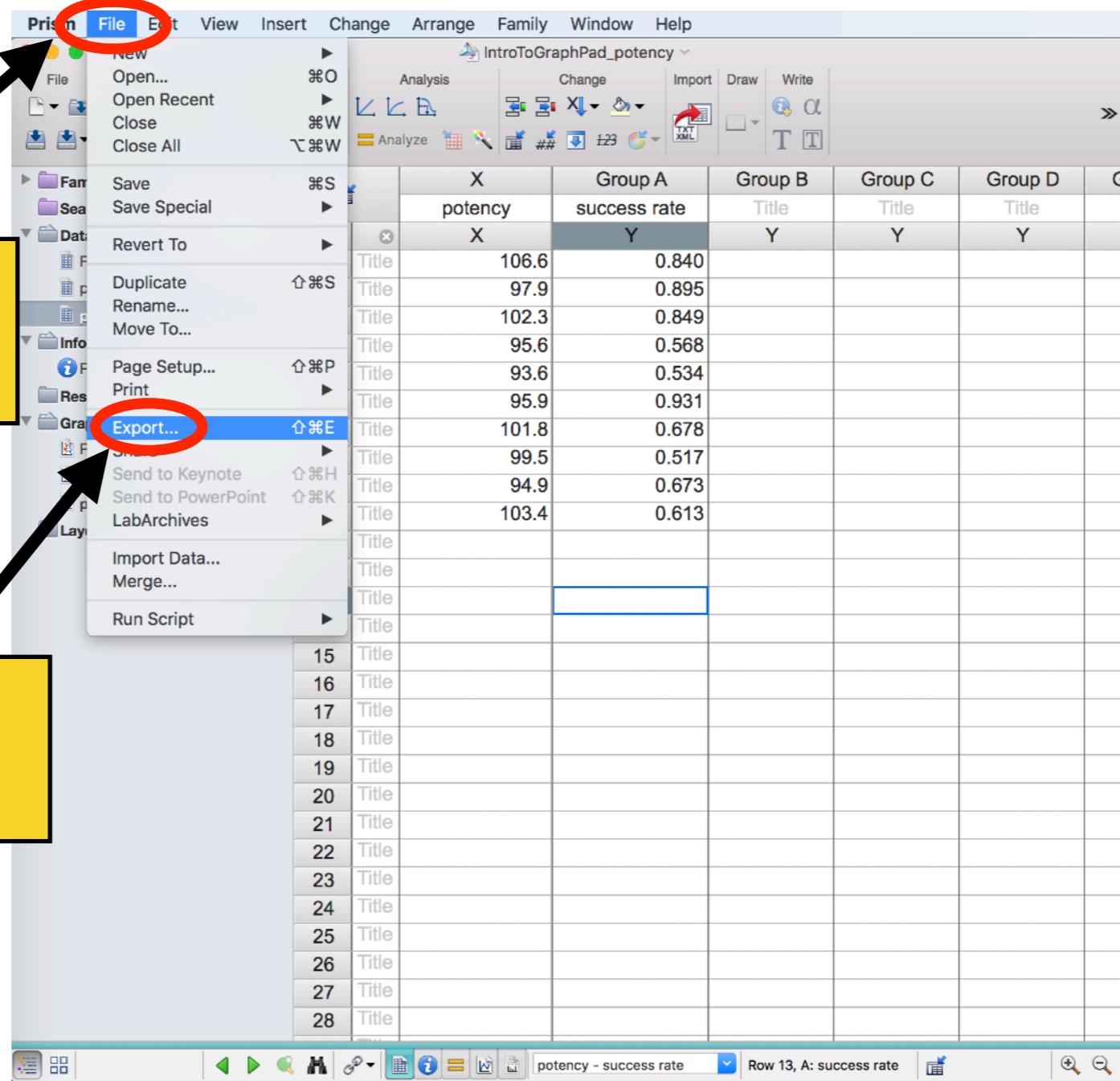
- Statistical analyses allow complex data to be summarized objectively and clearly into one or two numbers
- A pictorial representation will often alert you to come important aspects of the data that can be missed if we relied solely on one or two dry, numerical statistics

# Numeric Tables

- **Pros:**
  - ✓ Full details of the original data are available for re-analysis
  - ✓ When variables are qualitative, a graphic may not be possible or appropriate
- **Cons:**
  - ✓ Lack immediacy
  - ✓ In general, individuals can only process 6-10 data points

