UNIVERSITÄTSMEDIZIN GÖTTINGEN UMG

Introduction to Jamovi

Introduction to Statistics / Neuroscience 2023/2024

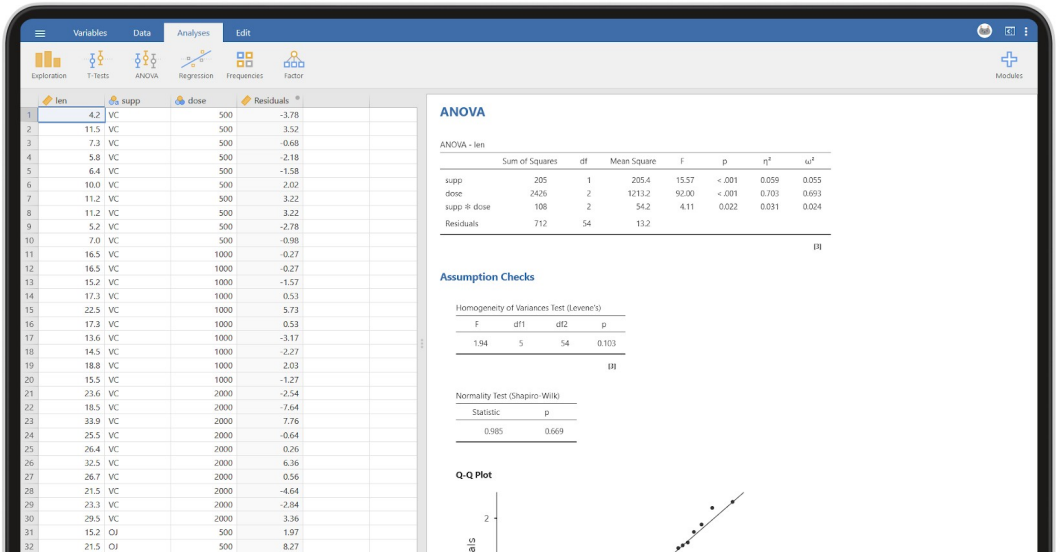
Renato Valladares Panaro - Department of Medical Statistics Göttingen

Agenda

- What is Jamovi?
- R integration
- The statistical community
- Featured packages for neuroscience
- Getting familiar with Jamovi
- Exercises (about 10 min of introduction + ~1.2 hour of guided exercises)

What is Jamovi?

- Jamovi is a new “3rd generation” statistical **spreadsheet**.
- Designed from the ground up to be **easy** to use.
- Jamovi is a compelling **alternative to** costly **statistical products** such as SPSS and SAS.
- Jamovi is built on top of the **R statistical language**, giving you access to **the best** the statistics community has to offer.



R integration

- R excels in data analysis and **statistical** modelling.
- It offers a **vast collection** of packages for statistical analysis, hypothesis testing, and data visualization.
- R focus on reproducibility and transparency makes it **well-suited for research** projects.
- R strengths make it a preferred language in **data-driven domains** and for individuals working with large datasets.

Top companies working with Posit

source: https://posit.co/

Why Jamovi instead of RStudio?

- The RStudio IDE by Posit is the **recommended software** for development purposes while **jamovi** is preferred **for built-in analyses**.

- The software is comparable to point-and-click software such as IBM SPSS but can also work as an interactive computing platform. We aim to **reduce the learning curve** of the course.

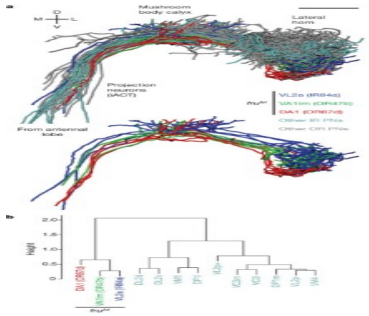
jamovi Stats. Open. Now.

