

Math Modeling, Week 7

Fit the diffusion model to the data in [SpeedAccData.txt](#)* by adapting the code in [diffusionFit.m](#).

The data are from a lexical-decision task, with four stimulus types (words of three frequency levels, and nonwords) and two instruction conditions (speed and accuracy). To make things realistic, I'm giving you the original data file I received (from E.J. Wagenmakers, via Chris Donkin), along with the explanation of the file:

The columns are:

- 1) pnum = participant number
- 2) blocknum = block number
- 3) practice = 1 if practice block, otherwise 0
- 4) speedaccuracy = 1 for speed-instruction and 0 for accuracy-instruction
- 5) stimulus = unique identifier of stimulus, stimuli are nested in frequency conditions
- 6) frequencycondition = Code "1" means "high frequency word", code "2" means "low frequency word", and code "3" means "very low frequency word". Codes 4, 5, and 6 mean "nonword" (4 is derived from a HF word, 5 is derived from an LF word, and 6 is derived from a VLF word).
- 7) response = 0 is nonword, 1 is word, -1 is not interpretable response (i.e., pushed a button, but not the right one and also not the one next to the right button)
- 8) t_in_sec = RT in seconds
- 9) censor = 1 if value is eliminated from further analysis; practice block, uninterpretable response, too fast response (<180 ms), too slow response (>3 sec)

Here's what you'll need to do to model these data:

- Aggregate across subjects and blocks (i.e., ignore the participant and block columns)
- Exclude practice trials
- Allow separate thresholds and starting points for speed and accuracy conditions
- Aggregate over individual stimuli (i.e., ignore the stimulus column)
- Combine the three nonword categories, yielding four stimulus types, and allow a different drift rate for each type
- Exclude trials with uninterpretable responses
- It's common practice to exclude excessively short or long RTs, so you can simply use the censor column to exclude these extreme RTs, practice trials, and uninterpretable responses

*Wagenmakers, E.-J., Ratcliff, R., Gomez, P., & McKoon, G. (2008). A diffusion model account of criterion shifts in the lexical decision task. *Journal of Memory and Language*, 58, 140-159.