# Export data table from GraphPad

1. Click 'File' in top menu bar

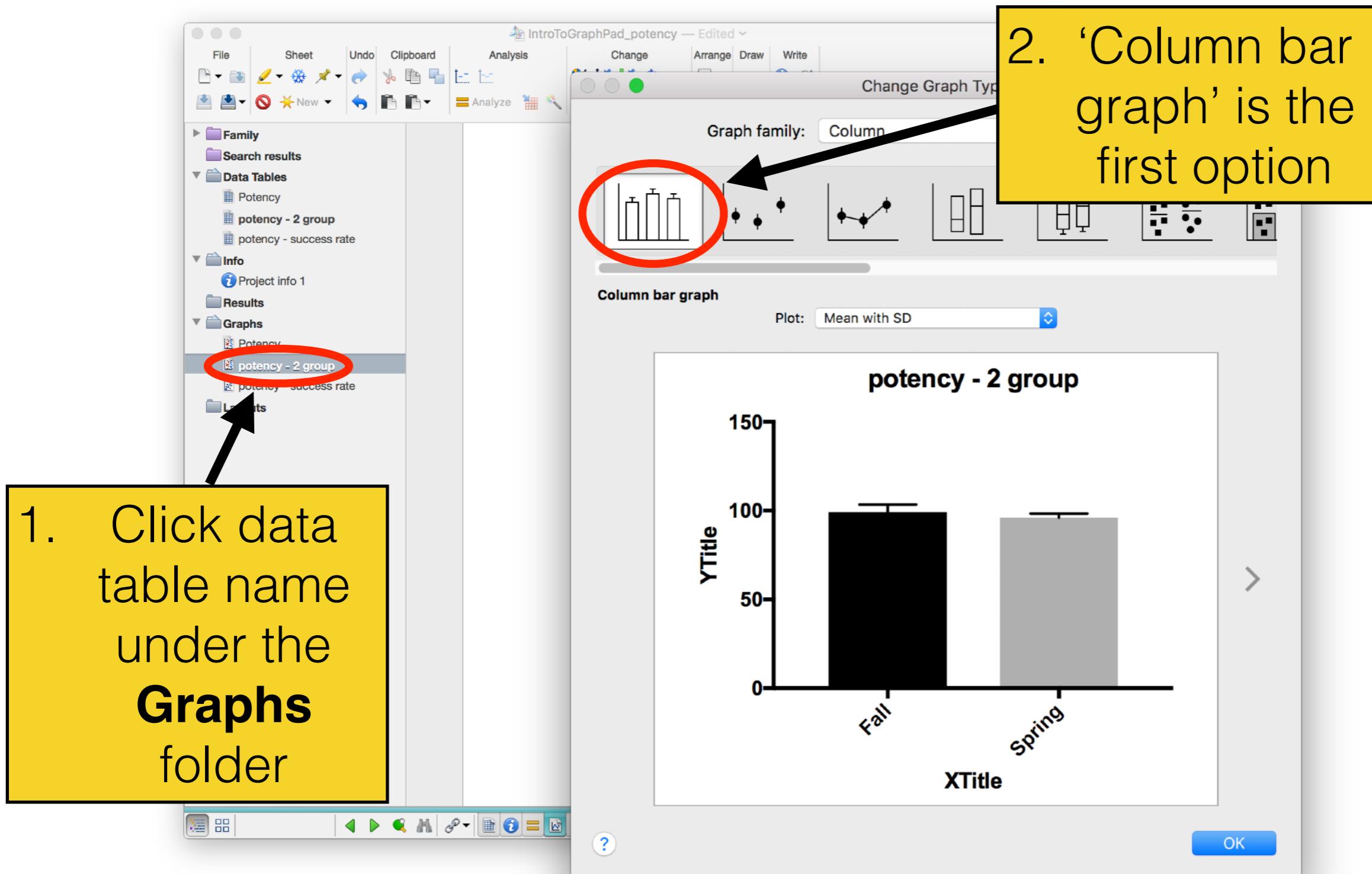


2. Choose 'Export...'

# Bar Charts

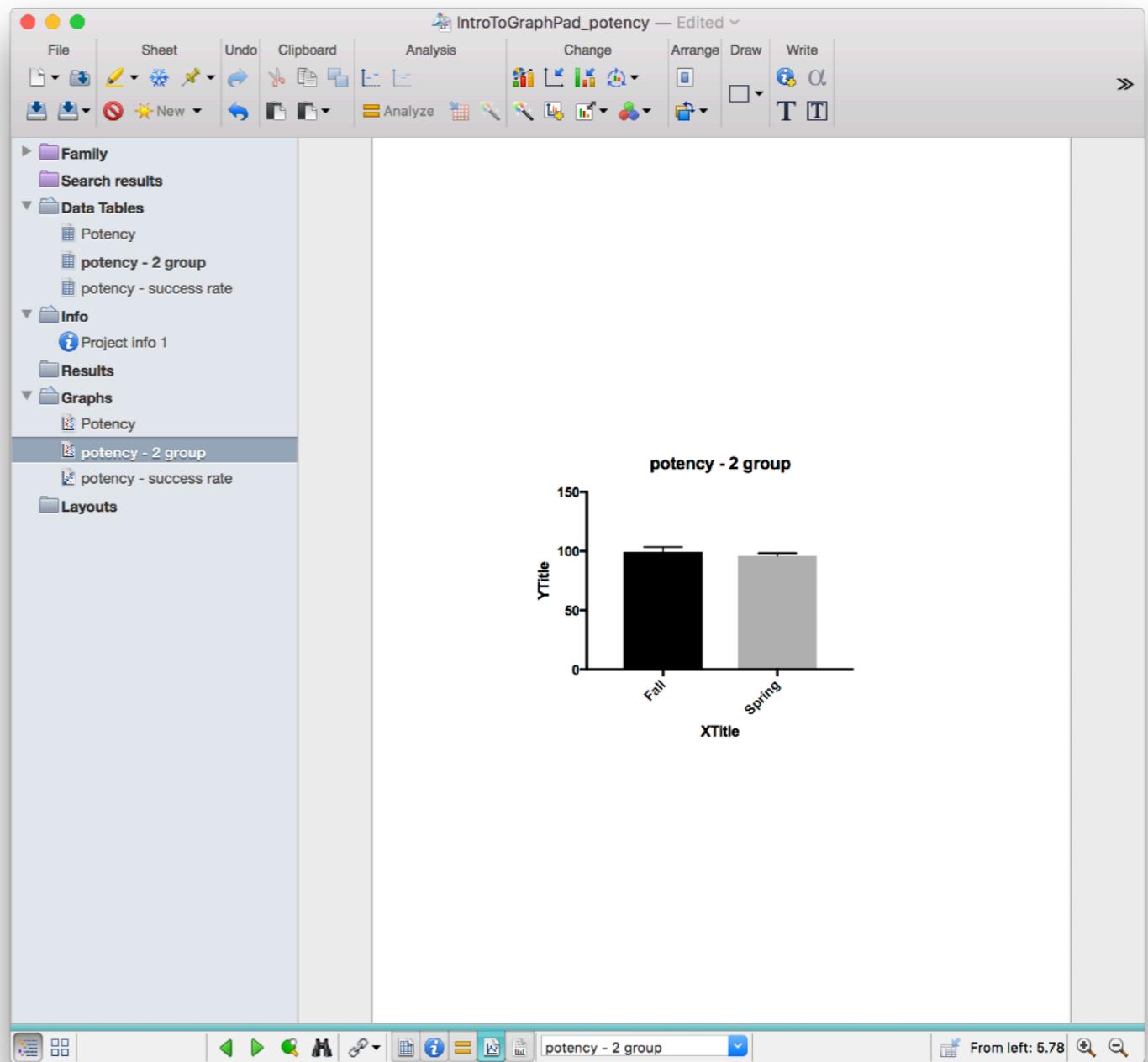
- One of the most commonly used charts (for better or for worse)
- Can plot interval, ordinal, or nominal data
- Often used to display a statistical summary of an interval variable

