**Supplementary Material for**

What’s special about orthographic processing?

Further evidence from transposition effects in same-different matching

Maria Ktori, Daisy Bertrand, & Jonathan Grainger

1. Linear mixed-effects results of the Reaction Time data in Experiment 1

A1. Output of the linear mixed-effects analyses conducted on the RT of all same trials in Experiment 1, including a summary of both random and fixed effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Groups** | **Name** | **Variance** | SD |  |
| Item | (Intercept) | 0 | 0 |  |
| Participant | (Intercept) | 0.05238 | 0.2289 |  |
| Residual |  | 0.05792 | 0.2407 |  |
| **Predictor** | **Estimate** | **SE** | **t** | **Pr(>|t|)** |
| (Intercept) | 6.440006 | 0.051614 | 124.77 | < .001 |
| Display | -0.054207 | 0.006584 | -8.23 | <.001 |
| Character Type | -0.011672 | 0.006576 | -1.78 | 0.076 |
| Trial Order | -0.049356 | 0.006579 | -7.50 | <.001 |
| Display ∗ Character Type | 0.008517 | 0.006573 | 1.30 | 0.195 |

Note. Formula: log reaction time ∼ Display ∗ Character Type + Trial Order + (1|item) + (1|participant). Display reference: Horizontal; Character Type reference: Letters

A2. Output of the linear mixed-effects analyses conducted on the RT of all different trials in Experiment 1, including a summary of both random and fixed effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Groups** | **Name** | **Variance** | **SD** |  |
| Item | (Intercept) | 9.790e-04 | 0.0312885 |  |
|  | Type of Change | 2.659e-04 | 0.0163075 |  |
| Participant | (Intercept) | 3.992e-02 | 0.1998003 |  |
|  | Type of Change | 3.790e-08 | 0.0001947 |  |
| Residual |  | 5.679e-02 | 0.2382967 |  |
| **Predictor** | **Estimate** | **SE** | **t** | **Pr(>|t|)** |
| (Intercept) | 6.446e+00 | 4.669e-02 | 138.06 | < .001 |
| Display | 1.211e-05 | 5.577e-03 | 0.00 | 0.998 |
| Character Type  | 7.608e-03 | 5.983e-03 | 1.27 | 0.203 |
| Type of Change | -3.101e-02 | 5.688e-03 | -5.45 | < .001 |
| Position of Change | 1.983e-02 | 5.405e-03 | 3.67 | < .001 |
| Trial Order | -2.344e-02 | -5.522e-03 | -4.24 | <.001 |
| Display ∗ Character Type | 1.759e-03 | 5.555e-03 | 0.32 | 0.752 |
| Display ∗ Type of Change  | -7.330e-03 | -5.566e-03 | -1.32 | 0.188 |
| Character Type ∗ Type of Change | -7.021e-04 | 5.677e-03 | -0.12 | 0.902 |
| Display ∗ Character Type ∗ Type of Change | -1.430e-02 | -5.557e-03 | -2.57 | 0.010 |

Note. Formula: log reaction time ∼ Display ∗ Character Type ∗ Type of Change + Position of Change + Trial Order + (1+Type of Change |item) + (1+Type of Change |participant). Display reference: Horizontal; Character Type reference: Letters; Type of Change reference: Substitution.

A3. Output of the linear mixed-effects analyses conducted on the RT of all different trials in the horizontal display condition in Experiment 1

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| --- |
| **Random Effects** |
| **Groups** | **Name** | **Variance** | **SD** |  |
| Item | (Intercept) | 2.168e-04 | 0.014724 |  |
|  | Type of Change | 4.565e-05 | 0.006757 |  |
| Participant | (Intercept) | 3.654e-02 | 0.191147 |  |
|  | Type of Change | 1.312e-05 | 0.003623 |  |
| Residual |  | 5.425e-02 | 0.232906 |  |
| **Fixed Effects** |
| **Predictor** | **Estimate** | **SE** | **t** | **Pr(>|t|)** |
| (Intercept) | 6.470610 | 0.046331 | 139.66 | < .001 |
| Character Type  | 0.009385 | 0.007825 | 1.20 | 0.231 |
| Type of Change | -0.039147 | 0.007851 | -4.99 | < .001 |
| Position of Change | 0.010284 | 0.007044 | 1.46 | 0.144 |
| Trial Order | -0.020527 | 0.007652 | -2.68 | 0.007 |
| Character Type ∗ Type of Change | -0.015948 | 0.007769 | -2.05 | 0.040 |
| *Simple Main Effects of the Character Type ∗ Type of Change interaction* |
|  | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| Type of Change: Letters | 0.05509 | 0.01096 | 5.03 | <.001 |
| Type of Change: Symbols | 0.02320 | 0.01113 | 2.08 | 0.037 |
| Character Type: Substitution | 0.006563 | 0.009888 | 0.66 | 0.507 |
| Character Type: Transposition | -0.0253 | 0.01206 | -2.10 | 0.036 |

