Statistics for the Sciences

Descriptive Statistics with SPSS

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January 18, 2025

Lab topics

- We use the data set `kaufman.csv` in this lab
- Exploring Categorical Data
  - Frequency table
  - Bar chart
  - Pie Chart
- SPSS Syntax Introduction
- Exploring Numerical Data
  - Mean, median, mode
  - Histogram
  - Box-plot
- Resoureces learning SPSS
  - IBM SPSS Statistics documentation
    https://www.ibm.com/docs/en/spss-statistics/29.0.0
  - SPSS TUTORIALS from Kent State University
    https://libguides.library.kent.edu/SPSS/GettingStarted

Data Import

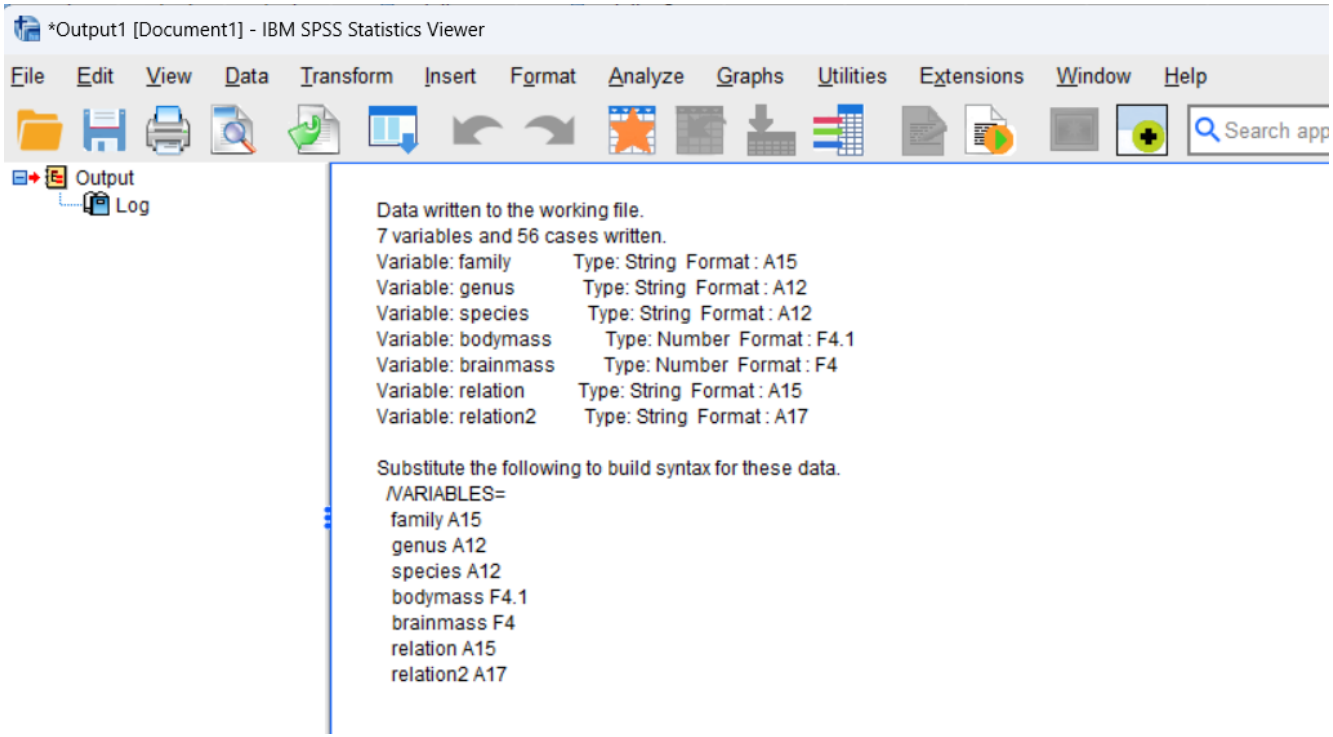
- Open the **IBM SPSS Statistics Data Editor**
  - SPSS' main window is the data editor. This is the only window that's always open when we run SPSS. We mainly use it only for inspecting our data.
  - It is not recommended to edit data in the data editor.
  - Each line is called a *case* and each column is a *variable*.
- An SPSS data file always has two tabs in the left bottom corner:
  - `Data View` is where we inspect our actual data and
  - `Variable View` is where we see additional information about our data.
- In the left bottom corner we find tabs for switching between Variable View and Data View.