# Create a Bar Chart in GraphPad

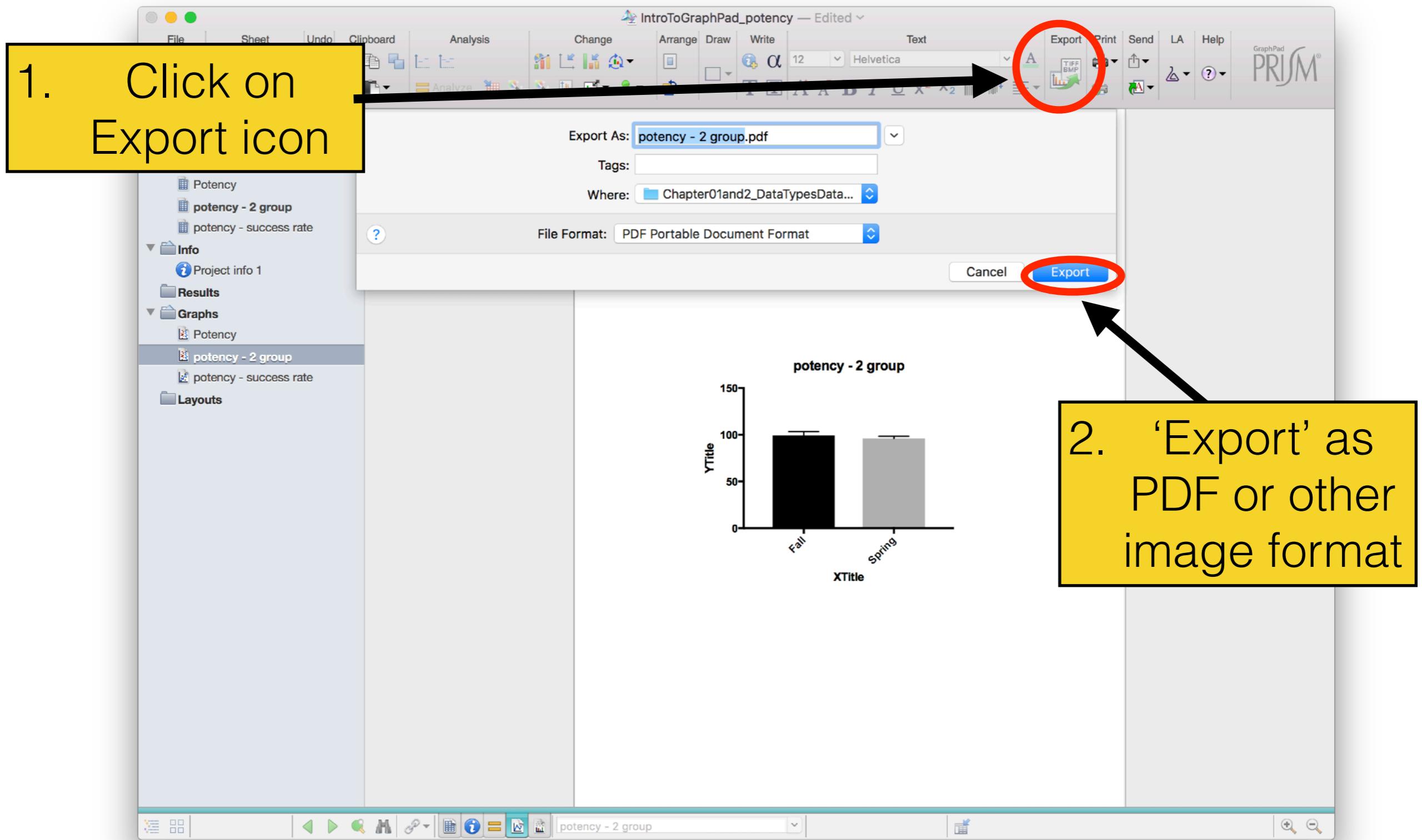


# Graph Details

- Click on different elements of the graphic to edit
- You can change many details including:
  - Axis titles
  - Title
  - Bar patterns and colors
  - Fonts



# Export Graphic



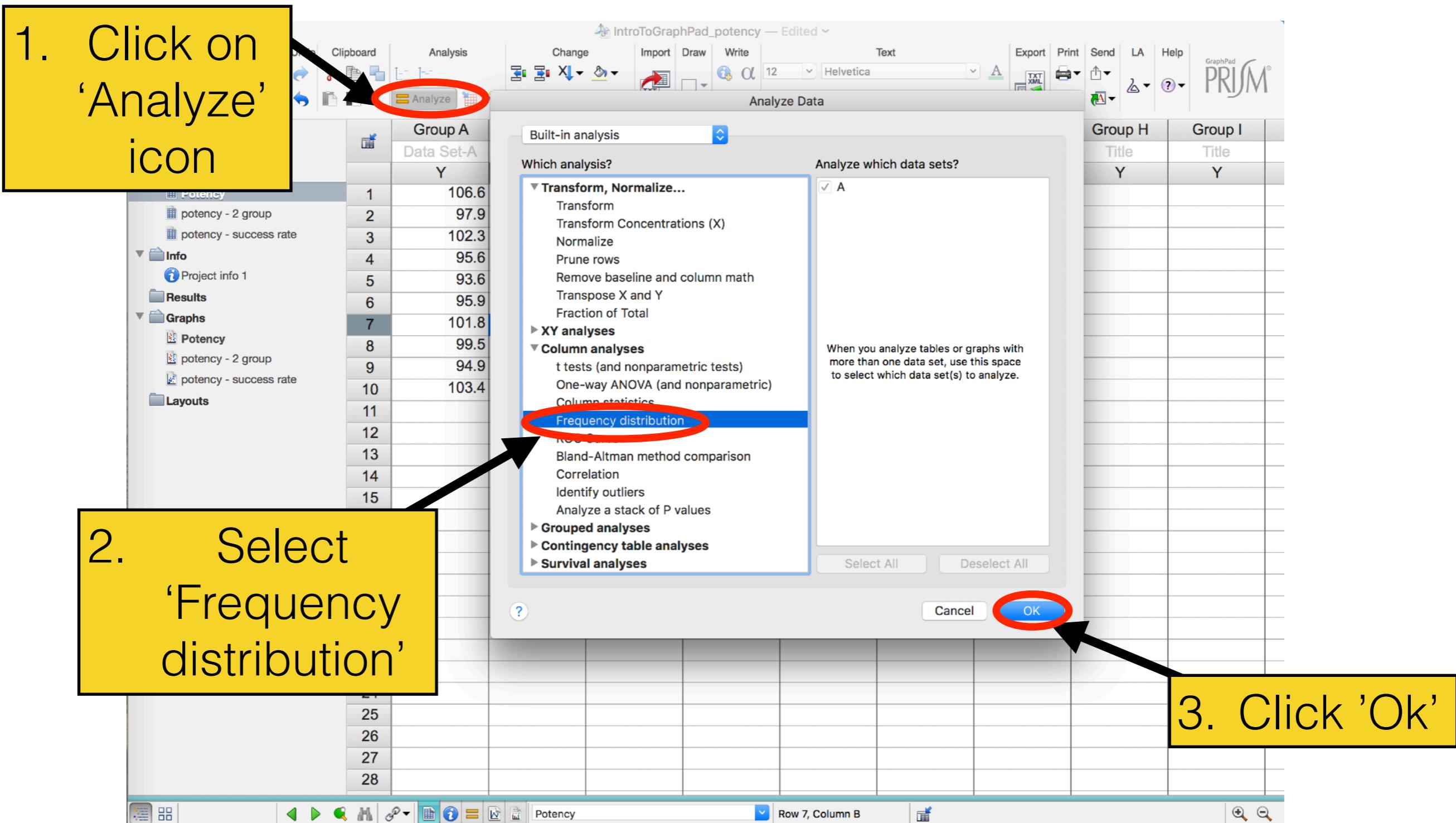
# Graphics for Distribution of Values

- Used for interval data
- Histogram
  - ‘Bins’ continuous values and counts the number of observations within a bin
  - Provides details about the shape of the distribution
- Box-and-whisker plots
  - Shows the quantiles of the data along with outlier values
  - Good for large number of values
- Scatter plots (single variable)
  - Plots every observation
  - Good for small number of values

