**Supplementary Materials**

**Appendix A: List of Word Stimuli**

**Table A.1** Example Word stimuli in the training program

|  |  |  |
| --- | --- | --- |
| No. | /i/ | /ɪ/ |
| 1 | deem | dim |
| 2 | gene | gin |
| 3 | sheen | shin |
| 4 | peat | pit |
| 5 | teen | tin |
| 6 | feels | fills |
| 7 | week | wick |
| 8 | eats | its |
| 9 | seeks | six |
| 10 | seen | sin |
| 11 | cheap | chip |
| 12 | beat | bit |
| 13 | beaker | Bicker |
| 14 | candied | Candid |
| 15 | fleet | flit |



**Fig. A.1** Acoustic distribution of the training stimuli along the F1, F2 and vowel duration dimensions in the two training conditions. Panel A represents the target vowels of the tokens used in the multiple-talker (MT) condition. Panel B represents the target vowels of the tokens used in the single-talker (ST) condition.

**Table A.2** Acoustic characteristics of the target vowels produced by talkers in the multiple-talker (MT) and single-talker (ST) conditions

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Vowel category | Acoustic feature | MT*Mean* (*SD*) | ST*Mean* (*SD*) | *p* value | MTVariability | STVariability | *p* value |
| /i/ | F0 (Hz) | 180 (52) | 201 (29) | .15 | 0.018 | 0.0058 | < .01 |
| F1 (Hz) | 358 (59) | 373 (53) | .08 | 0.0050 | 0.0038 | .29 |
| F2 (Hz) | 2458 (217) | 2508 (183) | .10 | 0.0015 | 0.0011 | .25 |
| Duration (ms) | 278 (125) | 254 (110) | .19 | 0.037 | 0.036 | .51 |
| /ɪ/ | F0 (Hz) | 190 (54) | 211 (21) | .12 | 0.018 | 0.0021 | < .001 |
| F1 (Hz) | 519 (73) | 529 (82) | .40 | 0.0038 | 0.0047 | .72 |
| F2 (Hz) | 1931 (209) | 1903 (194) | .34 | 0.0022 | 0.0021 | .49 |
| Duration (ms) | 188 (90) | 175 (84) | .28 | 0.040 | 0.041 | .57 |

**Table A.3** Example word stimuli in the quizzes after training sessions

|  |  |  |
| --- | --- | --- |
| No. | /i/ | /ɪ/ |
| 1 | teal | till |
| 2 | reap | rip |
| 3 | heed | hid |
| 4 | keen | kin |
| 5 | least | list |

**Table A.4** Example word stimuli in the perception test

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Phonetic contexts | /i/ | /ɪ/ |
| 1 | Untrained words | sheep | ship |
| 2 | beach | bitch |
| 3 | deep | dip |
| 4 | seep | sip |
| 5 | deed | did |
| 6 | leek | lick |
|  |  |  |  |
| 7 | Trained words | peat | pit |
| 8 | deem | dim |
| 9 | teen | tin |
| 10 | feels | fills |

**Appendix B: Summary output of the linear mixed-effects models regarding training effects**

**Table B.1** Summary output of the LMM on the word identification accuracy

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.61  | 0.05  | 72.08  | 12.90  | <.001 |
| GroupMT | <0.01  | 0.05  | 83.88  | 0.04  | .97  |
| GroupST | -0.01  | 0.05  | 83.88  | -0.19  | .85  |
| Testpost1 | -0.01  | 0.04  | 110.50  | -0.19  | .85  |
| Testpost2 | 0.01  | 0.05  | 96.30  | 0.15  | .89  |
| Typeuntrained | <0.01  | 0.05  | 34.39  | 0.02  | .99  |
| GroupMT:Testpost1 | 0.14  | 0.06  | 110.50  | 2.35  | .02  |
| GroupST:Testpost1 | 0.16  | 0.06  | 110.50  | 2.74  | .01  |
| GroupMT:Testpost2 | 0.06  | 0.06  | 96.30  | 0.99  | .32  |
| GroupST:Testpost2 | 0.12  | 0.06  | 96.30  | 1.86  | .07  |
| GroupMT:Typeuntrained | -0.02  | 0.04  | 3393.00  | -0.49  | .63  |
| GroupST:Typeuntrained | 0.01  | 0.04  | 3393.00  | 0.27  | .79  |
| Testpost1:Typeuntrained | 0.02  | 0.04  | 3393.00  | 0.46  | .65  |
| Testpost2:Typeuntrained | 0.03  | 0.04  | 3393.00  | 0.70  | .48  |
| GroupMT:Testpost1:Typeuntrained | 0.04  | 0.05  | 3393.00  | 0.75  | .45  |
| GroupST:Testpost1:Typeuntrained | 0.01  | 0.05  | 3393.00  | 0.28  | .78  |
| GroupMT:Testpost2:Typeuntrained | <0.01  | 0.05  | 3393.00  | 0.04  | .97  |
| GroupST:Testpost2:Typeuntrained | 0.01  | 0.05  | 3393.00  | 0.28  | .78  |
|  |  |  |  |  |  |
| Random effects | Term | Variance | SD | Correlation |
| Subject | (Intercept) | 0.02  | 0.14  |  |  |
|  | testpost1 | 0.02  | 0.13  | -0.68  |  |
|  | testpost2 | 0.03  | 0.16  | -0.75  | 0.95 |
| Word | (Intercept) | 0.01  | 0.08  |  |  |