Data Import

- SPSS Variable View
  - variables are shown as rows of cells.
  - The first column shows the variable name for each variable.
  - The 2nd column shows the data type for each variable.
  - The fifth column may or may not contain a variable label. This describes the exact meaning of each variable.
  - You can edit the label for each variable
  - The sixth column shows value labels: descriptions of the meaning of one, many or all values that a variable may contain.
    - ⋆ For example, a variable "Gender" might have value labels like 1 = `Male` and 2 = `Female`.

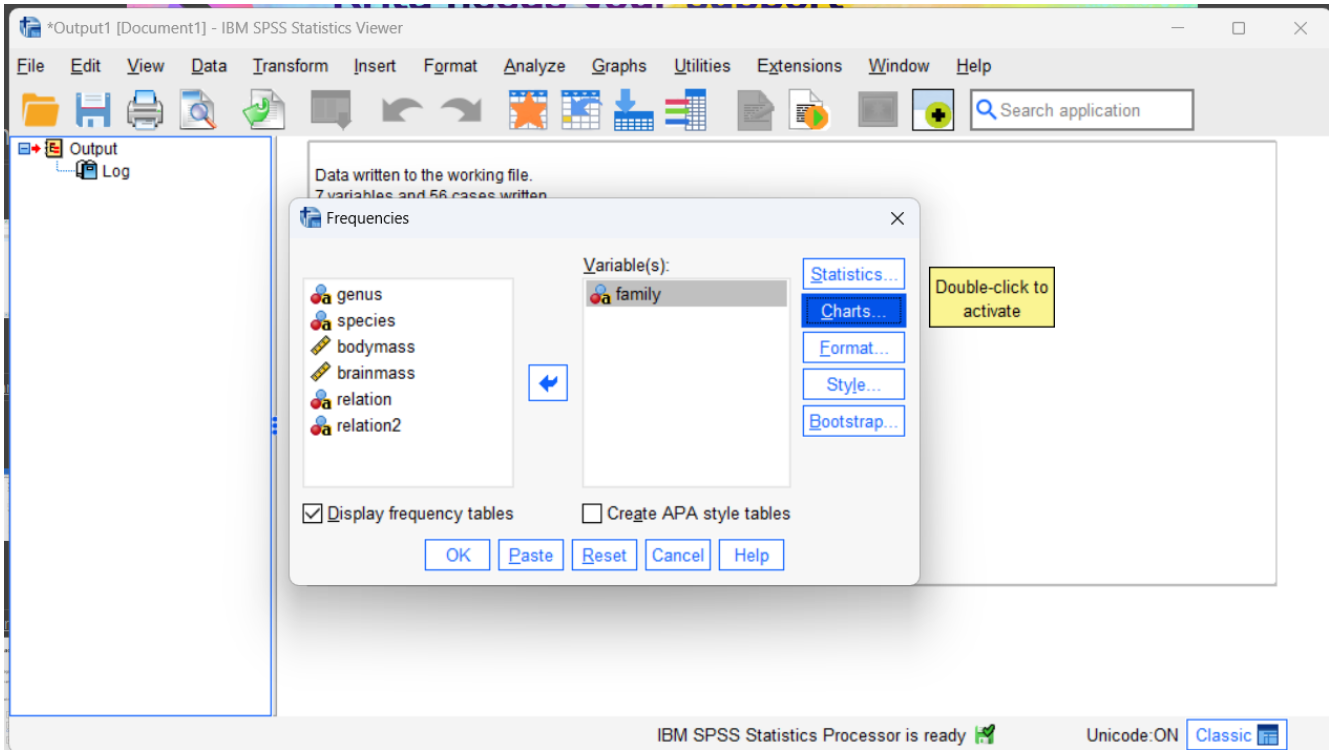
Data Import

- `File` → `Import Data` → `CSV Data ...`
- An **output viewer** window will be open after the data is successfully imported
  - We can save the contents of the Data Editor as an SPSS data file or `.sav` file