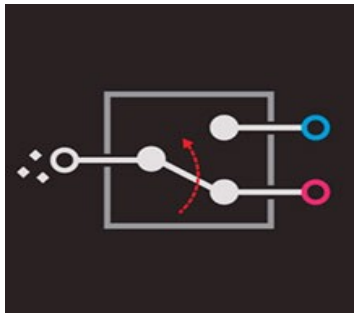
Interesting sources of comparison

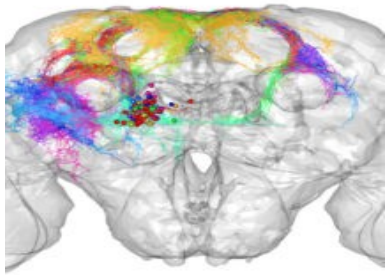
- For those who are already familiar with SPSS: From SPSS to jamovi: Linear regression.
- For those who are already familiar with JASP: Bringing jamovi and JASP labs into OpenIntro.
- Abbasnasab Sardareh, S., Brown, G. T., & Denny, P. (2021). Comparing four contemporary statistical software tools for introductory data science and statistics in the social sciences. Teaching Statistics, 43, S157-S172. (link)

Featured R packages in Neuroscience

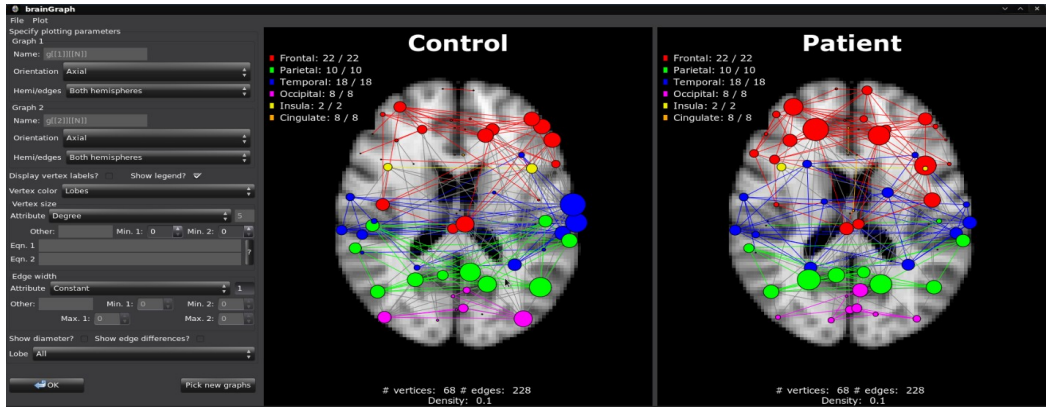
- nat: NeuroAnatomy Toolbox - Package for the (3D) visualisation and analysis of biological image data, especially tracings of single neurons.







- brainGraph - Package for performing graph theory analyses of brain MRI data.



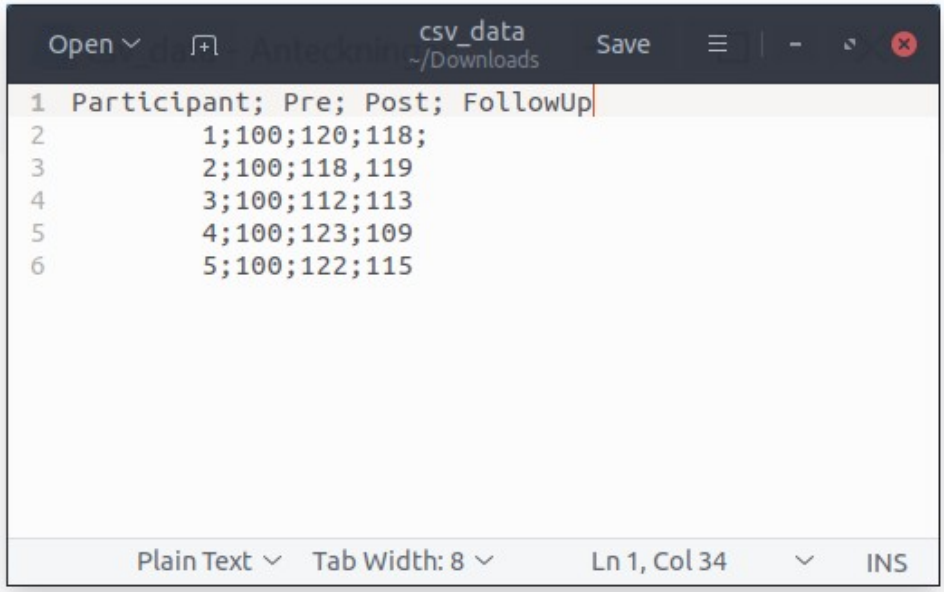
Installation

1. Go to jamovi website and **find** your **operating system**. (Linux users will probably need to install the flatpak library – ask me if you need help!)

5 minutes to install!

First steps in jamovi

- Does anyone need help with the **installation**?
- If not, go to the **supporting doc First steps in jamovi**.
- **Import** the following data to Jamovi.
- How to import data?
  - Type in a text note and save it as a .csv file.
  - Right-click and choose:
    - "Open with... Jamovi"



10 minutes to do so!