*Note*. Final models: ACC ~ Group \* Test \* Type + (1 + Test | Subject) + (1 | Word)

Reference level: Group: CTRL; Test: pre-test; Type: trained.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.



**Fig. B.1** Visualization of the two-way interaction between Group (MT, ST, CTRL) and Test (Pre-test, Post-test1, Post-test2) on the percent correct accuracy of word identification.

**Table B.2** Summary output of the LMM on the word identification response time (logRT)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 7.58  | 0.06  | 73.68  | 126.33  | < .001 |
| GroupMT | 0.11  | 0.08  | 65.30  | 1.36  | .18  |
| GroupST | 0.24  | 0.08  | 65.30  | 2.88  | .01  |
| Testpost1 | -0.06  | 0.05  | 79.58  | -1.11  | .27  |
| Testpost2 | -0.06  | 0.07  | 68.74  | -0.87  | .39  |
| Typeuntrained | 0.04  | 0.03  | 77.71  | 1.14  | .26  |
| GroupMT:Testpost1 | 0.10  | 0.08  | 79.58  | 1.28  | .20  |
| GroupST:Testpost1 | 0.10  | 0.08  | 79.58  | 1.32  | .19  |
| GroupMT:Testpost2 | 0.04  | 0.10  | 68.74  | 0.39  | .70  |
| GroupST:Testpost2 | 0.08  | 0.10  | 68.74  | 0.84  | .40  |
| GroupMT:Typeuntrained | -0.06  | 0.03  | 3393.00  | -1.66  | .10  |
| GroupST:Typeuntrained | -0.06  | 0.03  | 3393.00  | -1.72  | .09  |
| Testpost1:Typeuntrained | <0.01  | 0.03  | 3393.00  | -0.06  | .95  |
| Testpost2:Typeuntrained | -0.04  | 0.03  | 3393.00  | -1.17  | .24  |
| GroupMT:Testpost1:Typeuntrained | -0.03  | 0.05  | 3393.00  | -0.57  | .57  |
| GroupST:Testpost1:Typeuntrained | -0.01  | 0.05  | 3393.00  | -0.21  | .84  |
| GroupMT:Testpost2:Typeuntrained | -0.01  | 0.05  | 3393.00  | -0.15  | .88  |
| GroupST:Testpost2:Typeuntrained | 0.01  | 0.05  | 3393.00  | 0.13  | .90  |
|  |  |  |  |  |  |
| Random effects | Term | Variance | SD | Correlation |
| Subject | (Intercept) | 0.06  | 0.24  |  |  |
|  | testpost1 | 0.04  | 0.21  | -0.23  |  |
|  | testpost2 | 0.08  | 0.29  | -0.28  | 0.62 |
| Word | (Intercept) | 0.002  | 0.05  |  |  |

*Note*. Final models: logRT ~ Group \* Test \* Type + (1 + Test | Subject) + (1 | Word)

Reference level: Group: CTRL; Test: pre-test; Type: trained.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.

**Table B.3** Summary output of the LMM on the perceptual RWA coefficient of F1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.14  | 0.04  | 109.80  | 3.78  | < .001 |
| GroupMT | 0.02  | 0.05  | 109.80  | 0.32  | .75  |
| GroupST | <0.01  | 0.05  | 109.80  | 0.01  | .99  |
| Testpost1 | <0.01  | 0.04  | 114.00  | -0.04  | .97  |
| Testpost2 | 0.01  | 0.04  | 114.00  | 0.25  | .81  |
| GroupMT:Testpost1 | 0.20  | 0.05  | 114.00  | 4.12  | < .001 |
| GroupST:Testpost1 | 0.21  | 0.05  | 114.00  | 4.19  | < .001 |
| GroupMT:Testpost2 | 0.17  | 0.05  | 114.00  | 3.33  | .001 |
| GroupST:Testpost2 | 0.18  | 0.05  | 114.00  | 3.70  | < .001 |
|  |  |  |  |  |  |
| Random effect | Term | Variance | SD |  |  |
| Subject | (Intercept) | 0.01  | 0.12  |  |  |

*Note*. Final models: F1 ~ Group \* Test + (1 | Subject)

Reference level: Group: CTRL; Test: pre-test.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.