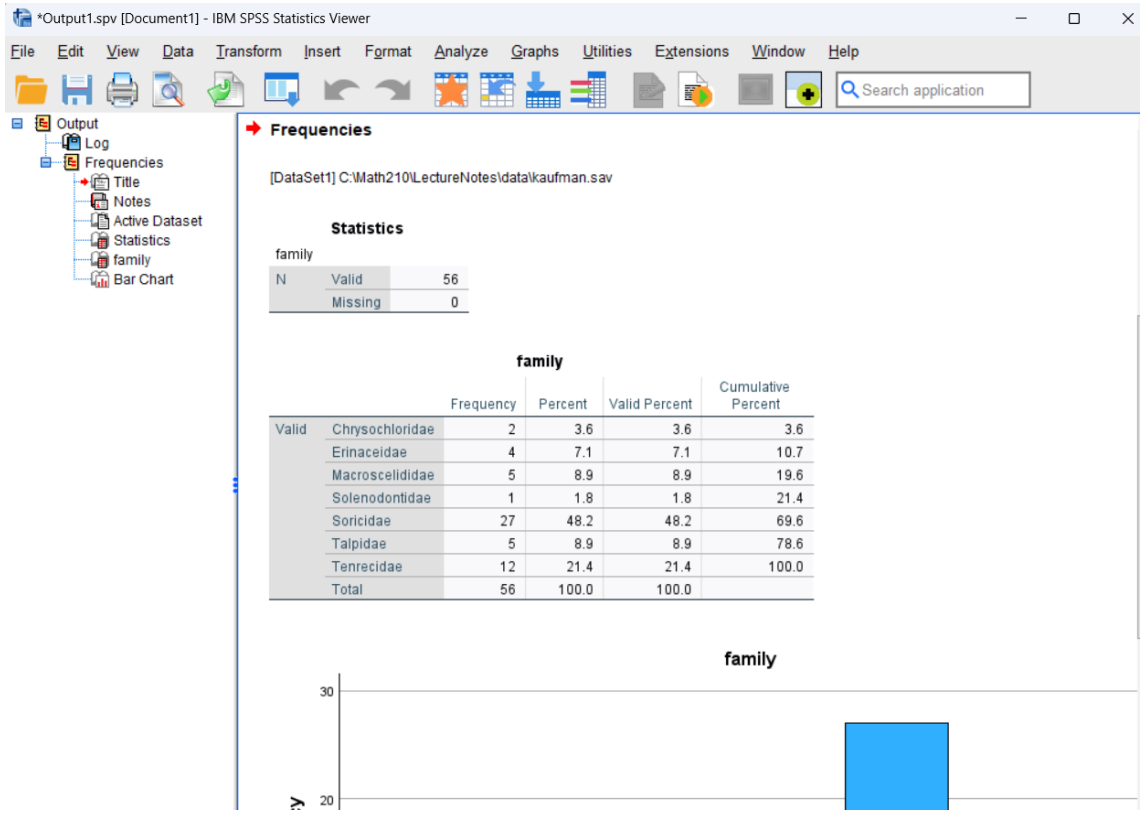


Frequency table, bar chart and pie chart

- In either window, click `Analyze` → `Descriptive Statistics` → `Frequencies ...`



