**Appendix1 Descriptions for the random terms and the post hoc contrasts in the models**

**1.1 Accuracy rates of Stroop naming in SC**

The selected random predictors for the by-participant accuracy model was by-participant random intercept nested under dialectal background, χ2dialectal\_background|participant(15) = 322.32, p < 0.001, and for the by-stimuli accuracy model, the selected random predictor was by-stimuli random intercept, χ2stimuli(1) = 28.15, p < 0.001.

Regarding post-hoc contrasts of dialectal backgrounds, both the JN and SH bidialectal groups showed significantly greater accuracy than the BJ mono-dialectal group when presented with tonally congruent characters that competed segmentally (c8). The SH bi-dialectal group also showed significantly greater accuracy than the OD bi-dialectal group under competition from color characters (c5), as well as under competition from exact homophones of competing color characters (c6).

Moreover, fifty-two post-hoc contrasts of Stroop conditions within participant groups in the by-participant model and forty-five in the by-stimuli model were significant. Here, we only report the pairs with significant contrasts in only one aspect of ink-character relations: (1) two groups of bi-dialectals (JN & OD) and SC monolectals who lived in Shanghai (SC, but only in the by-stimuli model) showed significantly reduced accuracy when presented with competition from color characters (c5) as compared to those from exact homophones of competing color characters. (2) the Beijing SC monolectals (BJ) showed significantly reduced accuracy when presented with segmental competition from tonally congruent color characters (c8) as compared to when presented with competition from exact homophones of competing color characters (c9).

However, note that tone-alone post-hoc contrasts (c1 vs. c0, c3 vs. c4, c8 vs c5, c9 vs. c6/c7, c6 vs. c7) and the semantic contrast between color word congruency and homophone congruency (c2 vs. c3) were not significant within any of the participant groups.

**1.2 Stroop naming latencies in SC**

The selected random predictors were by-participant random slopes of the scaled order in the sequence of the same color as presented to the participant, χ2OrderSameCols|Parcode(3) = 18088.02, p < 0.001, by-stimuli random intercepts, χ2stimuli(1) = 198.79, p < 0.001, and random intercepts of pairs of ink color and character related color, χ2color-pair(1) = 167.22, p < 0.001.

Regarding post-hoc contrasts of dialectal backgrounds, OD bi-dialectals showed longer naming latencies in various conditions, as compared with the BJ monolectal group as well as the JN and SH bi-dialectal groups.

Moreover, 75 post-hoc contrasts of Stroop conditions within participant groups were significant. Here, we again only report the pairs with significant contrasts in one aspect of ink-character relation: All the participant groups showed (1) longer naming latencies when presented with competition from color characters (c5) as compared with from exact homophones of competing color characters (c6), (2) longer naming latencies when presented with competition from tonally congruent color characters (c8) as compared with competition from exact homophones of color characters (c9).

However, note again that tone-alone post-hoc contrasts (c1 vs. c0, c3 vs. c4, c8 vs. c5, c9 vs. c6/c7, c6 vs. c7) and the semantic contrast between color-character congruency and homophone congruency (c2 vs. c3) were not significant within any of the participant groups, in line with the accuracy results.

**1.3 Bi-dialectal groups’ accuracy rates in SC and regional dialects**

The selected random predictors for the by-participant accuracy model was by-participant random intercept nested under dialectal background, χ2dialectal\_background|participant(3) = 126.33, p < 0.001, and for the by-stimuli accuracy model, the selected random predictor was by-stimuli random intercept, χ2stimuli(1) = 3.03, p = 0.08.

When putting dialectal backgrounds in post-hoc contrasts, the JN bi-dialectal group showed lower accuracy than the SH bi-dialectal group across three Stroop conditions and naming dialects: (1) naming in regional dialect when presented with a competing color character’s homophone (c6), (2) naming in regional dialect when presented with competition between tonally congruent colors and characters (c8), (3) naming in SC when presented with competing colors and characters (c5).

When putting dialect of naming in post-hoc contrasts, naming colors in regional dialects showed lower accuracy as compared with naming in SC across three Stroop conditions by the following groups: (1) the JN group under the competition from a competing color character’s homophone (c6), (2) the JN group under the competition from a tonally congruent color-character (c8), and (3) the SH group when presented with competition from a color character (c5).

Moreover, thirty-six post-hoc contrasts of Stroop conditions within participant groups and in the same dialect of naming in the by-participant model and thirty-one in the by-stimuli model were significant. Here, we again only report the pairs with significant contrasts in only one aspect of ink-character relation: (1) the JN group in SC and the SH group in their regional dialect SH showed significantly reduced accuracy under competition from color characters (c5) as compared with from exact homophones of competing color characters (c6), (2) the JN group in their regional dialect JM showed significantly reduced accuracy under competition from tonally congruent color characters (c8) as compared with competition from exact homophones of color characters (c9).

Similar with the analyses presented above, tone-alone post-hoc contrasts (c1 vs. c0, c3 vs. c4, c8 vs. c5, c9 vs. c6/c7, c6 vs. c7) and the semantic contrast between color-character congruency and homophone congruency (c2 vs. c3) were not significant within any of the participant groups or in any dialects.

**1.4 Bi-dialectal groups’ naming latencies in SC and regional dialects**

The selected random predictors were again by-participant random slopes of the scaled order in the sequence of the same color as presented to the participant, χ2OrderSameCols|Parcode(23) = 14845.72, p < 0.001, by-stimuli random intercepts, χ2stimuli(21) = 143.32, p < 0.001, and random intercepts of pairs of ink color and character related color, χ2color-pair(21) = 164.45, p < 0.001.

Regarding post-hoc contrasts of dialectal backgrounds, the JN group were significantly faster as compared with the SH group, when naming in their regional dialects under the competition from a tonally congruent color character (c8).

When comparing post-hoc contrasts of naming colors in their regional dialects to naming them in SC, the results show that naming latencies in regional dialects significantly increase in ten combinations of Stroop conditions and dialectal backgrounds, which can be organized into four sets:

(1) the JN group when presented with competitions from color characters (c5) or from a competing color character’s tonally-different homophone (c7),

(2) the SH group when presented with any of the segmentally competing Stroop conditions (c5, c6, c7, c8, and c9),

(3) the SH group when presented with congruency from a segmental homophone of the ink-color name (c4),

(4) the SH group under the two conditions of segmental irrelevance (c0 and c1).

