[Warsaw Workshop] Dynamical Systems – Instructions for Participants

Content

The workshop is designed to accommodate various audiences with different levels of experience in programming and data analysis. The program is divided into two days:

- Day 1: General introduction to dynamical systems in modeling cognition. Introduction to recurrence quantification analysis (RQA). Demonstrations of the introduced concepts using web demos. **No programming will be required.**
- Day 2: Interpersonal coordination studies using movement tracking. Hands-on tutorial on movement tracking, data preprocessing, and analysis using RQA. **Analyses will be done in the R programming language.**

During the second day participants less experienced in R will have an opportunity to pair up with those more experienced to get the most of the workshop.

Required software

Before the workshop please install the latest version of Firefox (https://www.mozilla.org) or Chrome (https://www.google.com/chrome/) web browser. Please make sure that you are able to load the following website and track movement using your webcam: https://hill.psych.uw.edu.pl/mediapipe_test/

For the second day of the workshop, please install R and RStudio on your system. These two programs need to be downloaded and installed separately.

- R download page: https://cran.rstudio.com/ (choose the current version for your operating system).
- RStudio download page: https://www.rstudio.com/products/rstudio/download/ (choose RStudio Desktop).

You can find step-by-step guide how to install R and RStudio on Windows, Linux and Mac here: https://techvidvan.com/tutorials/install-r/

After installing R, you will be required to install a few R packages. In order to do so, open RStudio and execute the following command in the command line (prompt at the bottom-left corner of the window):

```
install.packages(c("tidyverse", "crqa", "lme4", "plyr", "reshape2",
"tseriesChaos"))
```

Afterwards, you may verify that the installation was successful by executing the following command in RStudio prompt:

```
library(tidyverse)
```

It should result in printing versions of the loaded packages without error messages (do not worry about "Conflicts").

If you encounter any problems with the installation of the required software or are unsure whether your setup will be adequate please contact Julian Zubek (j.zubek@uw.edu.pl).

Preparation for the workshop
If you have not used R before, it would be a good idea to go through an introductory tutorial. We recommend "Hands-On Programming with R" by Garrett Grolemund: https://rstudio-education.github.io/hopr/ (especially parts I and II).

To get a glimpse into the basic themes of the dynamical systems in the study of cognition we recommend reading the introductory chapter of the "Tutorials in contemporary nonlinear methods for the behavioral sciences" volume:

● Carello, C. & Moreno, M. (2005). Why nonlinear methods? In M. A. Riley & G. C. Van Orden (Eds.), Tutorials in contemporary nonlinear methods for the behavioral sciences (pp. 1-25). Retrieved March 7, 2022, from https://www.nsf.gov/pubs/2005/nsf05057/nmbs/nmbs.pdf