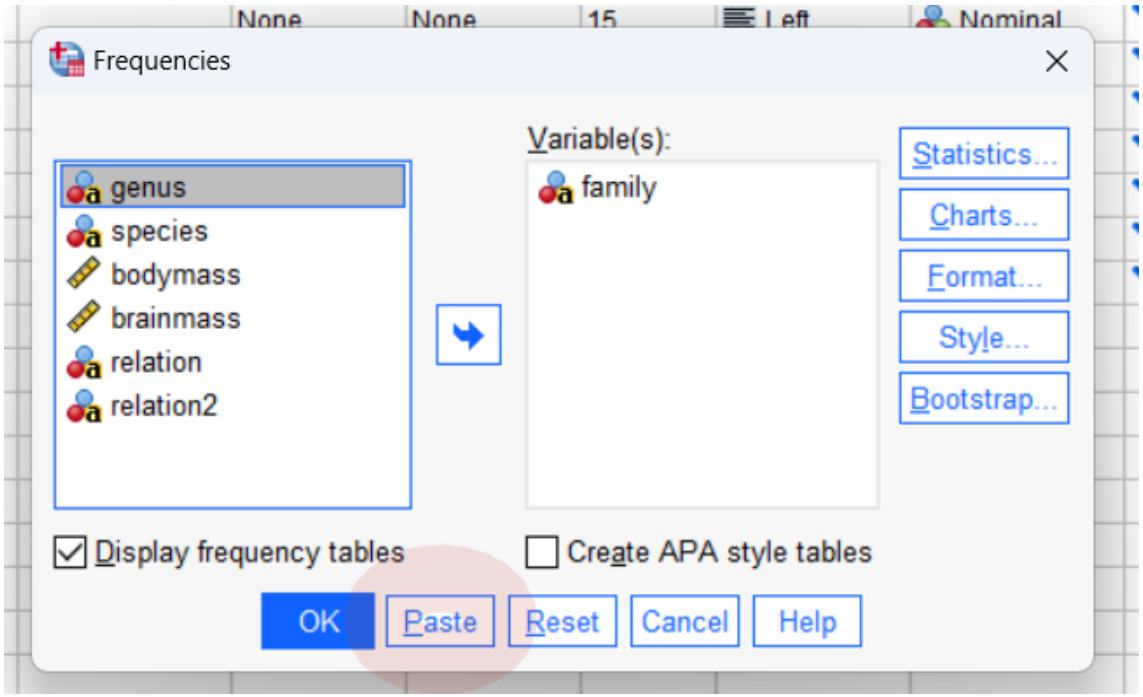
Frequency table, bar chart and pie chart



- Suppose we chose a bar chart, we then can click `Graphs` → `Pie...` add a Pie chart.

SPSS Syntax Introduction

- SPSS syntax is a language containing instructions for analyzing and editing data and other SPSS commands. Using syntax can provide greater flexibility and **reproducibility** of your analyses.
- SPSS users working directly from the menu may not actually see they syntax they're running.
- Now let's suppose we'd like to gain some insight into how the bar chart is created. How to paste/use SPSS syntax?



SPSS Syntax Introduction

- We now click the `Paste` button. Upon doing so, a new SPSS window opens which is known as the **Syntax Editor**.
- The Syntax Editor contains a FREQUENCIES command which holds the instructions we just gave SPSS in the Frequencies dialog.
- Review the syntax in the Syntax Editor to understand the commands and options used to create the bar chart.

```
* Encoding: UTF-8.
DATASET ACTIVATE DataSet1.
FREQUENCIES VARIABLES=family
  /BARCHART FREQ
  /ORDER=ANALYSIS.
```

SPSS Syntax Introduction

- We need to run the command to generate the results and the results will be added to the output window.
  - The simplest way to run syntax is to select the command(s) you'd like to run and click the `run selection` icon in the toolbar.
- You may write your own code

```
DATASET ACTIVATE DataSet1.
FREQUENCIES VARIABLES=family
  /BARCHART FREQ
  /PIECHART FREQ
  /ORDER=ANALYSIS.
```