Analyses

- Try to **reproduce** the analysis you saw in the **first video** (First steps in jamovi).
- Copy the analysis and paste in a word/ppt file as in the **second video** (First steps in jamovi).
- The data regards to the The **Effect of Vitamin C** on Tooth Growth in Guinea Pigs.
  - *ToothGrowth.csv* file.
- Format: A data frame with 60 observations on 3 variables.
  - length (Decimal): **Length** of odontoblasts (cells responsible for tooth growth).
  - supp (Nominal): **Delivery method** type (VC - ascorbic acid or OJ – orange juice).
  - dose (Nominal): **Dose** in milligrams/day (0.5, 1.0 or 2.0).

Guinea Pigs

Analyses

- Download the ***ToothGrowth*** dataset here.
- Try to **reproduce** the analysis you saw in the **First steps in jamovi video**.

ANOVA

ANOVA - length

	Sum of Squares	df	Mean Square	F	p
supp	205	1	205.4	15.57	< .001
dose	2426	2	1213.2	92.00	< .001
supp ✻ dose	108	2	54.2	4.11	0.022
Residuals	712	54	13.2		

15 minutes!

The Spreadsheet (Data Variables)

- Available **data types**: Integer, decimal, text.
- Available **measure types**: Nominal, ordinal, Continuous, ID.
  - The data type is chosen **automatically** according to the measure type.
  - ID is intended to **identify** the rows.
- **Exercise**: Try to **change** the name of the variable “len” to “lenght” (or vice-versa) using the F3 shortcut.

5 minutes!

	len	supp
1	4.2	VC
2	11.5	VC
3	7.3	VC
4	5.8	VC

The Spreadsheet (Computed Variable)

- **Exercise:** : Use the “add” button to **create** the following variables.
  - LOG10(len)
  - VMEAN(len)
  - (dose - VMEAN(len)) / VSTDEV(len)
  - Z(len)
- **Exercise**: Write a description for **each variable** you created.

E.g.: LOG10(len): Logarithmic length of odontoblasts (base 10)

10 minutes!

The Spreadsheet (Computed Variable)

- **Suggested description**
  - LOG10(len) = “Logarithmic length of odontoblasts (base 10) ”.
  - VMEAN(len) = “Average length of odontoblasts (base 10) ”.
  - (dose - VMEAN(dose)) / VSTDEV(dose) = “ Odontoblasts' length Z-score”.
  - Z(dose) = “Odontoblasts' length Z-score”.

- There are **many ways** to reach out the same result**!**

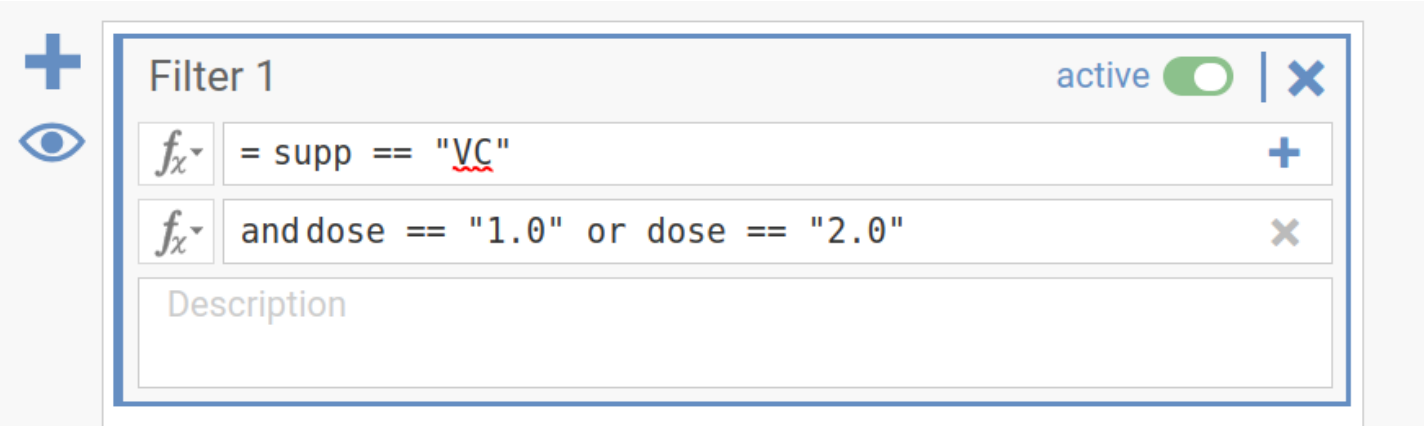
The Spreadsheet (Filters)

- How many pigs were **administered with** ascorbic acid (**VC**)?
- How many of them were given a **VC dosage exceeding 0.5 milligrams** per day?
- How could you estimate the difference between observed odontoblasts in pigs that received ascorbic acid (**VC**) with a dosage **below 2.0 milligrams** per day compared to those that received **lower dosages and/or** orange juice (**OJ**)?

