**Supportive Information**

The scripts in this folder are based on scripts from:

Chen, T, & Hartshorne, J. K. (2021, June 1) Data: More evidence from 1.1 million subjects that the critical period for syntax closes in late adolescence. <https://osf.io/vab8j/>

Hartshorne, J. K., Tenenbaum, J. B., & Pinker, S. (2018). A critical period for second language acquisition: Evidence from 2/3 million English speakers. Cognition, 177, 263–277. <https://doi.org/10.1016/j.cognition.2018.04.007>

The original datafile can be found at <https://osf.io/pyb8s/files>

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

This folder contains the following R scripts:

*0-Preparing Data for Analyses (tofit and data\_binned) LL.R*

This script prepares the data. It is based on the script "analyze\_learning\_curves.R", that we received from Tianhu Chen and Joshua Hartshorne.

*1X-Analyses XXX LL.R*

These seven scripts contain mostly the same code with small modifications. For all seven learner group configurations, the script runs the Deoptim analyses for both continuous and discontinuous models and calculates the R-squares, SSEs, AICs and relative likelihoods. The seven configurations are:

A) all groups simultaneously,

B) monolinguals,

C) bilinguals,

D) immersions,

E) non-immersions,

F) early immersion learners (1-9),

G) later immersion learners (10-30).

The names of these scripts indicate the learner group configuration. We chose to have separate scripts with a lot of redundancy to make it easier to replicate a specific analysis. We tried to keep the formatting of the scripts as similar as possible. The scripts are based on "3-Analyses-final.R", which can be found on <https://osf.io/vab8j/>.

*2-aggregate\_functions LL.R*

This script contains aggregate and smoothing functions used in the other scripts. This script is based on "analyse\_learning\_curves.R", that we received from Tianhu Chen and Joshua Hartshorne.

*3X-learnercurves\_functions XXX LL.R*

These scripts contain functions for the continuous and discontinuous learner curves for all seven learner group configurations defined above. There are ten scripts instead of fourteen, since the functions for the whole group of immersion learners are used for the early and later immersion learners separately as well. These scripts are based on the "helper-functions.R" script that can be downloaded from <https://osf.io/vab8j/>

*4-Plots learningcurves XXX LL.R*

These four scripts contain the code used for plotting the learning curves for all groups simultaneously. There are separate scripts for: 1) the continuous model only, 2) the discontinuous model only, 3) the discontinuous model for immersion and non-immersion learners separately, and 4) the continuous model for the early and the discontinuous model for the later immersion learners. This script is based on "learningcurves\_models.R", that we received from Tianhu Chen and Joshua Hartshorne.

*Bar Chart for Immersion learners LL.R*

Running this script will result in a Bar Chart which is referred to in section *Part 2: all four learner groups analyzed separately*.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The following sequence of steps is required in performing a complete analysis:

1. *Store the data and ALL the scripts in a folder of your preference*
2. *Next, run “0-Preparing Data for Analyses (tofit and data\_binned) LL.R”*
3. *Run the “1X-Analyses XXX.R” script of your choice*
4. *Finally, run the associated “4-Plots learningcurves” script.*
5. *Repeat this procedure starting from 3) for other learner groups.*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Note 1: The figures generated by 4-Plots learningcurves lot\_early and lot\_later LL.R, and Bar Chart for Immersion learners LL.R are not included in the manuscript.

Note 2: Information on the origin of the various R scripts is included at the top of each R script.

Note 3: The *2-aggregate\_functions*, and the *1X-Analyses* scripts still contain many functions defined by Joshua Hartshorne and Tianhu Chen that are not used in the present study. We have kept them to give a picture of additional possibilities.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Enjoy