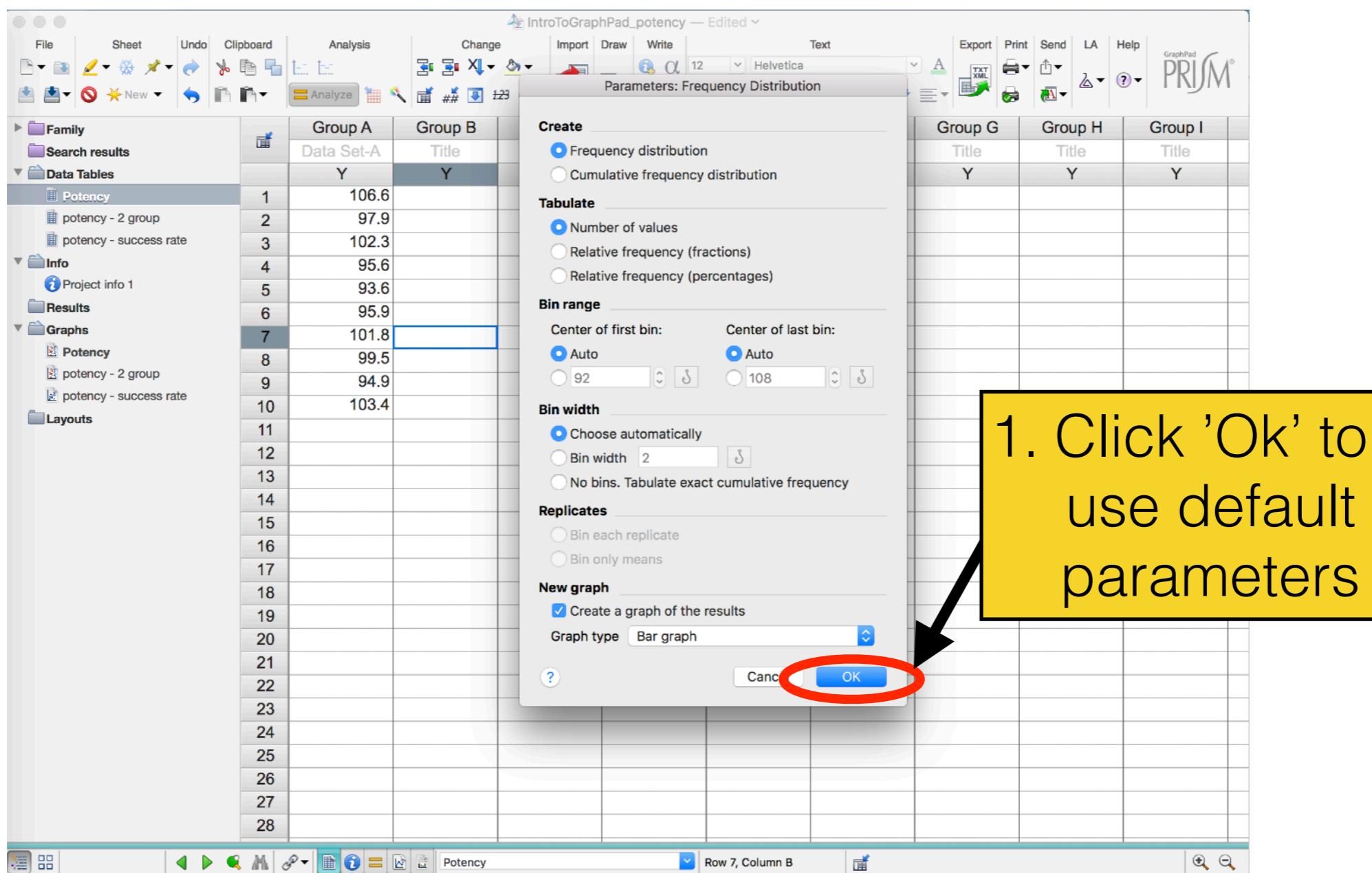
# Histogram in GraphPad

1. Click ‘Analyze’ in the *Analysis* box
2. Choose ‘Frequency Distribution’ under **Column analyses** in the *Which Analysis?* box
3. Click ‘Ok’
4. Do not change current parameter defaults
5. Click ‘Ok’
6. Open the new graph in the *Graphs* folder
7. Double click on the graph to get the ‘Format Graph’ box
8. Graph Settings —> Spacing —> Between adjacent data —> 0%

# Histogram in GraphPad



# Histogram in GraphPad



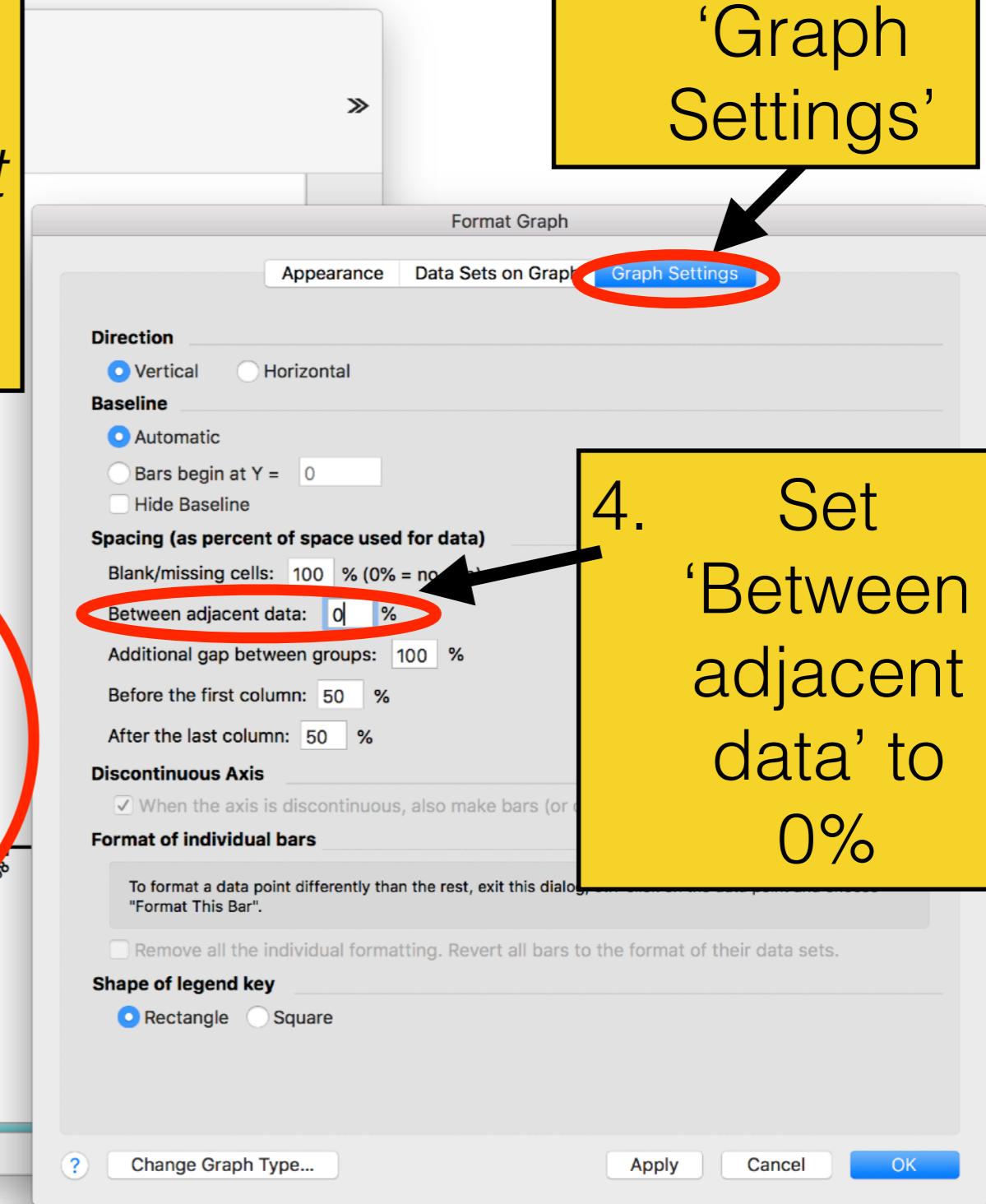
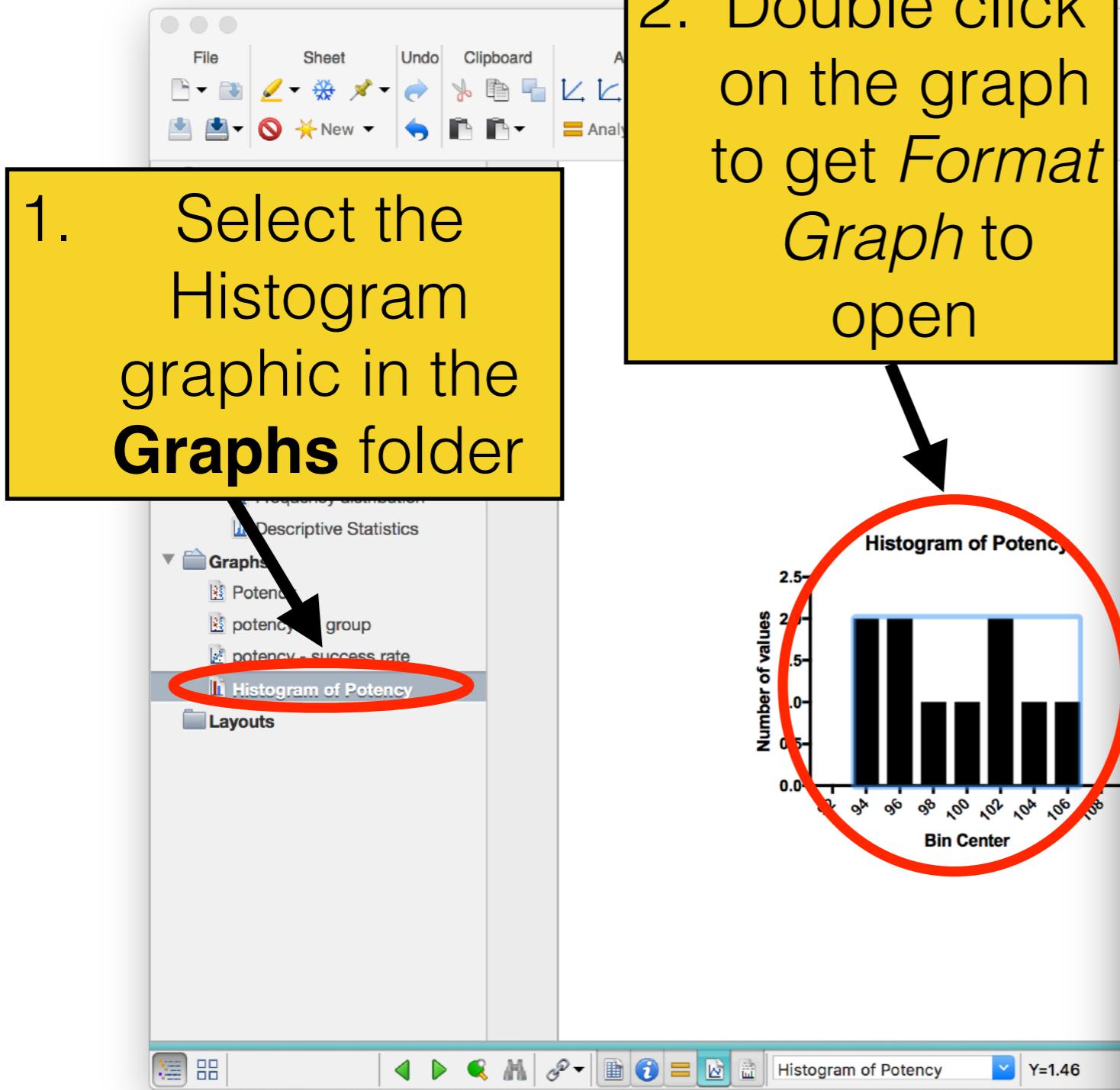
# Histogram in GraphPad