10 minutes!

The Spreadsheet (Filters)

- How many pigs were **administered with** ascorbic acid (**VC**)? **30 Guinea pigs** (half data).
- How many of them were given a **VC dosage exceeding 0.5 milligrams** per day? **20 Guinea pigs** (1/3 data).



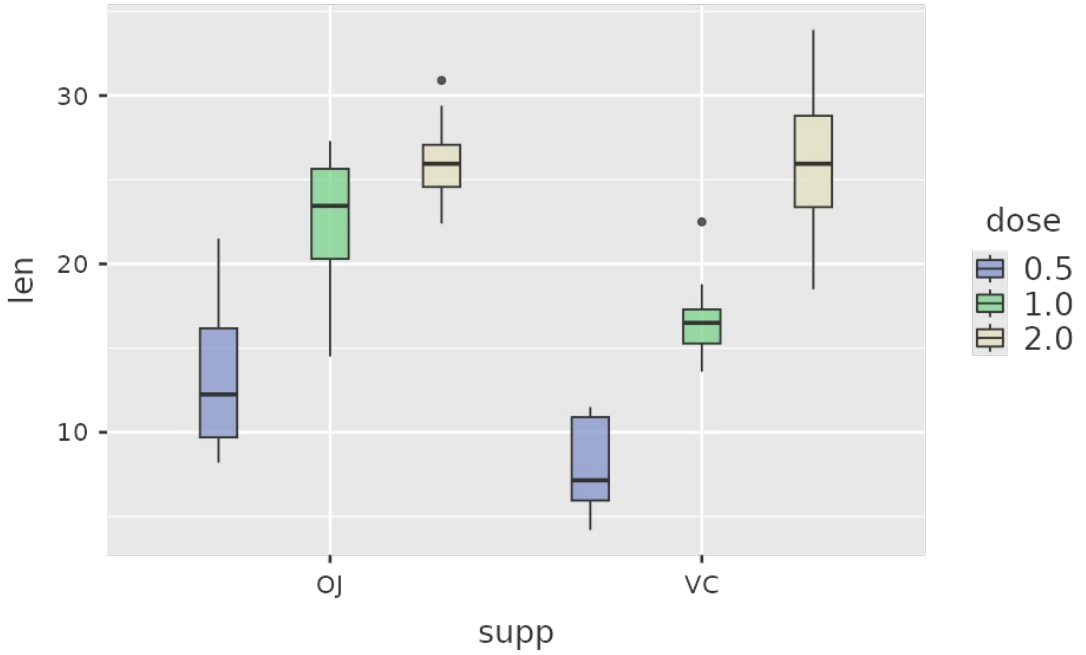
- How could you estimate the difference between observed odontoblasts in pigs that received ascorbic acid (**VC**) with a dosage **below 2.0 milligrams** per day compared to those that received **lower dosages and/or** orange juice (**OJ**)?
- **Statistics!**

Descriptive statistics example

- How could you estimate the difference between observed odontoblasts in pigs that received ascorbic acid (**VC**) with a dosage **below 2.0 milligrams** per day compared to those that received **lower dosages and/or** orange juice (**OJ**)?

Descriptives

				Percentiles		
	supp	dose	Median	50th	25th	75th
len	OJ	0.5	12.25	12.25	9.70	16.2
		1.0	23.45	23.45	20.30	25.7
		2.0	25.95	25.95	24.57	27.1
	VC	0.5	7.15	7.15	5.95	10.9
		1.0	16.50	16.50	15.27	17.3
		2.0	25.95	25.95	23.38	28.8



Updating the data

- **Importing/Exporting** and **saving** the results.
  - **Results:** Write the date, your name and the title as you prefer, and save the ANOVA results to a **.pdf file** using the Export tab.
  - **Script:** Save the **.omv file** (**jamovi script extension**) you have just created.
  - **Dataset:** Update the dataset *ToothGrowth* **including the variables created** (use the Export tab again).

5 minutes!

- Syntax mode **will not be covered** in this tutorial (R programming).