

These are the step-by-step instructions for the '**New and Improved Formula Editor in JMP 13**' demo. This contains talking points and also the demo steps. Demo instructions are underlined and in bold to highlight what is done in JMP.

1. **Click Big Class button** to open Big Class.jmp data table, **create new column, edit formula**
  - a. **Show in comparison to JMP 12.2 version w/ Big Class editing empty column** (preset)
  - b. Explain new flow of the formula editor
    - i. Left to right: functions - JMP 13 has much more intuitive function tree. Before we had to choose the function categories with pull-down menu
      1. **(JMP 12) Functions (grouped) -> Trigonometric**
      2. shows function category and expand to show individual f'ns,
        - a. **Expand Row and Numeric categories**
      3. click on category->flyout menu
        - a. **Click on Trigonometric category to show flyout menu**
    - ii. Looking back to JMP 12, Table Columns shared space with Constants, Variables and Parameters. Couldn't work with Columns, Functions and Parameters without changing pull-down menus.
      1. **(JMP 12) Table Columns->Parameters**
    - iii. For JMP 13, we get a REAL column list that you're used to using in platforms. List shows modeling type. We can change modeling type from formula editor and it propagates to the DT.
      1. **Context click on 'name' and make it 'None'**
      2. **Raise data table to show its column list updated.**
      3. **Change 'name' back to 'Nominal'**
      4. Column list's Red triangle menu allows settings to toggle display of data types, modeling types, grouped/ungrouped columns. Allows sorting and filtering: starts with..., name contains...
      5. **Click on Column Red triangle menu and show choices**
    - iv. Below the Column list we have an additional area for Table variable, constants, parameters and local variables.
      1. **Table Variable->Parameters**
    - v. Above workspace are simple function buttons, like on a calculator. Couple of new buttons, 'X' is clear entire formula and undo/re-do (long requested enhancement) arrows
      1. **Hover over 'X', undo and redo as mentioned**
    - vi. Large workspace showing formatted formula.

- c. Can expand formula tree, e.g. Discrete Probability to show individual functions
    - i. Can resize formula and column areas individually
      - 1. **Expand and/or shrink formula and Column columns.**
      - 2. **Shrink formula or column width to 0**
    - ii. Resizing from the corner will keep column widths the same and resize the workspace
      - 1. **Drag bottom right corner and resize whole Formula Editor**
    - iii. If you accidentally collapse columns or get out of whack, you can reset the panel layout from the main red triangle menu. This resets the formula and column list column widths but leave window size unchanged.
      - 1. **LIRT->Reset Panel Layout.**
    - iv. Formula Editor remembers the window size last time you used it, so you won't have to resize it every time you run JMP, like we had to with previous JMP versions
  - d. This new version of the formula editor is reused in a couple other places. It's used to create computed columns in JMP's query builder and also used for Custom Format 'formulas'
2. OK, enough of the overview. Let's enter simple formula in our new column, :height/:age using clicking on columns and calculator buttons
- a. **Click 'height', click '/' calculator button, click 'age'**
  - b. Correcting mistakes is now simpler.
    - i. Let's assume you meant 'Weight' instead, you can
      - 1. **select ':height' term in workspace**
      - 2. select ':height' term in workspace to highlight what you want to change and then
      - 3. **Double-click :weight**
      - 4. Double-click :weight and it's replaced
    - ii. Now let's change it back to HEIGHT with a different (I think easier) approach
      - 1. Drag and drop new term directly over old term in workspace, i.e. drag 'height' and drop on top of the 'Weight' term in the workspace
      - 2. **Select :height column and drag and drop on top of :weight in workspace**
  - c. **Re-title column to 'Height / Age'**
3. As with prior versions of JMP, you can also edit formulas with the keyboard directly (if column names are easy and make sense)
- a. **Create new column and edit formula**
  - b. **Type ':weight/age' (colon on 1st, but not on 2nd).**
    - i. As you start typing, notice that a small version of the script editor pops up. We call this the 'tiny editor'.
    - ii. Doesn't matter if you type colon or not. Notice that Audrey typed a colon before weight, but not before age.
    - iii. Hit Enter and it displays formula as you would expect in the workspace
    - iv. **Hit Enter in tiny editor**
    - v. **Press OK to accept formula**
    - vi. **Re-title column to 'Weight / Age'**