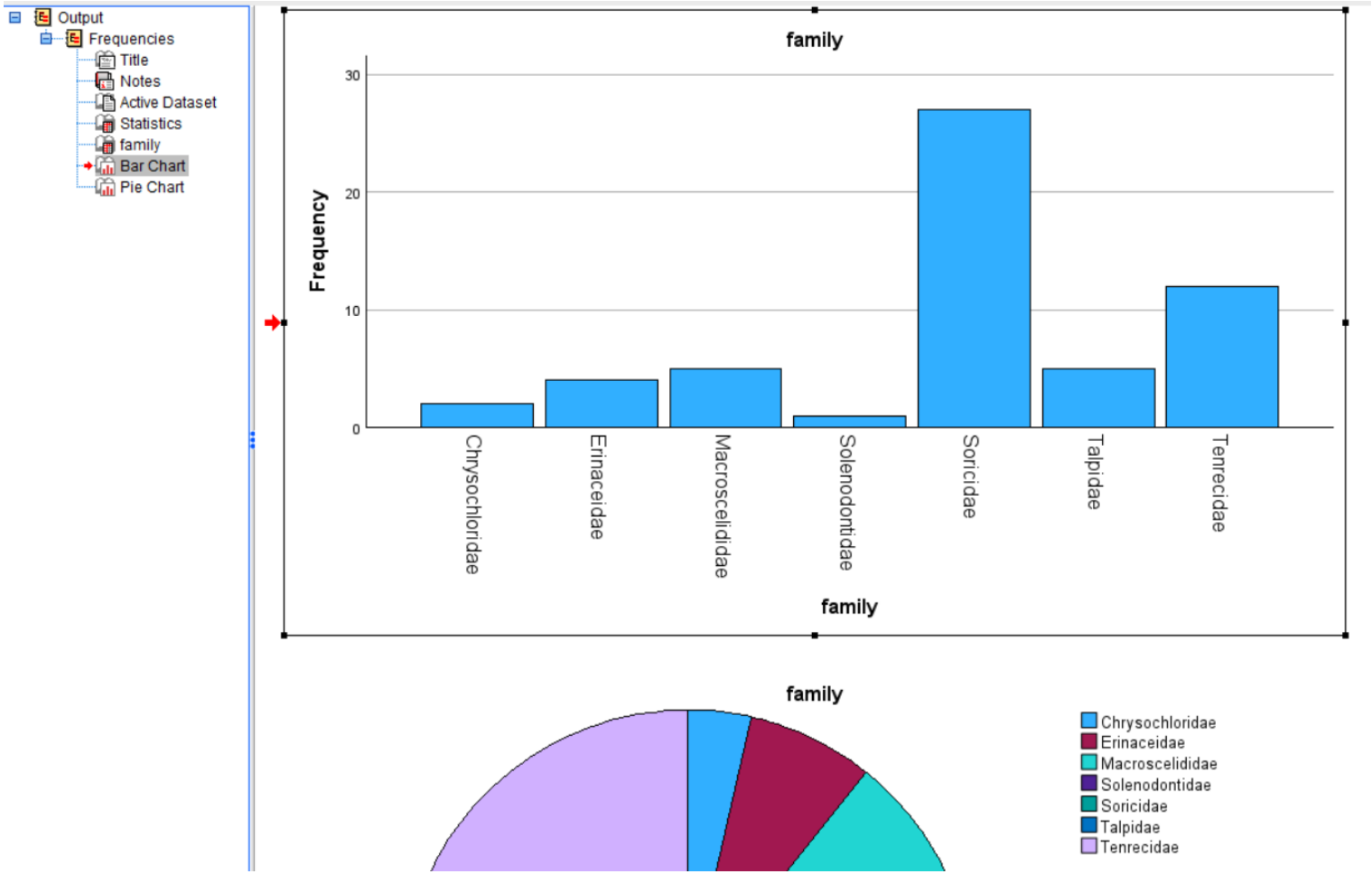
SPSS Syntax Introduction

- By using the Paste button and working with SPSS syntax, we can gain a deeper understanding of the operations you perform in SPSS and take full advantage of its powerful scripting capabilities.

Benefits of Using SPSS Syntax:

- Reproducibility: You can save your syntax and rerun analyses exactly as they were performed initially.
- Automation: Automate repetitive tasks by running the same syntax on different datasets.
- Flexibility: Syntax allows for more customization and options than may be available through the GUI alone.