**Table B.4** Summary output of the LMM on the perceptual RWA coefficient of F2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.15  | 0.04  | 103.22  | 4.01  | < .001 |
| GroupMT | 0.01  | 0.05  | 103.22  | 0.13  | .90  |
| GroupST | <0.01  | 0.05  | 103.22  | -0.04  | .97  |
| Testpost1 | <0.01  | 0.04  | 114.00  | -0.03  | .98  |
| Testpost2 | <0.01  | 0.04  | 114.00  | 0.09  | .93  |
| GroupMT:Testpost1 | 0.20  | 0.05  | 114.00  | 4.12  | < .001 |
| GroupST:Testpost1 | 0.19  | 0.05  | 114.00  | 3.75  | < .001 |
| GroupMT:Testpost2 | 0.18  | 0.05  | 114.00  | 3.72  | < .001 |
| GroupST:Testpost2 | 0.17  | 0.05  | 114.00  | 3.51  | < .001 |
|  |  |  |  |  |  |
| Random effect | Term | Variance | SD |  |  |
| Subject | (Intercept) | 0.017 | 0.13 |  |  |

*Note*. Final models: F2 ~ Group \* Test + (1 | Subject)

Reference level: Group: CTRL; Test: pre-test.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.

**Table B.5** Summary output of the LMM on the perceptual RWA coefficient of duration

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.50  | 0.07  | 97.40  | 6.97  | < .001 |
| GroupMT | 0.01  | 0.10  | 97.40  | 0.08  | .94  |
| GroupST | 0.01  | 0.10  | 97.40  | 0.09  | .93  |
| Testpost1 | 0.01  | 0.06  | 114.00  | 0.15  | .88  |
| Testpost2 | 0.01  | 0.06  | 114.00  | 0.13  | .89  |
| GroupMT:Testpost1 | -0.35  | 0.09  | 114.00  | -3.95  | < .001 |
| GroupST:Testpost1 | -0.31  | 0.09  | 114.00  | -3.49  | < .001 |
| GroupMT:Testpost2 | -0.40  | 0.09  | 114.00  | -4.54  | < .001 |
| GroupST:Testpost2 | -0.29  | 0.09  | 114.00  | -3.30  | .001  |
|  |  |  |  |  |  |
| Random effect | Term | Variance | SD |  |  |
| Subject | (Intercept) | 0.063 | 0.25 |  |  |

*Note*. Final models: duration ~ Group \* Test + (1 | Subject)

Reference level: Group: CTRL; Test: pre-test.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.



**Fig. B.2** Visualization of the two-way interaction between Group (MT, ST, CTRL) and Test (pre-test, post-test1, post-test2) on the respective RWA coefficients of F1, F2, and duration measured in perception. Post-test1 represents the post-test; post-test2 represents the delayed post-test.

**Table B.6** Summary output of the LMM on the production RWA coefficient of F1

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.14  | 0.03  | 116.59  | 4.02  | < .001 |
| GroupMT | -0.04  | 0.05  | 116.59  | -0.80  | .43  |
| GroupST | -0.003 | 0.05  | 116.59  | -0.06  | .96  |
| Testpost1 | -0.01  | 0.03  | 114.00  | -0.34  | .74  |
| Testpost2 | 0.02  | 0.03  | 114.00  | 0.53  | .60  |
| GroupMT:Testpost1 | 0.15  | 0.05  | 114.00  | 3.10  | .002  |
| GroupST:Testpost1 | 0.12  | 0.05  | 114.00  | 2.41  | .02  |
| GroupMT:Testpost2 | 0.13  | 0.05  | 114.00  | 2.72  | .01  |
| GroupST:Testpost2 | 0.09  | 0.05  | 114.00  | 1.75  | .08  |
|  |  |  |  |  |  |
| Random effect | Term | Variance | SD |  |  |
| Subject | (Intercept) | 0.01 | 0.11 |  |  |

*Note*. Final models: F1 ~ Group \* Test + (1 | Subject)

Reference level: Group: CTRL; Test: pre-test.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.