Moreover, sixty post-hoc contrasts of Stroop conditions were significant within participant groups and in the same dialects. Here, we again only report the pairs with significant contrasts in only one aspect of ink-character relation:

(1) Both the participant groups in both dialects showed longer naming latencies under competition from color characters (c5) as compared with from exact homophones of competing color characters (c6).

(2) Both the participant groups in both dialects showed longer naming latencies under competition from tonally congruent color characters (c8) as compared with competition from exact homophones of color characters (c9).

However, again note that tone-alone post-hoc contrasts (c1 vs. c0, c3 vs. c4, c8 vs c5, c9 vs. c6/c7, c6 vs. c7) and the semantic contrast between color-character congruency and homophone congruency (c2 vs. c3) were not significant under any minimal combinations of participant groups and dialects, similar to the accuracy results and results in 3.1.

**Appendix 2 The by-speaker model on Stroop accuracy rates in SC**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ACCratepercent~Stroop\_Condition\*DialBG+(1+DialBG|Parcode) | | | | | | |
| ANOVA terms | Sum Sq | Mean Sq | NumDF | DenDF | F value | Pr(>F) |
| Stroop\_Condition | 1545.64 | 171.74 | 9.00 | 1863.01 | 30.03 | 0.00 |
| DialBG | 52.29 | 13.07 | 4.00 | 80.70 | 2.29 | 0.07 |
| Stroop\_Condition:DialBG | 250.33 | 6.95 | 36.00 | 1863.01 | 1.22 | 0.18 |
| Summary terms | | Estimate | Std. Error | df | t value | Pr(>|t|) |
| (Intercept) | | 99.28 | 0.37 | 820.02 | 270.62 | 0.00 |
| Stroop\_Conditionc1 | | 0.48 | 0.49 | 1863.01 | 0.99 | 0.32 |
| Stroop\_Conditionc2 | | 0.72 | 0.49 | 1863.01 | 1.47 | 0.14 |
| Stroop\_Conditionc3 | | 0.51 | 0.49 | 1863.01 | 1.04 | 0.30 |
| Stroop\_Conditionc4 | | 0.20 | 0.49 | 1863.01 | 0.40 | 0.69 |
| Stroop\_Conditionc5 | | -1.96 | 0.49 | 1863.01 | -4.02 | 0.00 |
| Stroop\_Conditionc6 | | -0.47 | 0.49 | 1863.01 | -0.97 | 0.33 |
| Stroop\_Conditionc7 | | -0.07 | 0.49 | 1863.01 | -0.13 | 0.89 |
| Stroop\_Conditionc8 | | -3.10 | 0.49 | 1863.01 | -6.36 | 0.00 |
| Stroop\_Conditionc9 | | -1.00 | 0.49 | 1863.01 | -2.04 | 0.04 |
| DialBGJN | | 0.37 | 0.50 | 1379.12 | 0.74 | 0.46 |
| DialBGOD | | 0.09 | 0.66 | 226.92 | 0.14 | 0.89 |
| DialBGSC | | 0.39 | 0.58 | 1461.23 | 0.68 | 0.50 |
| DialBGSH | | 0.56 | 0.53 | 1481.60 | 1.07 | 0.28 |
| Stroop\_Conditionc1:DialBGJN | | -0.96 | 0.67 | 1863.01 | -1.43 | 0.15 |
| Stroop\_Conditionc2:DialBGJN | | -0.74 | 0.67 | 1863.01 | -1.10 | 0.27 |