4. Create new column to categorize these children. Use Match() function to label kids as "pre-teen", "teen", "young adult". First we will select 'age', since we will be matching different AGE values to categorize the kids.
  - a. **\*Create new column and edit formula**
  - b. **\*select :age column**
  - c. **\*Click on 'Conditional'->Flyout menu -> select Match.**
    - i. AFTER Selecting 'Match', notice a menu pops up asking if you want JMP to populate the Match() with the values it knows from the table. Select 'Add Match Arguments from Data'.
    - ii. **Select 'Add Match Arguments from Data'.**
    - iii. TRICK: Another way to do this auto-filling for these types of functions.
      1. **\*Delete formula with 'X' calculator button**
      2. **\*Select 'age'**
      3. This time we will **Expand function tree for 'Conditional'**
      4. Can also **SHIFT-click on Match function.** Auto-fills the values of :age for you
  - d. As we fill in this formula, we'll point out a couple of things
    - i. Notice that you can move the selection box in the workspace by hitting the arrow keys on the keyboard.
      1. **Up arrow** moves you "out" one layer of the formula
      2. **Down arrow** moves you "in" on layer
      3. **Left and Right arrows** move you 'forward'/'back' through formula terms
    - ii. **\*Fill in "pre-teen" for age 12**
    - iii. Hitting 'return' toggles you in/out of tiny editor
    - iv. **Hit Enter key several times and stop with tiny editor open**
    - v. You can force the editor to full-screen by **hitting the full-screen icon**
    - vi. **Hit OK** to return to edit mode.
  - e. **Fill in the rest of the ages: 13-15="teen", 16-17="young adult"**
    - i. Notice can **copy/paste** to fill in fields **using context clicks or Ctl-c / Ctl-V**
    - ii. JSL script editor is auto-sized to tiny or full-screen.
      1. **Using up arrow key** takes you to top of formula,
      2. **Hitting 'return'** here, again brings up the editor, but since this formula is larger, it brings up the editor as full-screen. JSL editor is automatically sized to clearly display the formula.
  - f. **Re-title column 8 as Category**

5. Custom formats. New for JMP 13.

- These use FE interface to create 'updates' to values being displayed.
- **Run Distribution in Big Class**
- 2 ways to add formatting to your data: 1) Change on reports or 2) change in your data tables directly.
- Custom formats can be added directly to an axis by updating Axis Settings.
  - This only affects THIS report.
- Custom formats can also update the display data table column values directly.
  - Doing it at DT will change the SOURCE of the data that is displayed for any reports you run from now on.
- Let's say we want to add Units (lbs) to our weight values.
- First way we can do this by editing axis properties on a report.
  - Want to add (lbs) unit to Weight on this Distribution report
  - Context click weight axis->**Axis Settings...**
  - **Format->Custom,**
  - **click on Set Custom Format** to bring up 'Formula Editor'. ONLY column is 'value'
  - Result of Custom Format is a character string, so want char(value), not value
    1. Char function can be found by **typing char in the filter above formulas**
    2. **click on Char**
  - Next want to concatenate string 'lbs'
    1. **Type concat in function filter**
    2. **Click concat**
  - **Type "lbs"**
- viii. Now, see :weight distribution shows 180lbs, etc
- ix. **Save to script window** and show JSL format.
- x. NOTE: This only changes that single report!
  1. **Run Bivariate** and notice that no 'lbs' for weight.

b. This time let's add Custom Format on DT column itself. Custom Formats can also change VALUE of what's being displayed, not just add descriptive words.

- i. Let's change Weight to kg by dividing by 2.2
- ii. **Bring up Big Class.jmp** data table
- iii. **Context click Column Info.. For :weight** column
- iv. **Format->Custom**
- v. **click on Set Custom Format** to bring up 'Formula Editor'. ONLY column is 'value'
- vi. Again, result is character string, so want do is divide value by 2.2, convert that to string, then concatenate " kg"
  1. **value/2.2**
  2. **Select entire formula**
  3. **Filter function to 'char'**
  4. **Filter to 'concat'**
  5. **Type " kg" --> char (value/2.2) | | " kg"**
  6. **Hit OK**
  7. **Change width to 9**
- vii. Add 3-4 (make it 9 width) to Format width in Column Info.. To account for added characters, but still showing ###. The value we are trying to display is too long because of the division by 2.2
- viii. Need to round computed value before converting it to a char.