1. Select the Histogram graphic in the **Graphs** folder

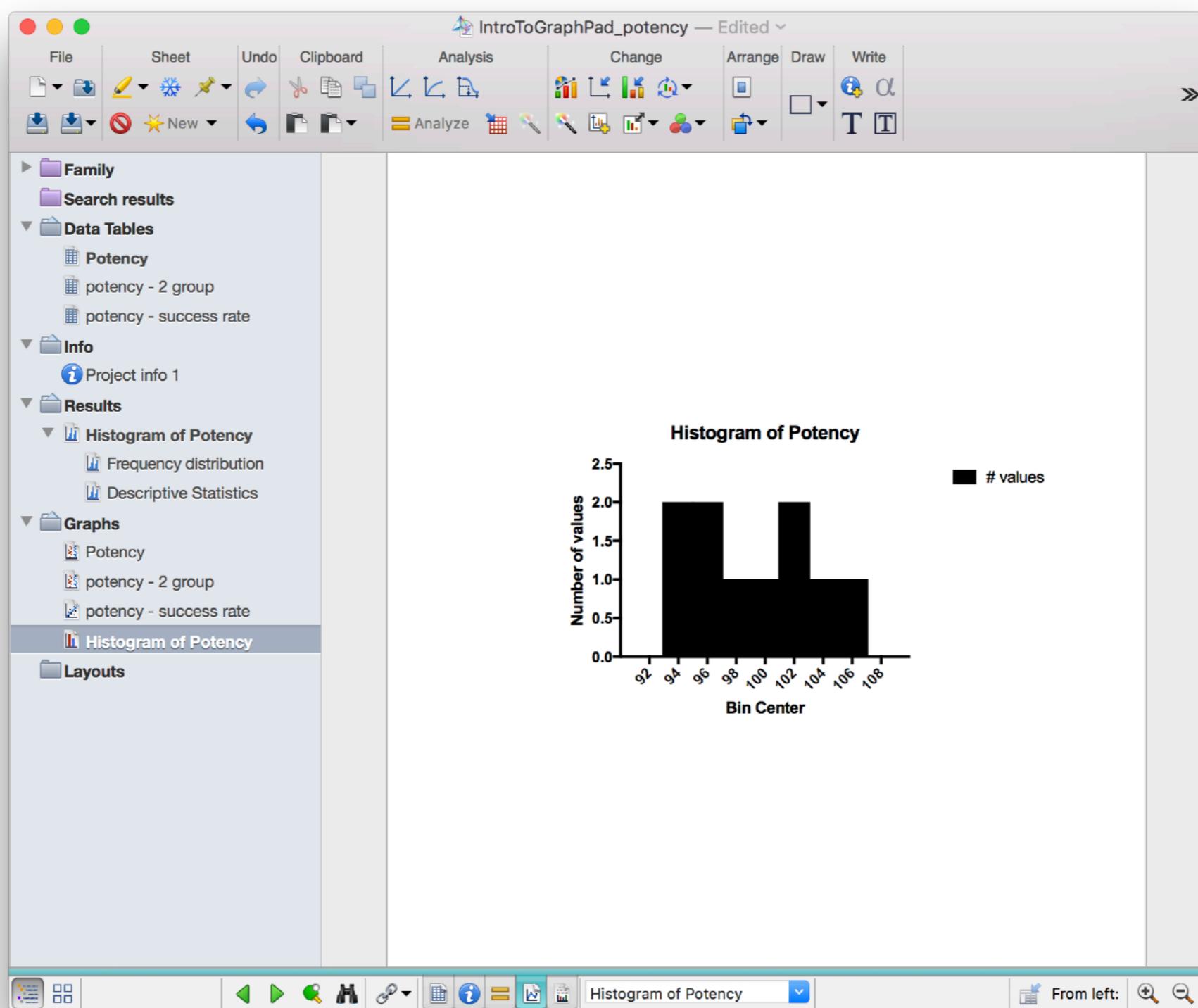
2. Double click on the graph to get *Format Graph* to open