Output viewer window

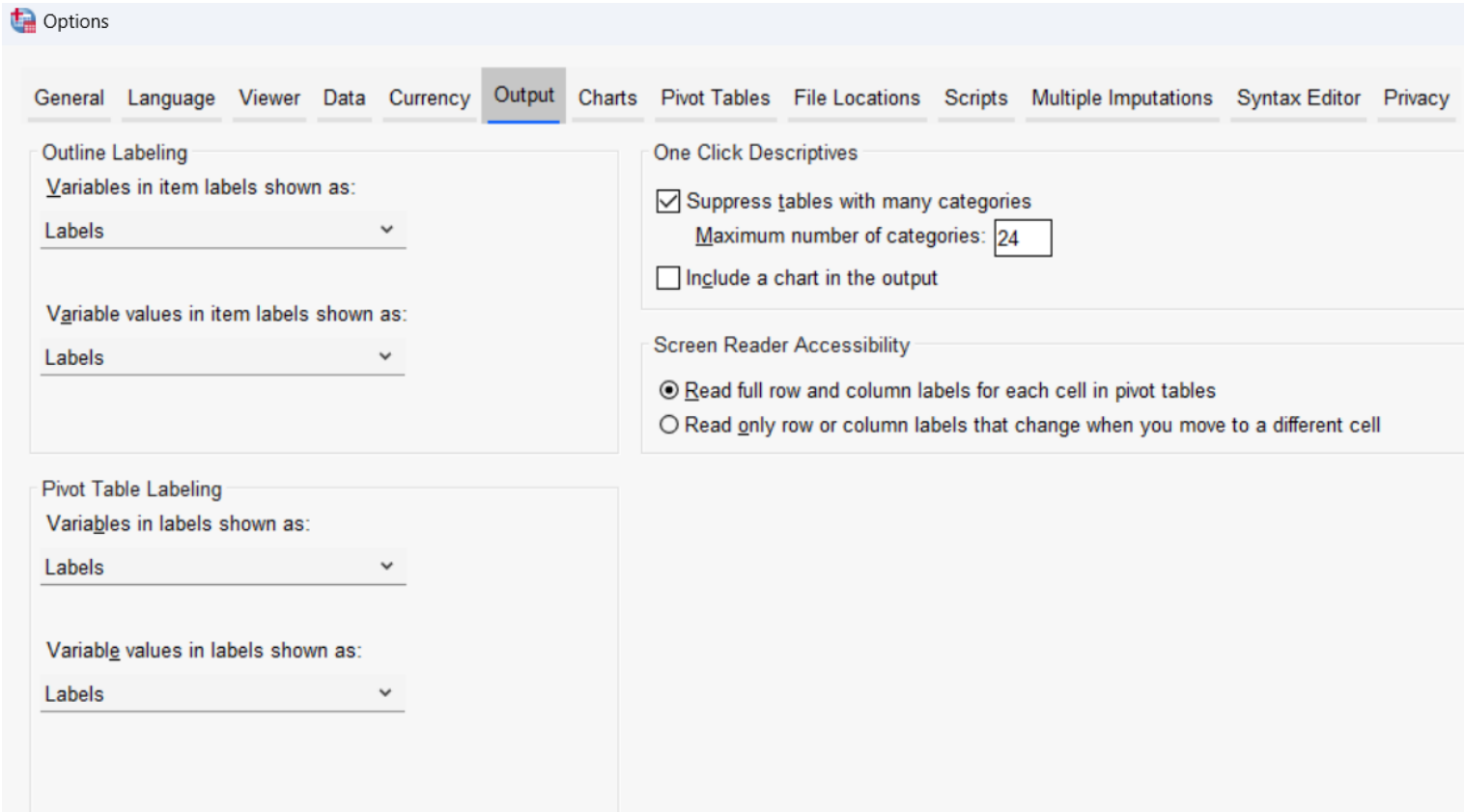


Output viewer window

- The Output Viewer is divided into two main sections: the Output Outline and the actual output items.
  - the actual output items -mostly tables and charts- are often exported to WORD or Excel for reporting.
- The output outline is mostly used for navigating through your output items
- SPSS often generates more output than you need. You can delete unnecessary items by selecting them in the Output Outline. Hold down the `Ctrl` key (or `Cmd` key on Mac) to select multiple items.
- You can also collapse and reorder output items in the outline
- To make some adjustments to our output tables or figures. One option for doing so is right-clicking the output and selecting Edit content SPSS Menu Arrow In Separate Window.

Variable and Value Labels in Output Tables

- When we are inspecting our data, we want to see variable names and labels in the output.
- we navigate to Edit SPSS Menu Arrow Options and selecting the Output tab.



SPSS Table Templates

- The default styling of tables is grey fonts with grey backgrounds.
- The best way to fix this is setting a table look before running any tables
  - Go to the menu: `Edit` $\rightarrow$ `Options`.
  - In the `Options` dialog box, select the **Pivot Tables** tab.
  - In the Pivot Tables tab, you'll see a section for TableLook.

SPSS Output - Charts

- First off, you can adjust basically anything about charts in the chart editor window. You can open one by right clicking a chart. This opens a chart editor window.
- You can apply styling -colors, borders, sizes and so on- to charts by setting a chart template before running any charts.
  - Go to the menu: `Edit` $\rightarrow$ `Options`.
  - In the `Options` dialog box, select the **Charts** tab.
- The easiest way for adjusting output items is using the pivot table editor and chart editor windows as discussed above.
  - Manually adjusting output items waste a lot of time.