**Table B.7** Summary output of the LMM on the production RWA coefficient of F2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.11  | 0.03  | 95.69  | 3.57  | < .001 |
| GroupMT | -0.01  | 0.04  | 95.69  | -0.26  | .80  |
| GroupST | -0.01  | 0.04  | 95.69  | -0.28  | .78  |
| Testpost1 | -0.001  | 0.03  | 114.00  | -0.03  | .97  |
| Testpost2 | -0.0001 | 0.03  | 114.00  | 0.00  | 1.00  |
| GroupMT:Testpost1 | 0.09  | 0.04  | 114.00  | 2.51  | .01  |
| GroupST:Testpost1 | 0.09  | 0.04  | 114.00  | 2.31  | .02  |
| GroupMT:Testpost2 | 0.10  | 0.04  | 114.00  | 2.69  | .01  |
| GroupST:Testpost2 | 0.11  | 0.04  | 114.00  | 3.02  | .003  |
|  |  |  |  |  |  |
| Random effect | Term | Variance | SD |  |  |
| Subject | (Intercept) | 0.01 | 0.11 |  |  |

*Note*. Final models: F2 ~ Group \* Test + (1 | Subject)

Reference level: Group: CTRL; Test: pre-test.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.

**Table B.8** Summary output of the LMM on the production RWA coefficient of duration

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.49  | 0.04  | 116.18  | 11.14  | < .001 |
| GroupMT | -0.06  | 0.06  | 116.18  | -0.92  | .36  |
| GroupST | 0.08  | 0.06  | 116.18  | 1.31  | .19  |
| Testpost1 | 0.01  | 0.05  | 114.00  | 0.26  | .80  |
| Testpost2 | <0.01  | 0.05  | 114.00  | 0.08  | .94  |
| GroupMT:Testpost1 | -0.15  | 0.06  | 114.00  | -2.38  | .02  |
| GroupST:Testpost1 | -0.21  | 0.06  | 114.00  | -3.33  | .001  |
| GroupMT:Testpost2 | -0.25  | 0.06  | 114.00  | -3.93  | < .001  |
| GroupST:Testpost2 | -0.21  | 0.06  | 114.00  | -3.37  | .001  |
|  |  |  |  |  |  |
| Random effect | Term | Variance | SD |  |  |
| Subject | (Intercept) | 0.02 | 0.14 |  |  |

*Note*. Final models: duration ~ Group \* Test + (1 | Subject)

Reference level: Group: CTRL; Test: pre-test.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.



**Fig. B.3** Visualization of the two-way interaction between Group (MT, ST, CTRL) and Test (Pre-test, Post-test1, Post-test2) on the respective RWA coefficients of F1, F2, and vowel duration measured in production.