| Stroop\_Conditionc3:DialBGJN | | -0.72 | 0.67 | 1863.01 | -1.07 | 0.29 |
| Stroop\_Conditionc4:DialBGJN | | 0.04 | 0.67 | 1863.01 | 0.05 | 0.96 |
| Stroop\_Conditionc5:DialBGJN | | -0.34 | 0.67 | 1863.01 | -0.50 | 0.62 |
| Stroop\_Conditionc6:DialBGJN | | -0.04 | 0.67 | 1863.01 | -0.06 | 0.95 |
| Stroop\_Conditionc7:DialBGJN | | -0.17 | 0.67 | 1863.01 | -0.25 | 0.80 |
| Stroop\_Conditionc8:DialBGJN | | 1.29 | 0.67 | 1863.01 | 1.92 | 0.05 |
| Stroop\_Conditionc9:DialBGJN | | -0.24 | 0.67 | 1863.01 | -0.37 | 0.72 |
| Stroop\_Conditionc1:DialBGOD | | -0.83 | 0.72 | 1863.01 | -1.15 | 0.25 |
| Stroop\_Conditionc2:DialBGOD | | -0.34 | 0.72 | 1863.01 | -0.47 | 0.64 |
| Stroop\_Conditionc3:DialBGOD | | -0.63 | 0.72 | 1863.01 | -0.87 | 0.38 |
| Stroop\_Conditionc4:DialBGOD | | 0.12 | 0.72 | 1863.01 | 0.16 | 0.87 |
| Stroop\_Conditionc5:DialBGOD | | -1.16 | 0.72 | 1863.01 | -1.61 | 0.11 |
| Stroop\_Conditionc6:DialBGOD | | -0.69 | 0.72 | 1863.01 | -0.95 | 0.34 |
| Stroop\_Conditionc7:DialBGOD | | -0.46 | 0.72 | 1863.01 | -0.63 | 0.53 |
| Stroop\_Conditionc8:DialBGOD | | 0.60 | 0.72 | 1863.01 | 0.83 | 0.40 |
| Stroop\_Conditionc9:DialBGOD | | -0.52 | 0.72 | 1863.01 | -0.72 | 0.47 |
| Stroop\_Conditionc1:DialBGSC | | -0.16 | 0.80 | 1863.01 | -0.20 | 0.84 |
| Stroop\_Conditionc2:DialBGSC | | -0.74 | 0.80 | 1863.01 | -0.93 | 0.35 |
| Stroop\_Conditionc3:DialBGSC | | -0.18 | 0.80 | 1863.01 | -0.23 | 0.82 |
| Stroop\_Conditionc4:DialBGSC | | 0.13 | 0.80 | 1863.01 | 0.16 | 0.87 |
| Stroop\_Conditionc5:DialBGSC | | -0.42 | 0.80 | 1863.01 | -0.53 | 0.59 |
| Stroop\_Conditionc6:DialBGSC | | -0.06 | 0.80 | 1863.01 | -0.08 | 0.94 |
| Stroop\_Conditionc7:DialBGSC | | -0.33 | 0.80 | 1863.01 | -0.41 | 0.68 |
| Stroop\_Conditionc8:DialBGSC | | 1.13 | 0.80 | 1863.01 | 1.42 | 0.16 |
| Stroop\_Conditionc9:DialBGSC | | -0.04 | 0.80 | 1863.01 | -0.05 | 0.96 |
| Stroop\_Conditionc1:DialBGSH | | -0.60 | 0.72 | 1863.01 | -0.84 | 0.40 |
| Stroop\_Conditionc2:DialBGSH | | -1.05 | 0.72 | 1863.01 | -1.46 | 0.14 |
| Stroop\_Conditionc3:DialBGSH | | -0.36 | 0.72 | 1863.01 | -0.49 | 0.62 |
| Stroop\_Conditionc4:DialBGSH | | -0.81 | 0.72 | 1863.01 | -1.12 | 0.26 |
| Stroop\_Conditionc5:DialBGSH | | 0.55 | 0.72 | 1863.01 | 0.76 | 0.45 |
| Stroop\_Conditionc6:DialBGSH | | 0.28 | 0.72 | 1863.01 | 0.39 | 0.70 |
| Stroop\_Conditionc7:DialBGSH | | -0.39 | 0.72 | 1863.01 | -0.55 | 0.59 |
| Stroop\_Conditionc8:DialBGSH | | 1.83 | 0.72 | 1863.01 | 2.55 | 0.01 |
| Stroop\_Conditionc9:DialBGSH | | 0.19 | 0.72 | 1863.01 | 0.26 | 0.79 |
| Random effects | | χ² |  | Df |  | p |
| (1+DialBG|Parcode) | | 322.32 |  | 15.00 |  | 0.00 |