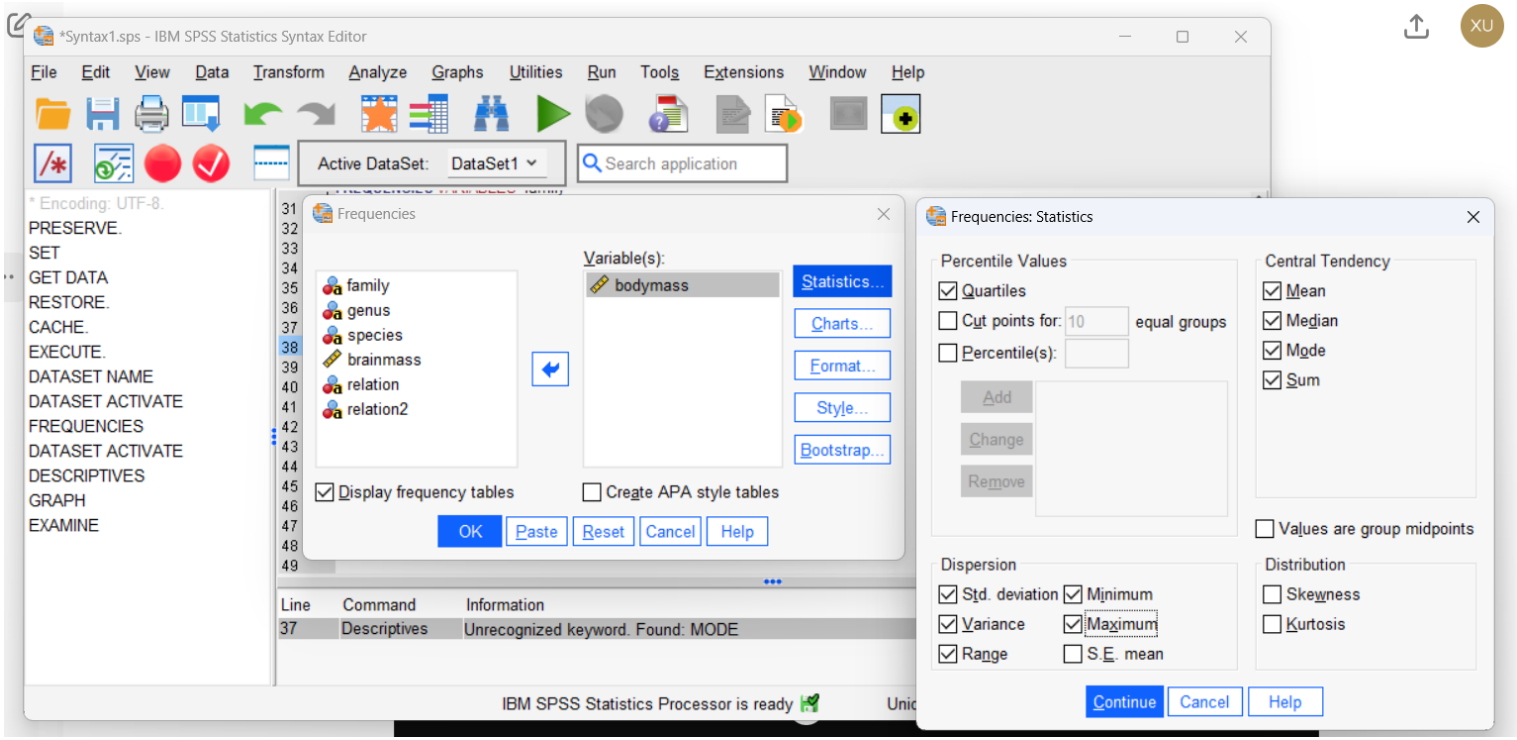
SPSS Output Export

- Output to WORD: A great way to convert SPSS output to WORD is exporting all contents of the output viewer in one go. You can do so by navigating to `File` Menu $\rightarrow$ `Export...`
- If you need only a handful of output items in WORD, you can just copy-paste them.
- You can convert all contents of your output window -including all tables and charts- in one go to a single Excel sheet.

