

Supplementary Material E: Random Effect Structures

Here, we outline the procedure for the optimization of random effect structures in the analysis of the experimental data. Note again that different hypothesis tests run on different subsets of the data (for example, the tests for the frequency effects run on the data points for one setting and one response condition, while the tests for setting effects run on the entire dataset).

1. For *all* tests on a given subset, we start with a maximal structure that includes random slopes for all fixed effects (including interactions) specified in the hypotheses. This structure considers that `freq_target` and `freq_dist` are manipulated within-subjects and within-targets, `mod` is manipulated within-subjects and between-targets, and `response` and `setting` are manipulated between-subjects and within-targets. This means the different analyses will start with the following random effect structures:

- Effects of conceptual distance and frequency, Exp. 1 and Exp. 3, for each response format:

```
36      (mod*freq_target + trial_order|subject) +  
      (freq_target + trial_order|target)
```

- Effects of conceptual distance and frequency, Exp. 2, for each response format:

```
37      (mod*freq_target + mod*freq_dist + trial_order|subject) +  
      (freq_target + freq_dist + trial_order|target)
```

- Effects of response format, Exp. 1 and Exp. 3:

```
38      (mod + freq_target + trial_order|subject) +  
      (freq_target*response + trial_order|target)
```

- Effects of response format, Exp. 2:

```
39      (mod + freq_target + freq_dist + trial_order|subject) +  
      (freq_target*response + freq_dist + trial_order|target)
```

- Effects of task setting, pooled data from all three experiments:

```
40 (mod + freq_target + trial_order|subject) + (setting +  
    freq_target + trial_order|target)
```

2. If one GLMM estimated on a given subset of the data does not converge, then we will reduce the random effect structure for all models estimated on that subset by removing random slopes. This will be done first by complexity (interactions before main effects) and then by theoretical importance to the hypotheses, according to our own assessment (less important before more important). Each variable is removed from the by-target slopes before the by-subject slopes. This results in the following order of removal:

1. Interactions from the by-target slopes
2. Interactions from the by-subject slopes (`freq_dist` before `freq_target`)
3. `trial_order` from the by-target slopes
4. `trial_order` from the by-subject slopes
5. `freq_dist` from the by-target slopes
6. `freq_dist` from the by-subject slopes
7. `mod` from the by-subject slopes
8. `freq_target` from the by-target slopes
9. `freq_target` from the by-subject slopes
10. `response` from the by-target slopes
11. `setting` from the by-target slopes

For each subset of the data, we will thus keep the maximal random effects structure for which all estimated models converge.