3. Select 'Graph Settings'

4. Set 'Between adjacent data' to 0%

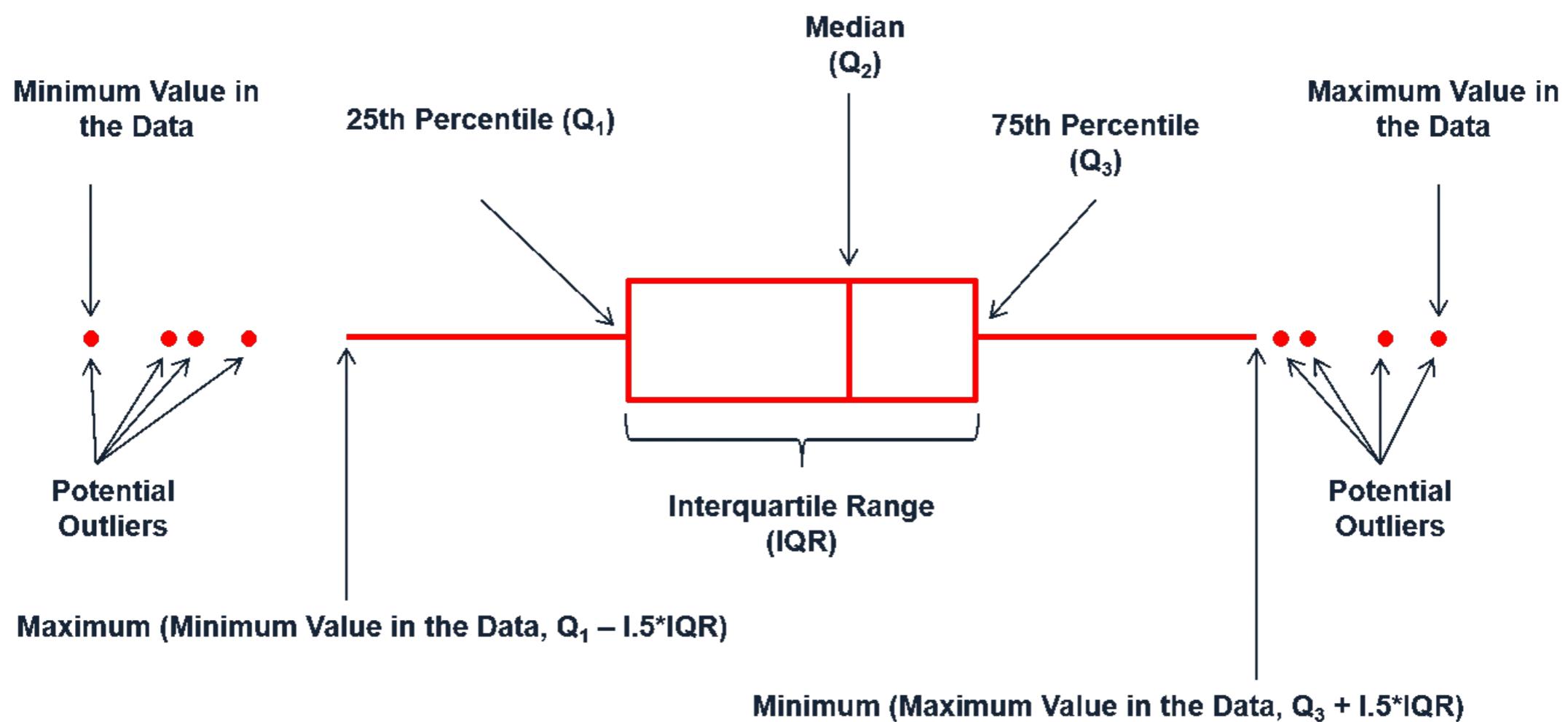


# Histogram in GraphPad

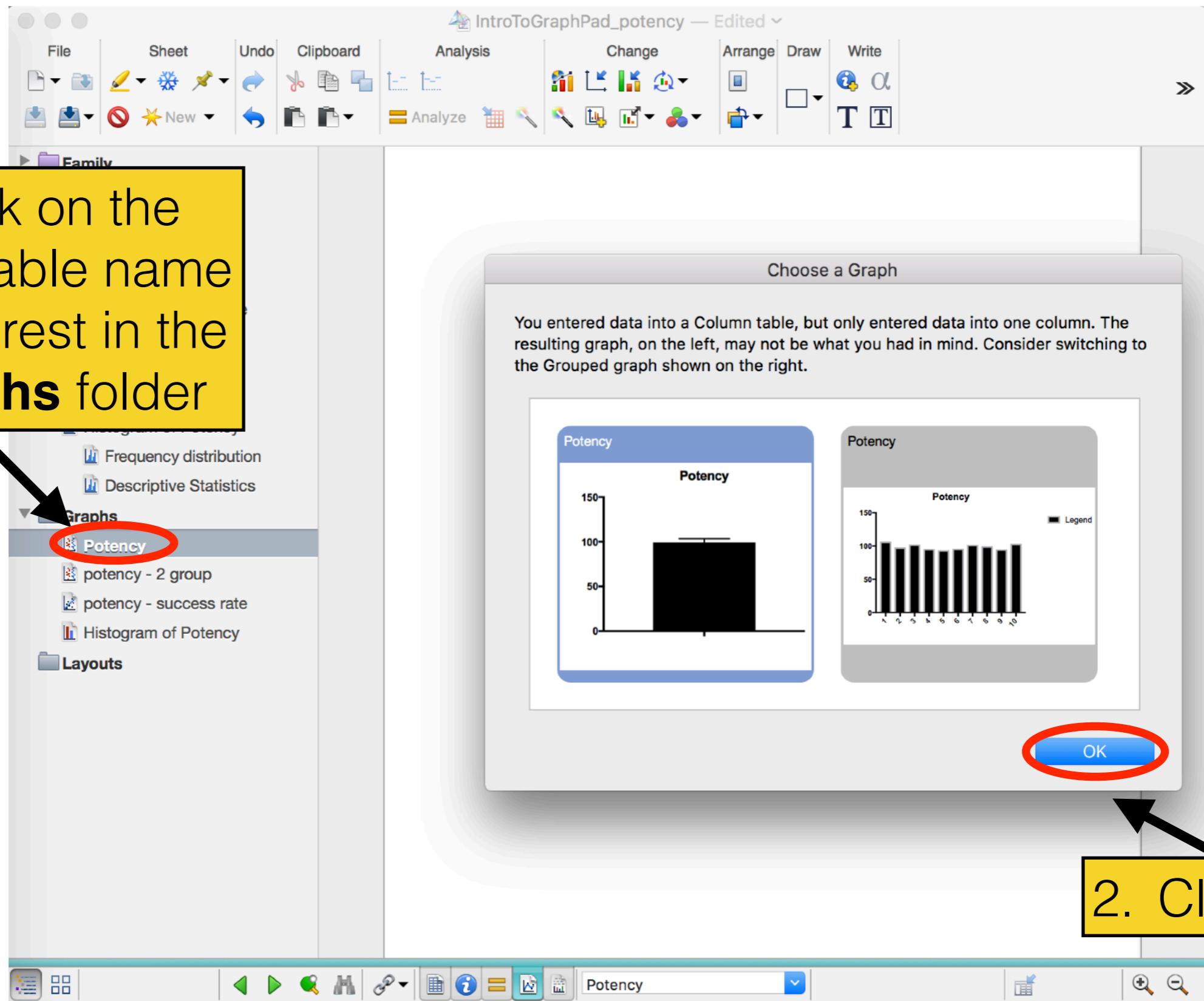


# Box-and-Whisker Plots

- Box-and-whisker plots, or just box plots, give you an idea about the distribution of the data without plotting every single point.