Exploring Numerical Data: Statistics

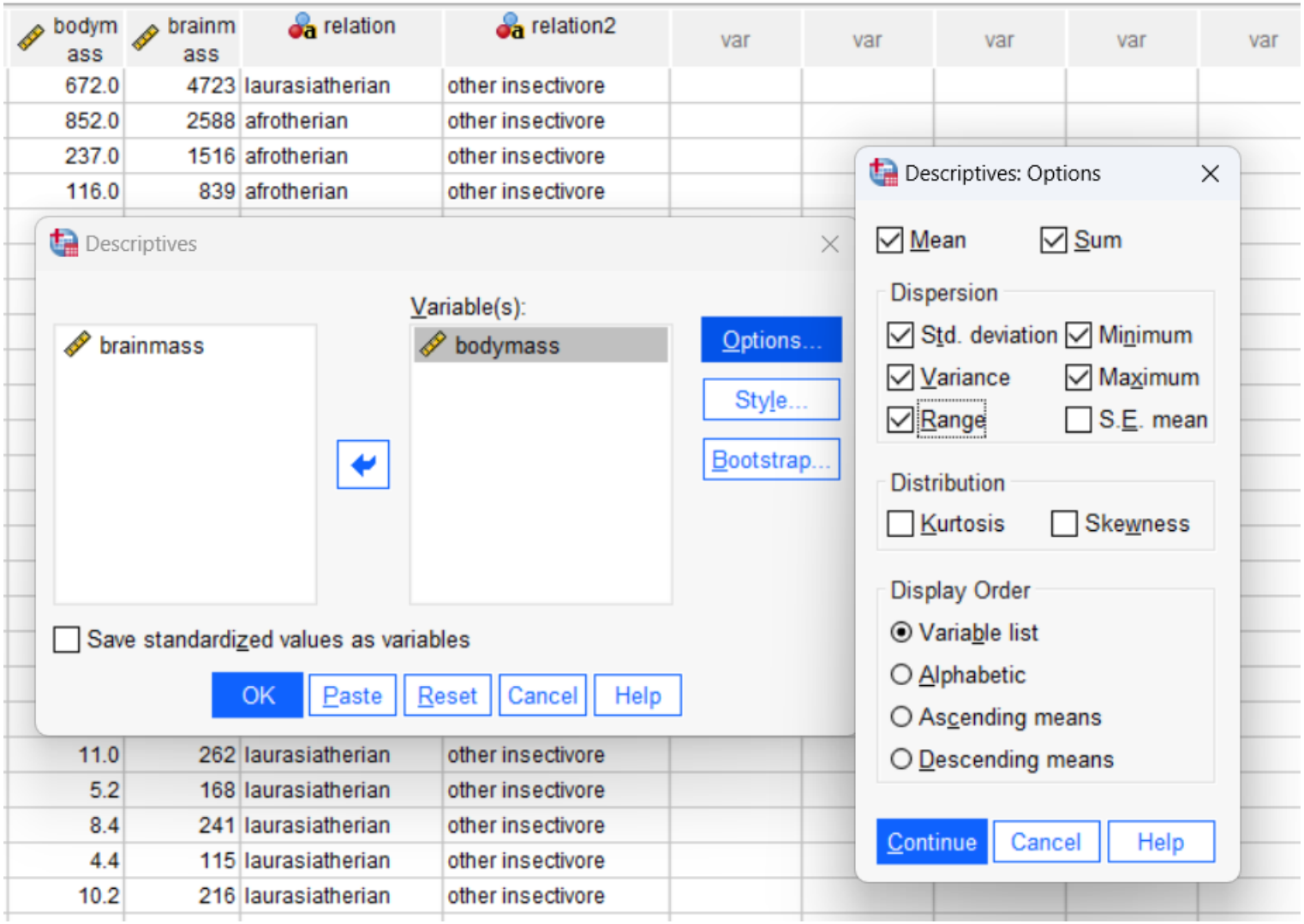
- Consider the numerical variable `bodymass`

`Analyze` → `Descriptive Statistics` → `Frequencies...`



Exploring Numerical Data: Statistics

- Or `Analyze` → `Descriptive Statistics` → `Descriptives...`



Exploring Numerical Data: Histogram and box-plots

- `Graphs` → `Histogram...`
- `Graphs` → `Boxplot...`
  - Choose `Simple` and `Summaries of separate variables` since we study one variable only.
- To get the quartiles only, we can `Analyze` → `Descriptive Statistics` → `Percentiles...`

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