**Appendix C: Summary output of the linear mixed-effects models with cognitive factors being included as fixed effects**

**Table C.1** Summary output of the LMM on the word identification accuracy with cognitive variables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.61  | 0.04  | 58.45  | 16.01  | < .001 |
| GroupST | -0.02  | 0.04  | 110.30  | -0.51  | .61  |
| Testpost1 | 0.12  | 0.03  | 2312.00  | 4.17  | < .001 |
| Testpost2 | 0.07  | 0.03  | 2312.00  | 2.36  | .02  |
| Typeuntrained | -0.02  | 0.04  | 37.79  | -0.40  | .69  |
| Flanker\_c | 0.01  | 0.02  | 110.30  | 0.82  | .41  |
| WM\_acc\_c | -0.42  | 0.31  | 110.30  | -1.34  | .18  |
| GroupST:Testpost1 | 0.04  | 0.04  | 2312.00  | 0.90  | .37  |
| GroupST:Testpost2 | 0.06  | 0.04  | 2312.00  | 1.51  | .13  |
| GroupST:Typeuntrained | 0.03  | 0.04  | 2312.00  | 0.78  | .44  |
| Testpost1:Typeuntrained | 0.06  | 0.04  | 2312.00  | 1.52  | .13  |
| Testpost2:Typeuntrained | 0.03  | 0.04  | 2312.00  | 0.71  | .48  |
| GroupST:Flanker\_c | 0.03  | 0.02  | 110.30  | 1.14  | .26  |
| GroupST:WM\_acc\_c | 0.56  | 0.39  | 110.30  | 1.42  | .16  |
| Testpost1:Flanker\_c | -0.01  | 0.02  | 2312.00  | -0.96  | .34  |
| Testpost2:Flanker\_c | 0.03  | 0.02  | 2312.00  | 1.91  | .06  |
| Testpost1:WM\_acc\_c | 1.06  | 0.32  | 2312.00  | 3.38  | < .001 |
| Testpost2:WM\_acc\_c | 0.53  | 0.32  | 2312.00  | 1.70  | .09  |
| Typeuntrained:Flanker\_c | 0.01  | 0.01  | 2312.00  | 0.37  | .71  |
| Typeuntrained:WM\_acc\_c | -0.10  | 0.29  | 2312.00  | -0.36  | .72  |
| GroupST:Testpost1:Typeuntrained | -0.02  | 0.05  | 2312.00  | -0.44  | .66  |
| GroupST:Testpost2:Typeuntrained | 0.01  | 0.05  | 2312.00  | 0.27  | .79  |
| GroupST:Testpost1:Flanker\_c | -0.01  | 0.02  | 2312.00  | -0.57  | .57  |
| GroupST:Testpost2:Flanker\_c | -0.06  | 0.02  | 2312.00  | -2.24  | .02  |
| GroupST:Testpost1:WM\_acc\_c | -0.82  | 0.40  | 2312.00  | -2.05  | .04  |
| GroupST:Testpost2:WM\_acc\_c | -0.27  | 0.40  | 2312.00  | -0.67  | .51  |
| GroupST:Typeuntrained:Flanker\_c | 0.01  | 0.02  | 2312.00  | 0.42  | .68  |
| GroupST:Typeuntrained:WM\_acc\_c | 0.12  | 0.37  | 2312.00  | 0.34  | .74  |
| Testpost1:Typeuntrained:Flanker\_c | 0.00  | 0.02  | 2312.00  | 0.02  | .99  |
| Testpost2:Typeuntrained:Flanker\_c | -0.02  | 0.02  | 2312.00  | -0.81  | .42  |
| Testpost1:Typeuntrained:WM\_acc\_c | -0.03  | 0.41  | 2312.00  | -0.06  | .95  |
| Testpost2:Typeuntrained:WM\_acc\_c | 0.17  | 0.41  | 2312.00  | 0.42  | .68  |
| GroupST:Testpost1:Typeuntrained:Flanker\_c | -0.02  | 0.03  | 2312.00  | -0.77  | .44  |
| GroupST:Testpost2:Typeuntrained:Flanker\_c | -0.02  | 0.03  | 2312.00  | -0.48  | .63  |
| GroupST:Testpost1:Typeuntrained:WM\_acc\_c | 0.18  | 0.52  | 2312.00  | 0.35  | .73  |
| GroupST:Testpost2:Typeuntrained:WM\_acc\_c | -0.21  | 0.52  | 2312.00  | -0.41  | .68  |
|  |  |  |  |  |  |
| Random effects | Term | Variance | SD |  |  |
| Subject | (Intercept) | 0.008 | 0.09 |  |  |
| Word | (Intercept) | 0.005 | 0.07 |  |  |

*Note*. Final model: Accuracy ~ Group \* Test \* Type \* (Flanker\_c + WM\_acc\_c) + (1 | Subject) + (1 | Word)

Reference level: Group: MT; Test: pre-test; Type: untrained.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.



**Fig. C.1** Panel A shows visualization of the three-way interaction between Group (MT, ST, CTRL), Test (Pre-test, Post-test1, Post-test2) and Working memory capacity (high, medium, low) on the word identification accuracy for two training groups (MT versus ST). Panel B shows visualization of the three-way interaction between Group (MT, ST, CTRL), Test (pre-test, post-test1, post-test2) and Selective attention ability (high, medium, low) on the word identification accuracy for two training group (MT versus ST).