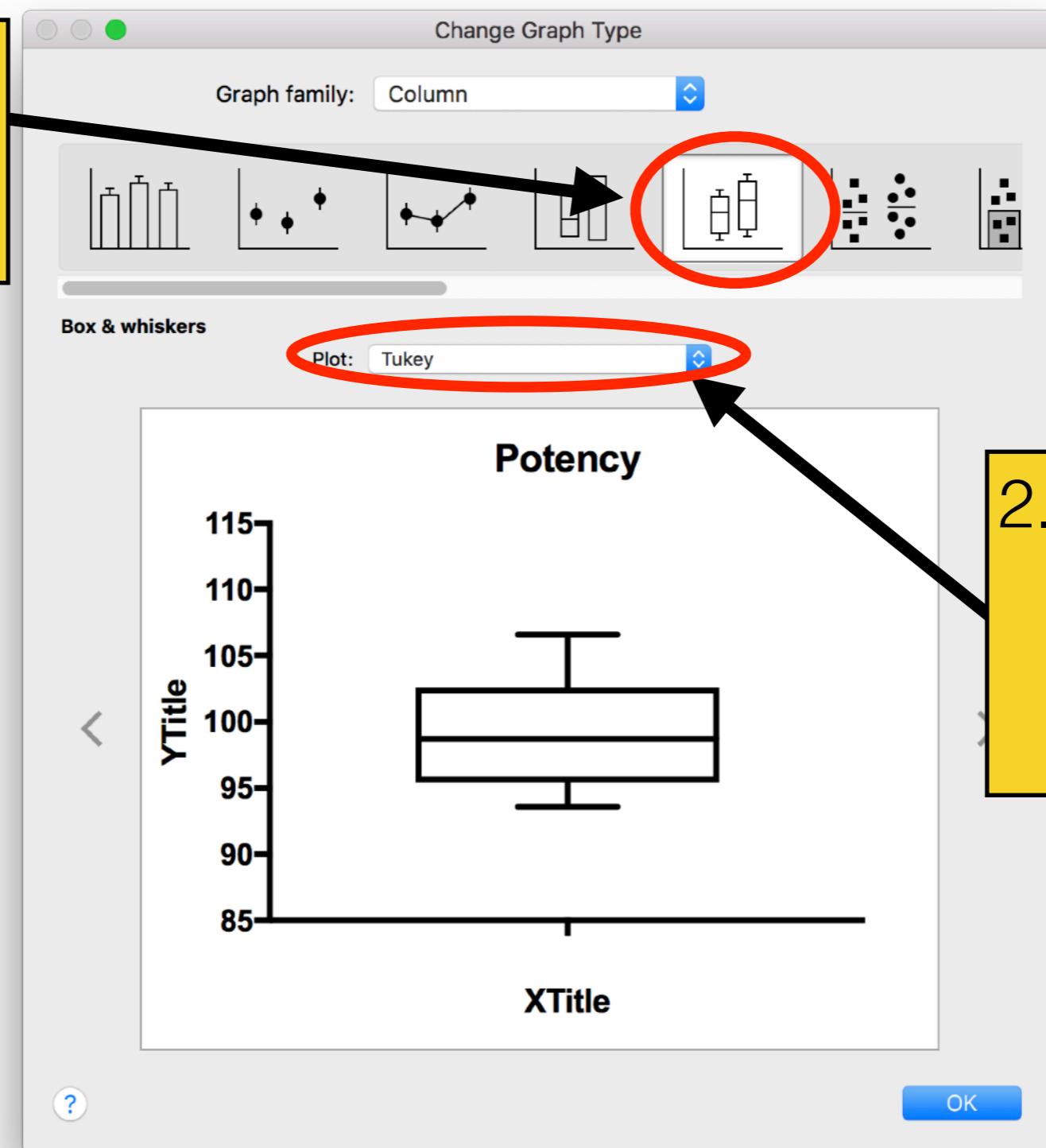


# Initiate Graphic in GraphPad



# Create a Box-and-Whisker Plot

1. Select 'Box & whiskers' graph type



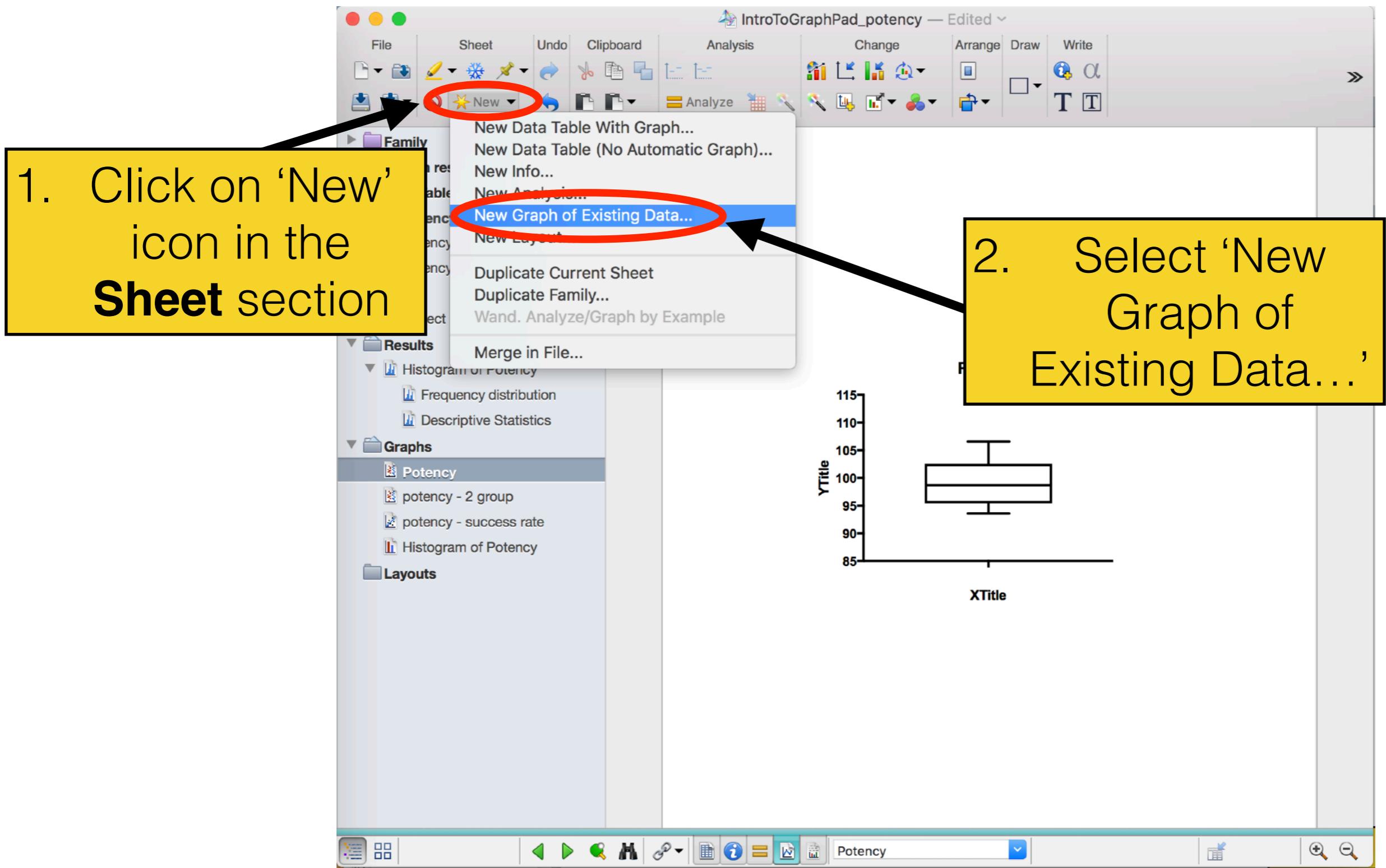
2. Select the 'Tukey' method for the whiskers