**Appendix 3 The by-stimuli model on Stroop accuracy rates in SC**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ACCratepercent~Stroop\_Condition\*DialBG+(1|StimuliID) | | | | | | |
| ANOVA terms | Sum Sq | Mean Sq | NumDF | DenDF | F value | Pr(>F) |
| Stroop\_Condition | 170.69 | 18.97 | 9.00 | 105.00 | 14.39 | 0.00 |
| DialBG | 35.61 | 8.90 | 4.00 | 420.00 | 6.75 | 0.00 |
| Stroop\_Condition:DialBG | 49.44 | 1.37 | 36.00 | 420.00 | 1.04 | 0.41 |
| Summary terms | | Estimate | Std. Error | df | t value | Pr(>|t|) |
| (Intercept) | | 99.28 | 0.32 | 457.24 | 310.82 | 0.00 |
| Stroop\_Conditionc1 | | 0.48 | 0.53 | 457.24 | 0.91 | 0.36 |
| Stroop\_Conditionc2 | | 0.72 | 0.65 | 457.24 | 1.09 | 0.27 |
| Stroop\_Conditionc3 | | 0.51 | 0.65 | 457.24 | 0.78 | 0.44 |
| Stroop\_Conditionc4 | | 0.20 | 0.55 | 457.24 | 0.35 | 0.72 |
| Stroop\_Conditionc5 | | -1.96 | 0.47 | 457.24 | -4.20 | 0.00 |
| Stroop\_Conditionc6 | | -0.47 | 0.47 | 457.24 | -1.01 | 0.31 |
| Stroop\_Conditionc7 | | -0.07 | 0.41 | 457.24 | -0.16 | 0.87 |
| Stroop\_Conditionc8 | | -3.10 | 0.61 | 457.24 | -5.07 | 0.00 |
| Stroop\_Conditionc9 | | -1.00 | 0.47 | 457.24 | -2.13 | 0.03 |
| DialBGJN | | 0.37 | 0.41 | 420.00 | 0.91 | 0.36 |
| DialBGOD | | 0.09 | 0.41 | 420.00 | 0.22 | 0.82 |
| DialBGSC | | 0.39 | 0.41 | 420.00 | 0.97 | 0.33 |
| DialBGSH | | 0.56 | 0.41 | 420.00 | 1.39 | 0.17 |
| Stroop\_Conditionc1:DialBGJN | | -0.96 | 0.68 | 420.00 | -1.42 | 0.16 |
| Stroop\_Conditionc2:DialBGJN | | -0.74 | 0.83 | 420.00 | -0.89 | 0.37 |
| Stroop\_Conditionc3:DialBGJN | | -0.72 | 0.83 | 420.00 | -0.86 | 0.39 |
| Stroop\_Conditionc4:DialBGJN | | 0.04 | 0.70 | 420.00 | 0.05 | 0.96 |
| Stroop\_Conditionc5:DialBGJN | | -0.34 | 0.59 | 420.00 | -0.57 | 0.57 |
| Stroop\_Conditionc6:DialBGJN | | -0.04 | 0.59 | 420.00 | -0.06 | 0.95 |
| Stroop\_Conditionc7:DialBGJN | | -0.17 | 0.52 | 420.00 | -0.32 | 0.75 |
| Stroop\_Conditionc8:DialBGJN | | 1.29 | 0.78 | 420.00 | 1.66 | 0.10 |
| Stroop\_Conditionc9:DialBGJN | | -0.24 | 0.59 | 420.00 | -0.41 | 0.68 |
| Stroop\_Conditionc1:DialBGOD | | -0.83 | 0.68 | 420.00 | -1.23 | 0.22 |
| Stroop\_Conditionc2:DialBGOD | | -0.34 | 0.83 | 420.00 | -0.41 | 0.68 |
| Stroop\_Conditionc3:DialBGOD | | -0.63 | 0.83 | 420.00 | -0.76 | 0.45 |
| Stroop\_Conditionc4:DialBGOD | | 0.12 | 0.70 | 420.00 | 0.17 | 0.87 |
| Stroop\_Conditionc5:DialBGOD | | -1.16 | 0.59 | 420.00 | -1.96 | 0.05 |
| Stroop\_Conditionc6:DialBGOD | | -0.69 | 0.59 | 420.00 | -1.16 | 0.25 |
| Stroop\_Conditionc7:DialBGOD | | -0.46 | 0.52 | 420.00 | -0.87 | 0.39 |
| Stroop\_Conditionc8:DialBGOD | | 0.60 | 0.78 | 420.00 | 0.78 | 0.44 |
| Stroop\_Conditionc9:DialBGOD | | -0.52 | 0.59 | 420.00 | -0.88 | 0.38 |
| Stroop\_Conditionc1:DialBGSC | | -0.16 | 0.68 | 420.00 | -0.24 | 0.81 |
| Stroop\_Conditionc2:DialBGSC | | -0.74 | 0.83 | 420.00 | -0.89 | 0.38 |
| Stroop\_Conditionc3:DialBGSC | | -0.18 | 0.83 | 420.00 | -0.22 | 0.82 |
| Stroop\_Conditionc4:DialBGSC | | 0.13 | 0.70 | 420.00 | 0.18 | 0.86 |
| Stroop\_Conditionc5:DialBGSC | | -0.42 | 0.59 | 420.00 | -0.71 | 0.48 |
| Stroop\_Conditionc6:DialBGSC | | -0.06 | 0.59 | 420.00 | -0.11 | 0.91 |
| Stroop\_Conditionc7:DialBGSC | | -0.33 | 0.52 | 420.00 | -0.63 | 0.53 |
| Stroop\_Conditionc8:DialBGSC | | 1.13 | 0.78 | 420.00 | 1.45 | 0.15 |
| Stroop\_Conditionc9:DialBGSC | | -0.04 | 0.59 | 420.00 | -0.06 | 0.95 |
| Stroop\_Conditionc1:DialBGSH | | -0.60 | 0.68 | 420.00 | -0.89 | 0.37 |
| Stroop\_Conditionc2:DialBGSH | | -1.05 | 0.83 | 420.00 | -1.26 | 0.21 |
| Stroop\_Conditionc3:DialBGSH | | -0.36 | 0.83 | 420.00 | -0.43 | 0.67 |
| Stroop\_Conditionc4:DialBGSH | | -0.81 | 0.70 | 420.00 | -1.15 | 0.25 |
| Stroop\_Conditionc5:DialBGSH | | 0.55 | 0.59 | 420.00 | 0.92 | 0.36 |
| Stroop\_Conditionc6:DialBGSH | | 0.28 | 0.59 | 420.00 | 0.47 | 0.64 |
| Stroop\_Conditionc7:DialBGSH | | -0.39 | 0.52 | 420.00 | -0.75 | 0.45 |
| Stroop\_Conditionc8:DialBGSH | | 1.83 | 0.78 | 420.00 | 2.36 | 0.02 |
| Stroop\_Conditionc9:DialBGSH | | 0.19 | 0.59 | 420.00 | 0.32 | 0.75 |
| Random effects | | χ² |  | Df |  | p |
| (1|StimuliID) | | 28.16 |  | 1.00 |  | 0.00 |

