



Exercise on the masked form priming megastudy

Exercise C. 1: Open bigram modelling of the masked form priming megastudy.

Loading the model

To start, begin a new session of the simulator. In the model chooser dialog, click the Customise button, and then load the Relative Position model with the “words6.eNd” vocabulary (the megastudy used 6-letter target stimuli, so we’ll use this set of about 5000 6-letter English words).

Loading the stimulus set

To save time, we’ll run a representative subset of the full stimulus set, consisting of 24 target words and each of the 28 primes associated with those targets (i.e., 672 stimuli in total). You’ll find this set in the subfolder called fpp – it’s called fpp.subset.24.eNd.

Running the simulation

Set the trial to pldt (i.e, primed LDT). Drag the prime and target column headers from the stimulus set to the corresponding boxes in the trial widget of the control bar. Set the prime_duration to 5. The Run button should now be green. Click it to run all 672 trials.

Looking at the results

Click on the  button to merge the simulation results with the stimulus set, so that we have the condition information for each trial. You might now try to get the means (and SDs etc) by running the summary_stats script via the R button.

There’s also a specialised script for examining how model predictions compare with the actual megastudy data. To access this, make sure that the Results tab that has focus is the one that combines the model output and the condition information, then click on the Plot button and choose fpp_plot. Click Apply on the dialog to see a default scatter plot showing the observed priming effects by predicted priming effects; each dot represents one of the 26 related prime conditions (priming effects are measured relative to the average of the two unrelated prime conditions). Note that the predicted priming effects have been rescaled to be on the same scale as the observed data (but the intercept is constrained to be zero). You should find that this model does quite a good job of explaining the data, although there are some conditions where there is a noteworthy discrepancy between the model and the data. Try the different options for the labels arguments to get a better sense of where the





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different conditions lie and how large the residuals are. Note that you need to press Apply for changes to take effect. To come back to this dialog later, if it's closed, click on the Spanner icon above the plot.

Next, try changing the plot.type from xyplot to residuals. Conditions with relatively large residuals are highlighted – you can change the cutoff parameter to modify what gets considered as a large residual. Make a note of the conditions which are problematic for the model, and the direction of the discrepancy between model and data. We'll explore these conditions further in a moment.

Exercise C.2: Effect of bottom-up inhibition in the model

The model assumes that active bigrams send inhibition to incompatible words (in much the same way that active letters send inhibition to incompatible words in the original IA model). What is the impact of this inhibition? To find out, click on the Parameter Settings  button, and change the parameter called bwc::inhibition (it should be #10) from -0.015 to 0. This effectively eliminates bigram-word inhibition (make sure that the parameter turns red in the table). Now click Run to run the simulation again. The fpp plot should be updated automatically. What happens to the model's fit to the data? Which priming effects are now underestimated by the model? [Why is SN-M now greatly underestimated? Note scale change] If reducing bottom-up inhibition has a negative impact on the model, would increasing this parameter help? Try running a simulation to find out. Note that the  button allows you to restore the original parameter settings. Another aspect of the parameter that you could examine is the role of top-down feedback from words to bigrams – note that zeroing this parameter will reduce the level of equilibrium word activity, and so it may be necessary to reduce the identifier::threshold which is used for lexical decision. Which parameters are particularly affected by the absence of top-down feedback? Why?

Exercise C.3: Bottom-up input (“match scores”) of priming conditions

To return to running individual stimuli, click the x next to the stimulus set name in the trial widget at the top of the screen. Change the trial to “present”. Switch to the Model tab on the left and right click on the bigrams layer and select a bigram_match plot of the state. Run a stimulus. Change the template parameter in the plot settings dialog to “garden”. Try running different stimuli and see what bigrams are activated. Why is the TH condition(dengar) problematic for this model?