# Scatter Plots with a Single Variable

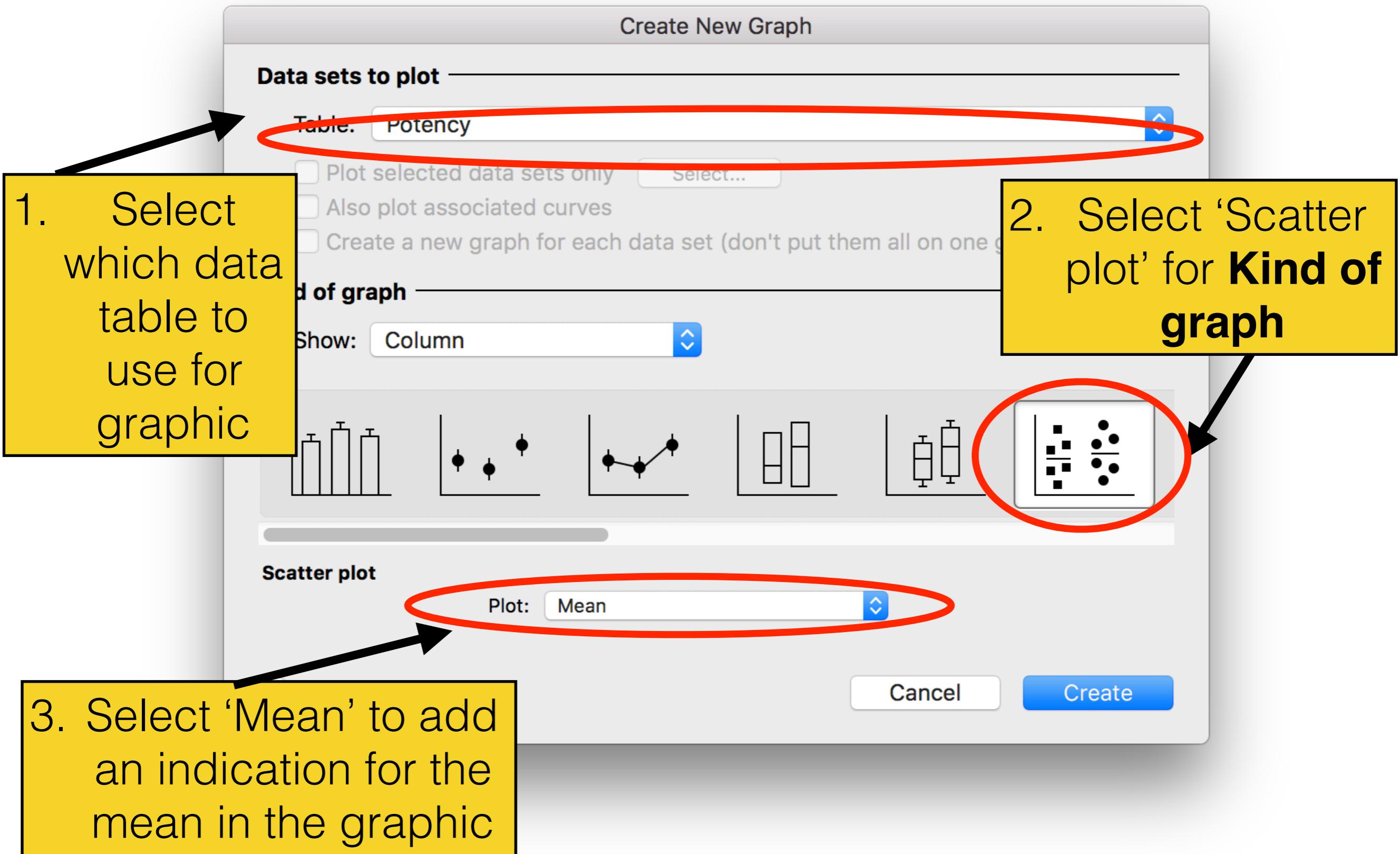
Scatter plots are used to display every data point. This makes it easier to:

- Find outliers
- Generate a general idea of scatter
- Estimate statistical summary measures

# Create a New Graphic in GraphPad



# Create a Scatter Plot for a Single Variable



# Scatter Plots (2 variables)

Dependent vs. Independent Variables

- A scatter plot is used to visualize the relationship between two variables (often a dependent variable and an independent variable).
  - Typically, the dependent variable is plotted on the vertical (y) axis and the independent variable is plotted on the horizontal (x) access.

# Create a Scatter Plot

The screenshot shows the GraphPad software interface with two yellow callout boxes containing numbered instructions.

**1. Click on data table of interest in **Graphs** section**

A black arrow points from this text to the "potency - success rate" item in the "Graphs" section of the project tree, which is highlighted with a red oval.

**2. Select 'Points only' graph type**

A black arrow points from this text to the "Points only" icon in the "Change Graph Type" dialog box, which is circled in red.

The main workspace displays a scatter plot titled "potency - success rate". The x-axis is labeled "potency" and ranges from 85 to 115. The y-axis is labeled "success rate" and ranges from 0.4 to 1.0. The plot contains approximately 15 data points showing a negative correlation.

The "Change Graph Type" dialog box shows the "Graph family: XY" dropdown set to "XY". It also displays several other graph types: a scatter plot (circled in red), a line graph, a bar graph, and a histogram.

# What did we learn?

- Graphics are usually better than tables for presenting data
- Bar charts are good for nominal or ordinal data or for comparing a summary measure, e.g., mean, across groups
- Histograms, box-and-whisker plots, and scatter plots give the reader more information about the distribution of the data
- Scatter plots with two variables quickly display the relationship between the two variables.