**Appendix 4** The model on Stroop naming latencies in SC

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| logRTms~Stroop\_Condition\*DialBG+(OrderSameCols|Parcode)+(1|StimuliID)+(1|ColPair) | | | | | | |
| ANOVA terms | Sum Sq | Mean Sq | NumDF | DenDF | F value | Pr(>F) |
| Stroop\_Condition | 12.51 | 1.39 | 9.00 | 55.16 | 39.21 | 0.00 |
| DialBG | 0.40 | 0.10 | 4.00 | 208.08 | 2.79 | 0.03 |
| Stroop\_Condition:DialBG | 4.02 | 0.11 | 36.00 | 47113.68 | 3.15 | 0.00 |
| Summary terms | | Estimate | Std. Error | df | t value | Pr(>|t|) |
| (Intercept) | | 6.51 | 0.04 | 46.96 | 165.01 | 0.00 |
| Stroop\_Conditionc1 | | 0.04 | 0.01 | 184.89 | 2.94 | 0.00 |
| Stroop\_Conditionc2 | | 0.01 | 0.05 | 30.44 | 0.12 | 0.90 |
| Stroop\_Conditionc3 | | -0.02 | 0.05 | 30.43 | -0.31 | 0.76 |
| Stroop\_Conditionc4 | | -0.01 | 0.05 | 29.17 | -0.26 | 0.80 |
| Stroop\_Conditionc5 | | 0.18 | 0.04 | 29.83 | 4.50 | 0.00 |
| Stroop\_Conditionc6 | | 0.07 | 0.04 | 29.79 | 1.73 | 0.09 |
| Stroop\_Conditionc7 | | 0.05 | 0.04 | 28.83 | 1.40 | 0.17 |
| Stroop\_Conditionc8 | | 0.19 | 0.04 | 33.43 | 4.69 | 0.00 |
| Stroop\_Conditionc9 | | 0.06 | 0.04 | 29.76 | 1.56 | 0.13 |
| DialBGJN | | 0.04 | 0.03 | 230.41 | 1.44 | 0.15 |
| DialBGOD | | 0.10 | 0.03 | 230.48 | 3.36 | 0.00 |
| DialBGSC | | 0.04 | 0.03 | 230.58 | 1.25 | 0.21 |
| DialBGSH | | 0.03 | 0.03 | 230.31 | 1.02 | 0.31 |
| Stroop\_Conditionc1:DialBGJN | | -0.02 | 0.01 | 47115.42 | -1.46 | 0.14 |
| Stroop\_Conditionc2:DialBGJN | | -0.05 | 0.01 | 47108.93 | -3.87 | 0.00 |
| Stroop\_Conditionc3:DialBGJN | | -0.02 | 0.01 | 47110.67 | -1.74 | 0.08 |
| Stroop\_Conditionc4:DialBGJN | | -0.02 | 0.01 | 47108.06 | -1.68 | 0.09 |
| Stroop\_Conditionc5:DialBGJN | | -0.06 | 0.01 | 47114.52 | -5.88 | 0.00 |
| Stroop\_Conditionc6:DialBGJN | | -0.02 | 0.01 | 47112.17 | -2.04 | 0.04 |
| Stroop\_Conditionc7:DialBGJN | | -0.02 | 0.01 | 47114.36 | -2.86 | 0.00 |
| Stroop\_Conditionc8:DialBGJN | | -0.08 | 0.01 | 47111.21 | -6.47 | 0.00 |
| Stroop\_Conditionc9:DialBGJN | | -0.02 | 0.01 | 47116.14 | -2.34 | 0.02 |
| Stroop\_Conditionc1:DialBGOD | | -0.03 | 0.01 | 47112.52 | -2.16 | 0.03 |
| Stroop\_Conditionc2:DialBGOD | | -0.01 | 0.01 | 47114.37 | -0.55 | 0.59 |
| Stroop\_Conditionc3:DialBGOD | | -0.02 | 0.01 | 47112.65 | -1.44 | 0.15 |
| Stroop\_Conditionc4:DialBGOD | | 0.00 | 0.01 | 47112.97 | -0.38 | 0.70 |
| Stroop\_Conditionc5:DialBGOD | | -0.02 | 0.01 | 47117.62 | -1.74 | 0.08 |
| Stroop\_Conditionc6:DialBGOD | | -0.01 | 0.01 | 47117.94 | -0.66 | 0.51 |
| Stroop\_Conditionc7:DialBGOD | | -0.02 | 0.01 | 47113.49 | -1.83 | 0.07 |
| Stroop\_Conditionc8:DialBGOD | | -0.04 | 0.01 | 47122.08 | -2.95 | 0.00 |
| Stroop\_Conditionc9:DialBGOD | | 0.01 | 0.01 | 47118.67 | 0.53 | 0.60 |
| Stroop\_Conditionc1:DialBGSC | | -0.02 | 0.01 | 47111.51 | -1.64 | 0.10 |
| Stroop\_Conditionc2:DialBGSC | | -0.01 | 0.02 | 47110.02 | -0.69 | 0.49 |
| Stroop\_Conditionc3:DialBGSC | | -0.01 | 0.02 | 47116.67 | -0.47 | 0.64 |
| Stroop\_Conditionc4:DialBGSC | | -0.01 | 0.01 | 47111.47 | -0.95 | 0.34 |
| Stroop\_Conditionc5:DialBGSC | | -0.01 | 0.01 | 47116.91 | -0.47 | 0.64 |
| Stroop\_Conditionc6:DialBGSC | | 0.00 | 0.01 | 47109.25 | 0.41 | 0.68 |
| Stroop\_Conditionc7:DialBGSC | | -0.01 | 0.01 | 47116.97 | -0.82 | 0.41 |
| Stroop\_Conditionc8:DialBGSC | | -0.03 | 0.02 | 47117.08 | -1.62 | 0.10 |
| Stroop\_Conditionc9:DialBGSC | | 0.01 | 0.01 | 47115.69 | 0.97 | 0.33 |
| Stroop\_Conditionc1:DialBGSH | | -0.03 | 0.01 | 47112.94 | -2.15 | 0.03 |
| Stroop\_Conditionc2:DialBGSH | | 0.01 | 0.01 | 47112.29 | 0.38 | 0.70 |
| Stroop\_Conditionc3:DialBGSH | | -0.02 | 0.01 | 47113.72 | -1.63 | 0.10 |
| Stroop\_Conditionc4:DialBGSH | | -0.01 | 0.01 | 47111.83 | -0.85 | 0.39 |
| Stroop\_Conditionc5:DialBGSH | | -0.03 | 0.01 | 47116.15 | -3.13 | 0.00 |
| Stroop\_Conditionc6:DialBGSH | | -0.02 | 0.01 | 47112.50 | -1.74 | 0.08 |
| Stroop\_Conditionc7:DialBGSH | | -0.02 | 0.01 | 47112.82 | -2.06 | 0.04 |
| Stroop\_Conditionc8:DialBGSH | | -0.05 | 0.01 | 47111.15 | -3.31 | 0.00 |
| Stroop\_Conditionc9:DialBGSH | | -0.01 | 0.01 | 47114.61 | -1.41 | 0.16 |
| Random effects | | χ² |  | Df |  | p |
| (OrderSameCols|Parcode) | | 18088.02 |  | 3.00 |  | 0.00 |
| (1|StimuliID) | | 198.79 |  | 1.00 |  | 0.00 |
| (1|ColPair) | | 167.22 |  | 1.00 |  | 0.00 |

**Appendix 5** The by-speaker model on the JN and SH bidialectal groups’ Stroop accuracy rates in both SC and their local dialects