**Table C.2** Summary output of the LMM on the perceptual RWA coefficient of F1 with cognitive variables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.16  | 0.04  | 78.34  | 4.14  | < .001 |
| GroupST | -0.02  | 0.05  | 78.34  | -0.42  | .68  |
| Testpost1 | 0.20  | 0.04  | 68.00  | 4.69  | < .001 |
| Testpost2 | 0.17  | 0.04  | 68.00  | 4.03  | < .001 |
| Flanker\_c | 0.03  | 0.02  | 78.34  | 1.37  | .17  |
| WM\_acc\_c | -0.35  | 0.42  | 78.34  | -0.84  | .41  |
| GroupST:Testpost1 | 0.01  | 0.06  | 68.00  | 0.14  | .89  |
| GroupST:Testpost2 | 0.02  | 0.06  | 68.00  | 0.37  | .71  |
| GroupST:Glanker\_c | -0.01  | 0.03  | 78.34  | -0.33  | .74  |
| GroupST:WM\_acc\_c | 0.28  | 0.54  | 78.34  | 0.52  | .60  |
| Testpost1:Flanker\_c | 0.00  | 0.02  | 68.00  | -0.09  | .93  |
| Testpost2:Flanker\_c | -0.02  | 0.02  | 68.00  | -1.00  | .32  |
| Testpost1:WM\_acc\_c | 0.86  | 0.47  | 68.00  | 1.84  | .07  |
| Testpost2: WM \_acc\_c | 0.35  | 0.47  | 68.00  | 0.75  | .46  |
| GroupST:Testpost1:Flanker\_c | 0.02  | 0.04  | 68.00  | 0.49  | .63  |
| GroupST:Testpost2:Flanker\_c | 0.04  | 0.04  | 68.00  | 1.19  | .24  |
| GroupST:Testpost1:WM\_acc\_c | -0.71  | 0.59  | 68.00  | -1.19  | .24  |
| GroupST:Testpost2:WM\_acc\_c | -0.05  | 0.59  | 68.00  | -0.08  | .94  |
|  |  |  |  |  |  |
| Random effects | Term | Variance | SD |  |  |
| Subject | (Intercept) | 0.01 | 0.11 |  |  |

*Note*. Final model: F1 ~ Group \* Test \* (Flanker\_c + WM\_acc\_c) + (1 | Subject)

Reference level: Group: MT; Test: pre-test.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.

**Table C.3** Summary output of the LMM on the perceptual RWA coefficient of F2 with cognitive variables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.16  | 0.04  | 75.26  | 4.24  | < .001 |
| GroupST | -0.02  | 0.05  | 75.26  | -0.30  | .77  |
| Testpost1 | 0.20  | 0.04  | 68.00  | 4.79  | < .001  |
| Testpost2 | 0.18  | 0.04  | 68.00  | 4.39  | < .001  |
| Flanker\_c | 0.03  | 0.02  | 75.26  | 1.42  | .16  |
| WM\_acc\_c | -0.38  | 0.43  | 75.26  | -0.88  | .38  |
| GroupST:Testpost1 | -0.01  | 0.06  | 68.00  | -0.25  | .80  |
| GroupST:Testpost2 | <0.01  | 0.06  | 68.00  | -0.08  | .94  |
| GroupST:Glanker\_c | -0.01  | 0.03  | 75.26  | -0.34  | .74  |
| GroupST:WM\_acc\_c | 0.30  | 0.54  | 75.26  | 0.54  | .59  |
| Testpost1:Flanker\_c | <0.01  | 0.02  | 68.00  | 0.01  | .99  |
| Testpost2:Flanker\_c | -0.02  | 0.02  | 68.00  | -1.08  | .28  |
| Testpost1:WM\_acc\_c | 0.75  | 0.46  | 68.00  | 1.64  | .11  |
| Testpost2: WM \_acc\_c | 0.39  | 0.46  | 68.00  | 0.86  | .40  |
| GroupST:Testpost1:Flanker\_c | 0.02  | 0.04  | 68.00  | 0.44  | .66  |
| GroupST:Testpost2:Flanker\_c | 0.04  | 0.04  | 68.00  | 1.21  | .23  |
| GroupST:Testpost1:WM\_acc\_c | -0.57  | 0.59  | 68.00  | -0.98  | .33  |
| GroupST:Testpost2:WM\_acc\_c | 0.05  | 0.59  | 68.00  | 0.08  | .94  |
|  |  |  |  |  |  |
| Random effects | Term | Variance | SD |  |  |
| Subject | (Intercept) | 0.01 | 0.11 |  |  |

*Note*. Final model: F2 ~ Group \* Test \* (Flanker\_c + WM\_acc\_c) + (1 | Subject)

Reference level: Group: MT; Test: pre-test.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.