1. Formula becomes: Char( Round( :value / 2.2, 2 ) ) || " kg"
    - a. **Column Info..**
    - b. **Set Custom Format**
    - c. **Hit down arrow twice** to highlight '(value/2.2)'
    - d. **Filter to 'round'**
    - e. **Type 2** for 2 decimals
  - ix. Couple things to NOTE:
    1. True data value in the DT is not changed. **Double-click on 1st row weight** we see 95. I think this is dangerous and tricky, so be careful
    2. Also, because you updated the column info, graphs using that data will also be changed.
      - a. **RERUN Bivariate** and show kg values now
  - x. **Close Dist and Biv reports.**
6. Last piece for Big Class, let's look at Cutting/Pasting formulas and readability improvements in JMP 13 compared to previous versions.
- a. (JMP12) We've run a StdErr Prediction formula in JMP 12.2
  - b. **(JMP12) Edit 'StdErr Prediction' Formula**
  - c. (JMP12) Bring up FE and look at the formula in workspace. DOESN'T resize horizontally to take advantage of wider workspace area
  - d. **(JMP12) Resize window to TRY better see huge formula**
  - e. **(JMP12) Double-click to edit formula.**
    - i. Very messy, hard to read. Basically a text editor
    - ii. **(JMP12) Context click->Copy**
  - f. Copy this formula to new JMP13 column
    - i. **JMP 13 - New column, edit formula**
    - ii. **Paste formula in**
    - iii. **Stretch workspace** to show how formula re-formats to use horizontal space
    - iv. Now **double-click** to bring up formula in **full-screen script editor**
      1. Nicely formatted, etc
    - v. **Hit OK** to show formula in workspace. Notice matrices
      1. **Select and double-click on [8x8]**, brings up full matrix
      2. **Now LIRT->Max Matrix size to show, set to 8.** Maximum size allowed is 15.
      3. Now [8x8] and [1x6] are fully displayed, but with values rounded to 4 characters.
7. **CLOSE Big Class and all reports.**
8. Back to Demo App and **click on US Population** to open US Population.jmp data table.
- a. Updating formula parameters directly. Look at X-formula, a simple exponential population growth formula starting in year 1790. B0 is initial population. B1 is the growth rate, here is 2.2%
    - i. **Click on '+' next to 'X-formula'** to bring up Formula Editor for that column
      1. '+' indicates there is a formula for that column
    - ii. Can **right click on B0->Edit** and update value. **Hit 'Apply'** to see DT cells update
    - iii. ALSO, easier trick to type **Alt-Shift click on value (not B0)** and edit Parameter in place. Type new value and hit enter. Again, hit 'Apply' button to update the DT cells
9. **Close US Population**

10. **Open Semiconductor Capability.jmp** data table. I like to use this data table for large number of columns. These formulas we are just to show the last few features. Really doesn't have anything to do with semiconductor data.
- a. Let's say we want ratio of sum of odd PNP's divided by sum of all PNP's.
    - i. **Edit formula for new column**
    - ii. **Filter formula for Sum** and select
    - iii. **Column List->Red triangle-> Starts With...** and **type PNP** and hit enter
    - iv. Column List: This list works like other selectable lists with Shift-click to select groups and ctrl-click to toggle selection of single items
    - v. **Select odd values of PNP\***
      1. 1st selection is added to formula, but 2nd (and 3rd, etc) are not added
      2. Once you have group selected you can add them in multiple ways
        - a. **Context click->'Replace the selected subexpression with columns'**
        - b. You now have sum of odd PNP's. Let's do this a different way using drag and drop.
        - c. **Undo**
        - d. Can **drag and drop selected columns** to any subexpression in workspace
          - i. To me this is easiest since don't have to highlight destination before moving columns over.
          - ii. As you drag over the formula subexpressions they highlight in blue.
          - iii. Just release mouse to drop that group into the formula
    - vi. **Select 'divide by' button** to now enter denominator
      1. **Select sum function** again
      2. **Select 1st item in list**
      3. **Shift-select last item** and **drag** into formula
- b. Now, let's make a "correction". Suppose we want to replace PNP1 with PNM1 in all places in the formula
  - i. Filter column list to show PNM1: **Red triangle->Starts with... PN**
  - ii. **Select one instance of PNP1** in the formula workspace, either one
  - iii. **Select PNM1 in column list** then
  - iv. **context click-> 'Replace All Occurrences of Selected subexpression'**
    1. Notice BOTH PNP1's changed to PNM1.
- c. Now we will make other edits to the formula. Let's change sum to multiplication for the numerator.
  - i. **Select numerator** subexpression in workspace
  - ii. **Alt-click on multiplication button**. All +'s change to '\*s
  - iii. Can also alt-click on functions:
  - iv. **Click 'Sum' function**
  - v. **Click 'Mean()' formula**
- d. New Formula Editor also has a full undo/redo stack while editing a formula
  - i. Click **undo** and **redo** to change the functions back and forth
  - ii. No more accidental destruction of your formula
  - iii. NOTE: once you hit OK, the undo stack is cleared, so can't undo after that...