

## 2.2: Statistical software

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### Graphical systems

There are two groups of statistical software. First, *graphical systems* which at a glance do not differ much from spreadsheets but supplied with much more statistical functions and have the powerful graphical and report modules. The typical examples are SPSS and MiniTab.

As all visual systems, they are flexible but only within the given range. If you need something new (new kind of plot, new type of calculation, unusual type of data input), the only possibility is to switch to non-visual side and use macros or sub-programs. But even more important is that visual ideology is not working well with more than one user, and does not help if the calculation should be repeated in different place with different people or several years after. That breaks *reproducibility*, one of the most important principle of science. Last but not least, in visual software statistical algorithms are hidden from end-user so if even you find the name of procedure you want, it is not exactly clear what program is going to do.

### Statistical environments

This second group of programs uses the command-line interface (CLI). User enters commands, the system reacts. Sounds simple, but in practice, statistical environments belong to the most complicated systems of data analysis. Generally speaking, CLI has many disadvantages. It is impossible, for example, to choose available command from the menu. Instead, user must *remember* which commands are available. Also, this method is so similar to programming that users of statistical environments need to have some programming skills.

As a reward, the user has the *full control* over the system: combine all types of analysis, write command sequences into scripts which could be run later at any time, modify graphic output, easily extend the system and if the system is open source, modify the core statistical environment. The difference between statistical environment and graphical system is like the difference between supermarket and vending machine!

SAS is the one of the most advanced and powerful statistical environments. This commercial system has extensive help and the long history of development. Unfortunately, SAS is frequently overcomplicated even for the experienced programmer, has many “vestiges” of 1970s (when it was written), closed-source and extremely expensive...

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