**Table C.4** Summary output of the LMM on the perceptual RWA coefficient of duration with cognitive variables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.50  | 0.07  | 66.16  | 7.04  | < .001 |
| GroupST | 0.02  | 0.10  | 66.16  | 0.16  | .88  |
| Testpost1 | -0.34  | 0.07  | 68.00  | -4.81  | < .001  |
| Testpost2 | -0.39  | 0.07  | 68.00  | -5.58  | < .001 |
| Flanker\_c | -0.03  | 0.04  | 66.16  | -0.71  | .48  |
| WM\_acc\_c | 0.32  | 0.79  | 66.16  | 0.41  | .68  |
| GroupST:Testpost1 | 0.03  | 0.10  | 68.00  | 0.31  | .76  |
| GroupST:Testpost2 | 0.10  | 0.10  | 68.00  | 1.03  | .31  |
| GroupST:Glanker\_c | -0.01  | 0.06  | 66.16  | -0.10  | .92  |
| GroupST:WM\_acc\_c | 0.81  | 1.00  | 66.16  | 0.81  | .42  |
| Testpost1:Flanker\_c | -0.01  | 0.04  | 68.00  | -0.24  | .81  |
| Testpost2:Flanker\_c | 0.03  | 0.04  | 68.00  | 0.79  | .43  |
| Testpost1:WM\_acc\_c | -1.12  | 0.77  | 68.00  | -1.44  | .15  |
| Testpost2: WM \_acc\_c | -0.41  | 0.77  | 68.00  | -0.53  | .60  |
| GroupST:Testpost1:Flanker\_c | -0.01  | 0.06  | 68.00  | -0.23  | .82  |
| GroupST:Testpost2:Flanker\_c | -0.07  | 0.06  | 68.00  | -1.23  | .23  |
| GroupST:Testpost1:WM\_acc\_c | 0.03  | 0.98  | 68.00  | 0.03  | .97  |
| GroupST:Testpost2:WM\_acc\_c | -0.89  | 0.98  | 68.00  | -0.90  | .37  |
|  |  |  |  |  |  |
| Random effects | Term | Variance | SD |  |  |
| Subject | (Intercept) | 0.01 | 0.11 |  |  |

*Note*. Final model: duration ~ Group \* Test \* (Flanker\_c + WM\_acc\_c) + (1 | Subject)

Reference level: Group: MT; Test: pre-test.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.

**Table C.5** Summary output of the LMM on the production RWA coefficient of F1 with cognitive variables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.10  | 0.04  | 67.15  | 2.55  | < .001 |
| GroupST | 0.04  | 0.05  | 67.15  | 0.72  | .47  |
| Testpost1 | 0.14  | 0.04  | 68.00  | 3.84  | < .001 |
| Testpost2 | 0.16  | 0.04  | 68.00  | 4.20  | < .001 |
| Flanker\_c | -0.02  | 0.02  | 67.15  | -0.76  | .45  |
| WM\_acc\_c | 0.39  | 0.41  | 67.15  | 0.95  | .35  |
| GroupST:Testpost1 | -0.03  | 0.05  | 68.00  | -0.64  | .52  |
| GroupST:Testpost2 | -0.05  | 0.05  | 68.00  | -0.99  | .33  |
| GroupST:Glanker\_c | 0.03  | 0.03  | 67.15  | 1.06  | .30  |
| GroupST:WM\_acc\_c | -0.35  | 0.53  | 67.15  | -0.67  | .51  |
| Testpost1:Flanker\_c | 0.01  | 0.02  | 68.00  | 0.71  | .48  |
| Testpost2:Flanker\_c | 0.02  | 0.02  | 68.00  | 1.23  | .22  |
| Testpost1:WM\_acc\_c | 0.10  | 0.41  | 68.00  | 0.24  | .81  |
| Testpost2: WM \_acc\_c | -0.08  | 0.41  | 68.00  | -0.21  | .84  |
| GroupST:Testpost1:Flanker\_c | -0.04  | 0.03  | 68.00  | -1.20  | .23  |
| GroupST:Testpost2:Flanker\_c | -0.03  | 0.03  | 68.00  | -0.84  | .40  |
| GroupST:Testpost1:WM\_acc\_c | -0.29  | 0.52  | 68.00  | -0.55  | .58  |
| GroupST:Testpost2:WM\_acc\_c | -0.14  | 0.52  | 68.00  | -0.27  | .79  |
|  |  |  |  |  |  |
| Random effects | Term | Variance | SD |  |  |
| Subject | (Intercept) | 0.01 | 0.12 |  |  |

*Note*. Final model: F1 ~ Group \* Test \* (Flanker\_c + WM\_acc\_c) + (1 | Subject)

Reference level: Group: MT; Test: pre-test.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.