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ACCratepercent~Stroop\_Condition\*DialBG\*InDial+(1+DialBG|Parcode) | | | | | | |
| ANOVA terms | Sum Sq | Mean Sq | NumDF | DenDF | F value | Pr(>F) |
| Stroop\_Condition | 1144.48 | 127.16 | 9.00 | 1757.32 | 21.80 | 0.00 |
| DialBG | 20.92 | 20.92 | 1.00 | 91.46 | 3.59 | 0.06 |
| InDial | 23.60 | 23.60 | 1.00 | 1767.26 | 4.05 | 0.04 |
| Stroop\_Condition:DialBG | 128.10 | 14.23 | 9.00 | 1757.32 | 2.44 | 0.01 |
| Stroop\_Condition:InDial | 78.20 | 8.69 | 9.00 | 1757.32 | 1.49 | 0.15 |
| DialBG:InDial | 1.10 | 1.10 | 1.00 | 1767.26 | 0.19 | 0.66 |
| Stroop\_Condition:DialBG:InDial | 61.60 | 6.84 | 9.00 | 1757.32 | 1.17 | 0.31 |
| Summary terms | | Estimate | Std. Error | df | t value | Pr(>|t|) |
| (Intercept) | | 99.54 | 0.36 | 829.78 | 275.73 | 0.00 |
| Stroop\_Conditionc1 | | 0.05 | 0.46 | 1757.32 | 0.11 | 0.91 |
| Stroop\_Conditionc2 | | 0.28 | 0.46 | 1757.32 | 0.60 | 0.55 |
| Stroop\_Conditionc3 | | 0.46 | 0.46 | 1757.32 | 1.00 | 0.32 |
| Stroop\_Conditionc4 | | 0.00 | 0.46 | 1757.32 | 0.00 | 1.00 |
| Stroop\_Conditionc5 | | -2.65 | 0.46 | 1757.32 | -5.69 | 0.00 |
| Stroop\_Conditionc6 | | -1.26 | 0.46 | 1757.32 | -2.70 | 0.01 |
| Stroop\_Conditionc7 | | -0.58 | 0.46 | 1757.32 | -1.25 | 0.21 |
| Stroop\_Conditionc8 | | -3.55 | 0.46 | 1757.32 | -7.64 | 0.00 |
| Stroop\_Conditionc9 | | -0.93 | 0.46 | 1757.32 | -1.99 | 0.05 |
| DialBGSH | | 0.00 | 0.53 | 1504.01 | 0.00 | 1.00 |
| InDialSC | | 0.12 | 0.46 | 1757.32 | 0.25 | 0.80 |
| Stroop\_Conditionc1:DialBGSH | | 0.00 | 0.71 | 1757.32 | 0.00 | 1.00 |
| Stroop\_Conditionc2:DialBGSH | | 0.19 | 0.71 | 1757.32 | 0.27 | 0.79 |
| Stroop\_Conditionc3:DialBGSH | | 0.01 | 0.71 | 1757.32 | 0.01 | 0.99 |
| Stroop\_Conditionc4:DialBGSH | | -0.16 | 0.71 | 1757.32 | -0.22 | 0.83 |
| Stroop\_Conditionc5:DialBGSH | | 0.52 | 0.71 | 1757.32 | 0.74 | 0.46 |
| Stroop\_Conditionc6:DialBGSH | | 0.92 | 0.71 | 1757.32 | 1.29 | 0.20 |
| Stroop\_Conditionc7:DialBGSH | | 0.42 | 0.71 | 1757.32 | 0.59 | 0.55 |
| Stroop\_Conditionc8:DialBGSH | | 2.56 | 0.71 | 1757.32 | 3.59 | 0.00 |
| Stroop\_Conditionc9:DialBGSH | | -0.03 | 0.71 | 1757.32 | -0.05 | 0.96 |
| Stroop\_Conditionc1:InDialSC | | -0.53 | 0.66 | 1757.32 | -0.80 | 0.42 |
| Stroop\_Conditionc2:InDialSC | | -0.30 | 0.66 | 1757.32 | -0.46 | 0.65 |
| Stroop\_Conditionc3:InDialSC | | -0.67 | 0.66 | 1757.32 | -1.02 | 0.31 |
| Stroop\_Conditionc4:InDialSC | | 0.23 | 0.66 | 1757.32 | 0.35 | 0.72 |
| Stroop\_Conditionc5:InDialSC | | 0.35 | 0.66 | 1757.32 | 0.53 | 0.60 |
| Stroop\_Conditionc6:InDialSC | | 0.74 | 0.66 | 1757.32 | 1.13 | 0.26 |
| Stroop\_Conditionc7:InDialSC | | 0.35 | 0.66 | 1757.32 | 0.53 | 0.60 |
| Stroop\_Conditionc8:InDialSC | | 1.74 | 0.66 | 1757.32 | 2.64 | 0.01 |
| Stroop\_Conditionc9:InDialSC | | -0.31 | 0.66 | 1757.32 | -0.48 | 0.63 |
| DialBGSH:InDialSC | | 0.19 | 0.71 | 1758.38 | 0.27 | 0.78 |
| Stroop\_Conditionc1:DialBGSH:InDialSC | | 0.36 | 1.00 | 1757.32 | 0.36 | 0.72 |
| Stroop\_Conditionc2:DialBGSH:InDialSC | | -0.50 | 1.00 | 1757.32 | -0.50 | 0.62 |
| Stroop\_Conditionc3:DialBGSH:InDialSC | | 0.35 | 1.00 | 1757.32 | 0.35 | 0.72 |
| Stroop\_Conditionc4:DialBGSH:InDialSC | | -0.68 | 1.00 | 1757.32 | -0.68 | 0.50 |
| Stroop\_Conditionc5:DialBGSH:InDialSC | | 0.36 | 1.00 | 1757.32 | 0.36 | 0.72 |
| Stroop\_Conditionc6:DialBGSH:InDialSC | | -0.61 | 1.00 | 1757.32 | -0.60 | 0.55 |
| Stroop\_Conditionc7:DialBGSH:InDialSC | | -0.65 | 1.00 | 1757.32 | -0.65 | 0.52 |
| Stroop\_Conditionc8:DialBGSH:InDialSC | | -2.02 | 1.00 | 1757.32 | -2.01 | 0.04 |
| Stroop\_Conditionc9:DialBGSH:InDialSC | | 0.47 | 1.00 | 1757.32 | 0.47 | 0.64 |
| Random effects | | χ² |  | Df |  | p |
| (1+DialBG|Parcode) | | 126.33 |  | 3.00 | 0.00 |  |

**Appendix 6** The by-stimuli model on the JN and SH bidialectal groups’ Stroop accuracy rates in both SC and their local dialects

