Home assignment ("take-home exam"): Stats III Mixed-Models 2014
Deadline: March 31, 2014, 1 minute before midnight; send your materials via email to Bernd Figner (b.figner@psych.ru.nl)

(A) What you have to hand in:

1. Word or pdf document that describes data analysis, results, and brief conclusions/interpretation of results, and includes figures (including figure legends). Maximum length: 6 A4 pages (not counting the title page and references)
(see also more details below)

2. The used data set (in csv format)

3. Commented R script
The script has to be commented in enough detail that a person with R knowledge but no knowledge about the data set/task you used, can understand what you did in this script. Also: The script has to work, i.e., besides adjusting the path to the working directory, the R script needs to be able to run as is.

NOTE: Everybody has to hand in their own work! Unless you have specific *clarification* questions, do NOT post your questions related to doing the take-home exam on BlackBoard.

(B) What you have to do

Do one or more mixed-models, including all the preparatory steps (such as reading the data, centering variables, merging data frames etc etc), diagnostics before running the model(s), diagnostics after running the model(s), get p values.
Report the model and results as if writing the results section for a paper that you would submit to a scientific journal. Follow APA style (i.e., also include a brief reference section). There is no need for an introduction or methods section with the exception that if you use your own data set (which I very strongly encourage), include a short description of the study design and used tasks/measures.

The **goal** is that you demonstrate that you can do all steps involved in a mixed-effects models analysis and report the results in text and figure. Thus, the goal is not that you present some specific significant results, but that you demonstrate your understanding of both the practical and theoretical aspects, and can evaluate the various steps involved in mixed modeling (this also means, for example, you can comment on the model residuals).

You can either use your own data for the take-home exam or you can use the data that I provide.

(C1) Some minimal requirements for the mixed-model(s), *if you use your own data*

I strongly encourage that you use your own data for this take-home exam. To make sure that the task is similarly difficult/easy as when using the provided data set, there are a few minimal requirements.

- At least 1 DV

- At least 3 fixed main effects plus at least 1 interaction; at least 1 of these effects should be within-subject and at least 1 between-subject
- At least 2 random effects (follow the Barr et al. (2013) "keep it maximal" advice and follow their suggestions if you need to simplify the model)
- p values for fixed effects determined via one (or more) of the following: anova(), Anova(), bootMer(), drop1(), KRmodcomp(), PBmodcomp()

--> More details what to include etc, see point (D) below!

(C2) Minimal requirements if you use the CCT data set I provided

Important: At the end of this document, you find explanations regarding the data set and the variables it includes!

- At least 1 DV
- Include at least the following fixed-effects predictors in your model (plus others as you see fit) (specify the random effects as it is appropriate, following the advice by Barr et al. (2013) to "keep it maximal" whenever possible)
    - hot vs. cold CCT
    - order (first or second of the two CCTs)
    - probability (i.e., number of loss cards)
    - gain amount
    - loss amount
    - block
    - whether the trial (=game round) was "censored" or not (see explanations below)
    - at least one of the variables from the demographics data
- at least 2 interaction terms: of those interaction terms, at least 1 has to be all within-subjects
- to be sure that you interpret all effects correctly, you can (but don't have to) use follow-up analyses (e.g., following up a model using the whole data frame with one or more models using only parts of the data frame); plotting and descriptives also help to understand what's going on in the data.

Your CCT analyses should answer the following questions (but feel free to investigate additional research questions!)

- Does risk-taking differ between the hot and cold CCT? If so, how?
- Does risk-taking change across blocks? If so, how?
- Is risk taking influenced by (a) probability (= number of loss cards), (b) gain amount, (c) loss amount? If so, in which directions? Do these effects differ between the hot and cold CCT? If so, how?
- What's the relationship between the demographics variable you chose and risk-taking?

(D) What has to be included in the word/pdf document that you have to hand in?

- If you use your own data, briefly describe the task/study including the relevant measures
- Describe the model setup (including if you did some preparatory steps such as transforming the data)
- If you did some model-selection procedure, explain the rationale and the involved steps
- Describe the results

    - Include both the statistical significances (including the coefficients), but also some descriptives, for example, when analyzing the effect of a factor with two levels, report the two means (means can be given in text or in table)
- Several figures, including figure captions (see next point for details)

Figures:
(a) Model-diagnostic plots

- plot(mymodel)
- distribution of residuals
- scatterplot of raw data versus predicted data

(b) Result-related plots

- Show effects of fixed main effects and interaction(s)
- At least 2 such plots (but ideally, for each investigated effect of interest, there should be a figure; as you would do it most likely when writing the results up for publication in a scientific journal)
- At least one xyplot that shows how participants differ (or not) from each other in some effect (an example could be to show how participants differ in the effect of loss amount on risk-taking, perhaps also separately for the hot and cold CCT)

If you decide to use the provided CCT data, there are several more documents on BlackBoard:

- 2 data sets: one with the CCT data, one with the demographics (I created for each a csv and an xls version for your convenience)
- a pdf file with explanations what the variables are, a brief task description (in case you can't remember), and some hints. Thus: Make sure to thoroughly read that document as well!