**Table C.6** Summary output of the LMM on the production RWA coefficient of F2 with cognitive variables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.10  | 0.03  | 62.60  | 3.08  | < .001 |
| GroupST | <0.01  | 0.05  | 62.60  | -0.01  | 1.00  |
| Testpost1 | 0.09  | 0.03  | 68.00  | 3.03  | .003  |
| Testpost2 | 0.10  | 0.03  | 68.00  | 3.39  | .001  |
| Flanker\_c | 0.01  | 0.02  | 62.60  | 0.40  | .69  |
| WM\_acc\_c | -0.02  | 0.36  | 62.60  | -0.07  | .95  |
| GroupST:Testpost1 | <0.01  | 0.04  | 68.00  | -0.05  | .96  |
| GroupST:Testpost2 | 0.01  | 0.04  | 68.00  | 0.34  | .74  |
| GroupST:Glanker\_c | <0.01  | 0.03  | 62.60  | -0.05  | .96  |
| GroupST:WM\_acc\_c | 0.41  | 0.45  | 62.60  | 0.90  | .37  |
| Testpost1:Flanker\_c | 0.01  | 0.02  | 68.00  | 0.65  | .52  |
| Testpost2:Flanker\_c | 0.01  | 0.02  | 68.00  | 0.84  | .41  |
| Testpost1:WM\_acc\_c | 0.42  | 0.33  | 68.00  | 1.27  | .21  |
| Testpost2: WM \_acc\_c | -0.09  | 0.33  | 68.00  | -0.26  | .79  |
| GroupST:Testpost1:Flanker\_c | -0.03  | 0.03  | 68.00  | -1.06  | .29  |
| GroupST:Testpost2:Flanker\_c | -0.04  | 0.03  | 68.00  | -1.56  | .12  |
| GroupST:Testpost1:WM\_acc\_c | -0.05  | 0.43  | 68.00  | -0.12  | .91  |
| GroupST:Testpost2:WM\_acc\_c | 0.30  | 0.43  | 68.00  | 0.69  | .49  |
|  |  |  |  |  |  |
| Random effects | Term | Variance | SD |  |  |
| Subject | (Intercept) | 0.01 | 0.11 |  |  |

*Note*. Final model: F2 ~ Group \* Test \* (Flanker\_c + WM\_acc\_c) + (1 | Subject)

Reference level: Group: MT; Test: pre-test.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.

**Table C.7** Summary output of the LMM on the production RWA coefficient of duration with cognitive variables

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed effects | Estimate | *SE* | *df* | *t* value | *p* value |
| (Intercept) | 0.43  | 0.05  | 66.38  | 9.36  | < .001 |
| GroupST | 0.15  | 0.07  | 66.38  | 2.25  | .03  |
| Testpost1 | -0.13  | 0.05  | 68.00  | -2.97  | .004  |
| Testpost2 | -0.24  | 0.05  | 68.00  | -5.35  | < .001  |
| Flanker\_c | -0.03  | 0.02  | 66.38  | -1.01  | .32  |
| WM\_acc\_c | 0.41  | 0.51  | 66.38  | 0.81  | .42  |
| GroupST:Testpost1 | -0.07  | 0.06  | 68.00  | -1.14  | .26  |
| GroupST:Testpost2 | 0.03  | 0.06  | 68.00  | 0.42  | .67  |
| GroupST:Glanker\_c | -0.02  | 0.04  | 66.38  | -0.55  | .59  |
| GroupST:WM\_acc\_c | -0.85  | 0.65  | 66.38  | -1.31  | .20  |
| Testpost1:Flanker\_c | 0.02  | 0.02  | 68.00  | 0.88  | .38  |
| Testpost2:Flanker\_c | 0.04  | 0.02  | 68.00  | 1.56  | .12  |
| Testpost1:WM\_acc\_c | -0.58  | 0.50  | 68.00  | -1.16  | .25  |
| Testpost2: WM \_acc\_c | -0.08  | 0.50  | 68.00  | -0.15  | .88  |
| GroupST:Testpost1:Flanker\_c | 0.04  | 0.04  | 68.00  | 1.07  | .29  |
| GroupST:Testpost2:Flanker\_c | <0.01  | 0.04  | 68.00  | -0.03  | .98  |
| GroupST:Testpost1:WM\_acc\_c | 0.48  | 0.64  | 68.00  | 0.75  | .46  |
| GroupST:Testpost2:WM\_acc\_c | -0.10  | 0.64  | 68.00  | -0.16  | .87  |
|  |  |  |  |  |  |
| Random effects | Term | Variance | SD |  |  |
| Subject | (Intercept) | 0.02 | 0.15 |  |  |

*Note*. Final model: duration ~ Group \* Test \* (Flanker\_c + WM\_acc\_c) + (1 | Subject)

Reference level: Group: MT; Test: pre-test.

Linear mixed model fit by REML.

t-tests use Satterthwaite’s method.