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ACCratepercent~Stroop\_Condition\*DialBG\*InDial+(1|StimuliID) | | | | | | |
| ANOVA terms | Sum Sq | Mean Sq | NumDF | DenDF | F value | Pr(>F) |
| Stroop\_Condition | 150.79 | 16.75 | 9.00 | 105.00 | 13.67 | 0.00 |
| DialBG | 13.71 | 13.71 | 1.00 | 315.00 | 11.19 | 0.00 |
| InDial | 4.69 | 4.69 | 1.00 | 315.00 | 3.82 | 0.05 |
| Stroop\_Condition:DialBG | 21.52 | 2.39 | 9.00 | 315.00 | 1.95 | 0.04 |
| Stroop\_Condition:InDial | 13.25 | 1.47 | 9.00 | 315.00 | 1.20 | 0.29 |
| DialBG:InDial | 0.19 | 0.19 | 1.00 | 315.00 | 0.15 | 0.70 |
| Stroop\_Condition:DialBG:InDial | 11.17 | 1.24 | 9.00 | 315.00 | 1.01 | 0.43 |
| Summary terms | | Estimate | Std. Error | df | t value | Pr(>|t|) |
| (Intercept) | | 99.54 | 0.30 | 398.10 | 334.46 | 0.00 |
| Stroop\_Conditionc1 | | 0.05 | 0.50 | 398.10 | 0.10 | 0.92 |
| Stroop\_Conditionc2 | | 0.28 | 0.61 | 398.10 | 0.46 | 0.65 |
| Stroop\_Conditionc3 | | 0.46 | 0.61 | 398.10 | 0.76 | 0.45 |
| Stroop\_Conditionc4 | | 0.00 | 0.52 | 398.10 | 0.00 | 1.00 |
| Stroop\_Conditionc5 | | -2.65 | 0.44 | 398.10 | -6.07 | 0.00 |
| Stroop\_Conditionc6 | | -1.26 | 0.44 | 398.10 | -2.88 | 0.00 |
| Stroop\_Conditionc7 | | -0.58 | 0.38 | 398.10 | -1.51 | 0.13 |
| Stroop\_Conditionc8 | | -3.55 | 0.57 | 398.10 | -6.23 | 0.00 |
| Stroop\_Conditionc9 | | -0.93 | 0.44 | 398.10 | -2.13 | 0.03 |
| DialBGSH | | -0.01 | 0.39 | 315.00 | -0.01 | 0.99 |
| InDialSC | | 0.12 | 0.39 | 315.00 | 0.30 | 0.77 |
| Stroop\_Conditionc1:DialBGSH | | 0.00 | 0.65 | 315.00 | 0.00 | 1.00 |
| Stroop\_Conditionc2:DialBGSH | | 0.19 | 0.80 | 315.00 | 0.24 | 0.81 |
| Stroop\_Conditionc3:DialBGSH | | 0.01 | 0.80 | 315.00 | 0.01 | 0.99 |
| Stroop\_Conditionc4:DialBGSH | | -0.16 | 0.68 | 315.00 | -0.23 | 0.82 |
| Stroop\_Conditionc5:DialBGSH | | 0.52 | 0.57 | 315.00 | 0.92 | 0.36 |
| Stroop\_Conditionc6:DialBGSH | | 0.92 | 0.57 | 315.00 | 1.61 | 0.11 |
| Stroop\_Conditionc7:DialBGSH | | 0.42 | 0.51 | 315.00 | 0.84 | 0.40 |
| Stroop\_Conditionc8:DialBGSH | | 2.56 | 0.75 | 315.00 | 3.42 | 0.00 |
| Stroop\_Conditionc9:DialBGSH | | -0.03 | 0.57 | 315.00 | -0.06 | 0.95 |
| Stroop\_Conditionc1:InDialSC | | -0.53 | 0.65 | 315.00 | -0.81 | 0.42 |
| Stroop\_Conditionc2:InDialSC | | -0.30 | 0.80 | 315.00 | -0.38 | 0.71 |
| Stroop\_Conditionc3:InDialSC | | -0.67 | 0.80 | 315.00 | -0.84 | 0.40 |
| Stroop\_Conditionc4:InDialSC | | 0.23 | 0.68 | 315.00 | 0.34 | 0.73 |
| Stroop\_Conditionc5:InDialSC | | 0.35 | 0.57 | 315.00 | 0.61 | 0.54 |
| Stroop\_Conditionc6:InDialSC | | 0.74 | 0.57 | 315.00 | 1.30 | 0.19 |
| Stroop\_Conditionc7:InDialSC | | 0.35 | 0.51 | 315.00 | 0.69 | 0.49 |
| Stroop\_Conditionc8:InDialSC | | 1.74 | 0.75 | 315.00 | 2.32 | 0.02 |
| Stroop\_Conditionc9:InDialSC | | -0.31 | 0.57 | 315.00 | -0.55 | 0.58 |
| DialBGSH:InDialSC | | 0.20 | 0.55 | 315.00 | 0.36 | 0.72 |
| Stroop\_Conditionc1:DialBGSH:InDialSC | | 0.36 | 0.92 | 315.00 | 0.39 | 0.70 |
| Stroop\_Conditionc2:DialBGSH:InDialSC | | -0.50 | 1.13 | 315.00 | -0.44 | 0.66 |
| Stroop\_Conditionc3:DialBGSH:InDialSC | | 0.35 | 1.13 | 315.00 | 0.31 | 0.75 |
| Stroop\_Conditionc4:DialBGSH:InDialSC | | -0.68 | 0.96 | 315.00 | -0.71 | 0.48 |
| Stroop\_Conditionc5:DialBGSH:InDialSC | | 0.36 | 0.81 | 315.00 | 0.44 | 0.66 |
| Stroop\_Conditionc6:DialBGSH:InDialSC | | -0.61 | 0.81 | 315.00 | -0.75 | 0.46 |
| Stroop\_Conditionc7:DialBGSH:InDialSC | | -0.65 | 0.71 | 315.00 | -0.91 | 0.36 |
| Stroop\_Conditionc8:DialBGSH:InDialSC | | -2.02 | 1.06 | 315.00 | -1.90 | 0.06 |
| Stroop\_Conditionc9:DialBGSH:InDialSC | | 0.47 | 0.81 | 315.00 | 0.58 | 0.56 |
| Random effects | | χ² |  | Df |  | p |
| (1|StimuliID) | | 3.03 |  | 1.00 |  | 0.08 |

**Appendix 7** The model on the JN and SH bidialectal groups’ Stroop naming latencies in both SC and their local dialects

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| logRTms~Stroop\_Condition\*DialBG\*InDial+ColRecentnesss+(OrderSameCols|Parcode)+(1|StimuliID)+(1|ColPair) | | | | | | |
| ANOVA terms | Sum Sq | Mean Sq | NumDF | DenDF | F value | Pr(>F) |
| Stroop\_Condition | 10.58 | 1.18 | 9.00 | 54.95 | 32.13 | 0.00 |
| DialBG | 0.02 | 0.02 | 1.00 | 93.21 | 0.43 | 0.52 |
| InDial | 2.53 | 2.53 | 1.00 | 42300.44 | 69.05 | 0.00 |
| ColRecentnesss | 14.27 | 14.27 | 1.00 | 42343.75 | 389.96 | 0.00 |
| Stroop\_Condition:DialBG | 1.09 | 0.12 | 9.00 | 42302.30 | 3.30 | 0.00 |
| Stroop\_Condition:InDial | 0.25 | 0.03 | 9.00 | 42302.71 | 0.77 | 0.65 |
| DialBG:InDial | 1.47 | 1.47 | 1.00 | 42300.31 | 40.07 | 0.00 |
| Summary terms | | Estimate | Std. Error | df | t value | Pr(>|t|) |
| (Intercept) | | 6.54 | 0.04 | 45.60 | 185.19 | 0.00 |
| Stroop\_Conditionc1 | | 0.01 | 0.01 | 173.82 | 1.29 | 0.20 |
| Stroop\_Conditionc2 | | -0.02 | 0.04 | 30.75 | -0.49 | 0.63 |
| Stroop\_Conditionc3 | | -0.05 | 0.04 | 30.74 | -1.11 | 0.28 |
| Stroop\_Conditionc4 | | -0.04 | 0.04 | 29.34 | -0.80 | 0.43 |
| Stroop\_Conditionc5 | | 0.14 | 0.04 | 30.07 | 3.85 | 0.00 |
| Stroop\_Conditionc6 | | 0.06 | 0.04 | 30.03 | 1.64 | 0.11 |
| Stroop\_Conditionc7 | | 0.04 | 0.04 | 28.97 | 1.24 | 0.23 |
| Stroop\_Conditionc8 | | 0.12 | 0.04 | 34.02 | 3.32 | 0.00 |
| Stroop\_Conditionc9 | | 0.04 | 0.04 | 29.99 | 1.27 | 0.22 |
| DialBGSH | | 0.03 | 0.03 | 106.72 | 1.19 | 0.24 |
| InDialSC | | 0.00 | 0.01 | 42299.55 | 0.43 | 0.66 |
| ColRecentnesss | | 0.02 | 0.00 | 42343.75 | 19.75 | 0.00 |
| Stroop\_Conditionc1:DialBGSH | | -0.01 | 0.01 | 42303.66 | -0.77 | 0.44 |
| Stroop\_Conditionc2:DialBGSH | | 0.00 | 0.01 | 42302.24 | 0.24 | 0.81 |
| Stroop\_Conditionc3:DialBGSH | | 0.00 | 0.01 | 42304.97 | -0.14 | 0.89 |
| Stroop\_Conditionc4:DialBGSH | | 0.00 | 0.01 | 42301.65 | 0.17 | 0.87 |
| Stroop\_Conditionc5:DialBGSH | | -0.01 | 0.01 | 42304.28 | -0.91 | 0.36 |
| Stroop\_Conditionc6:DialBGSH | | -0.01 | 0.01 | 42302.27 | -1.22 | 0.22 |
| Stroop\_Conditionc7:DialBGSH | | -0.01 | 0.01 | 42301.78 | -1.22 | 0.22 |
| Stroop\_Conditionc8:DialBGSH | | 0.03 | 0.01 | 42302.10 | 1.85 | 0.06 |
| Stroop\_Conditionc9:DialBGSH | | 0.00 | 0.01 | 42303.85 | -0.03 | 0.98 |
| Stroop\_Conditionc1:InDialSC | | 0.00 | 0.01 | 42303.80 | 0.34 | 0.73 |
| Stroop\_Conditionc2:InDialSC | | -0.02 | 0.01 | 42301.87 | -1.81 | 0.07 |
| Stroop\_Conditionc3:InDialSC | | 0.01 | 0.01 | 42301.38 | 0.79 | 0.43 |
| Stroop\_Conditionc4:InDialSC | | 0.00 | 0.01 | 42300.66 | 0.42 | 0.67 |
| Stroop\_Conditionc5:InDialSC | | -0.02 | 0.01 | 42303.12 | -1.94 | 0.05 |
| Stroop\_Conditionc6:InDialSC | | -0.01 | 0.01 | 42301.19 | -1.12 | 0.26 |
| Stroop\_Conditionc7:InDialSC | | -0.01 | 0.01 | 42301.69 | -1.67 | 0.10 |
| Stroop\_Conditionc8:InDialSC | | -0.02 | 0.01 | 42300.31 | -1.25 | 0.21 |
| Stroop\_Conditionc9:InDialSC | | -0.01 | 0.01 | 42299.53 | -0.62 | 0.53 |
| DialBGSH:InDialSC | | -0.04 | 0.01 | 42301.68 | -4.23 | 0.00 |
| Stroop\_Conditionc1:DialBGSH:InDialSC | | 0.00 | 0.02 | 42302.55 | 0.07 | 0.95 |
| Stroop\_Conditionc2:DialBGSH:InDialSC | | 0.05 | 0.02 | 42302.96 | 2.63 | 0.01 |
| Stroop\_Conditionc3:DialBGSH:InDialSC | | 0.00 | 0.02 | 42304.87 | 0.14 | 0.89 |
| Stroop\_Conditionc4:DialBGSH:InDialSC | | 0.01 | 0.02 | 42302.91 | 0.37 | 0.71 |
| Stroop\_Conditionc5:DialBGSH:InDialSC | | 0.04 | 0.01 | 42303.45 | 2.44 | 0.01 |
| Stroop\_Conditionc6:DialBGSH:InDialSC | | 0.02 | 0.01 | 42301.13 | 1.04 | 0.30 |
| Stroop\_Conditionc7:DialBGSH:InDialSC | | 0.02 | 0.01 | 42301.42 | 1.41 | 0.16 |
| Stroop\_Conditionc8:DialBGSH:InDialSC | | 0.01 | 0.02 | 42300.91 | 0.63 | 0.53 |
| Stroop\_Conditionc9:DialBGSH:InDialSC | | 0.01 | 0.01 | 42302.58 | 0.47 | 0.64 |
| Random effects | | χ² |  | Df |  | p |
| (OrderSameCols|Parcode) | | 14845.72 |  | 23.00 |  | 0.00 |
| (1|StimuliID) | | 143.32 |  | 21.00 |  | 0.00 |
| (1|ColPair) | | 164.45 |  | 21.00 |  | 0.00 |