Note. Formula: log reaction time ∼ Character Type ∗ Type of Change + Position of Change + Trial Order + (1+ Type of Change |item) + (1 + Type of Change |participant). Character Type reference: Letters; Type of Change reference: Substitution.

A4. Output of the linear mixed-effects analyses conducted on the RT of all different trials in the vertical display condition in Experiment 1

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| **Random Effects** |
| **Groups** | **Name** | **Variance** | **SD** |  |
| Item | (Intercept) | 1.896e-03 | 0.043546 |  |
|  | Type of Change | 2.909e-04 | 0.017056 |  |
| Participant | (Intercept) | 4.384e-02 | 0.209386 |  |
|  | Type of Change | 3.663e-06 | 0.001914 |  |
| Residual |  | 5.772e-02 | 0.240240 |  |
| **Fixed Effects** |
| **Predictor** | **Estimate** | **SE** | **t** | **Pr(>|t|)** |
| (Intercept) | 6.419107 | 0.050629 | 126.79 | < .001 |
| Character Type | 0.005845 | 0.008450 | 0.69 | 0.489 |
| Type of Change | -0.024159 | 0.007971 | -3.03 | 0.002 |
| Position of Change | 0.032018 | 0.007842 | 4.08 | <.001 |
| Trial Order | -0.030760 | 0.007967 | -3.86 | <.001 |
| Character Type ∗ Type of Change | 0.014014 | 0.007958 | 1.76 | 0.078 |

Note. Formula: log reaction time ∼ Character Type ∗ Type of Change + Position of Change + Trial Order + (1 + Type of Change |item) + (1 + Type of Change |participant). Character Type reference: Letters; Type of Change reference: Substitution.

A5. Output of the linear mixed-effects analyses conducted on the RT of all different trials with letters in Experiment 1

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| --- |
| **Random Effects** |
| **Groups** | **Name** | **Variance** | **SD** |  |
| Item | (Intercept) | 9.932e-04 | 0.031514 |  |
|  | Type of Change | 4.251e-04 | 0.020618 |  |
| Participant | (Intercept) | 3.510e-02 | 0.187342 |  |
|  | Type of Change | 7.199e-06 | 0.002683 |  |
| Residual |  | 5.401e-02 | 0.232409 |  |
| **Fixed Effects** |
| **Predictor** | **Estimate** | **SE** | **t** | **Pr(>|t|)** |
| (Intercept) | 6.454629 | 0.045746 | 141.10 | < .001 |
| Display  | 0.001712 | 0.007754 | 0.22 | 0.825 |
| Type of Change | -0.029787 | 0.008067 | -3.69 | <.001 |
| Position of Change | 0.019638 | 0.007284 | 2.70 | 0.007 |
| Trial Order | -0.018728 | 0.007674 | -2.44 | 0.015 |
| Display ∗ Type of Change | -0.021124 | 0.007742 | -2.73 | 0.006 |
| *Simple Main Effects of the Display ∗ Type of Change interaction* |
|  | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| Type of Change: Horizontal Display | 0.05091 | 0.01116 | 4.56 | < .001 |
| Type of Change: Vertical Display | 0.008664 | 0.011202 | 0.77 | 0.439 |
| Display: Substitution | 0.019412 | 0.009849 | 1.97 | 0.049 |
| Display: Transposition | -0.02284 | 0.01196 | -1.91 | 0.056 |

Note. Formula: log reaction time ∼ Display ∗ Type of Change + Position of Change + Trial Order + (1 + Type of Change |item) + (1 + Type of Change |participant). Display reference: Horizontal; Type of Change reference: Substitution.

A6. Output of the linear mixed-effects analyses conducted on RT of all different trials with symbols in Experiment 1

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| --- |
| **Random Effects** |
| **Groups** | **Name** | **Variance** | **SD** |  |
| Item | (Intercept) | 1.271e-03 | 0.035657 |  |
|  | Type of Change | 1.777e-04 | 0.013332 |  |
| Participant | (Intercept) | 4.698e-02 | 0.216745 |  |
|  | Type of Change | 4.373e-06 | 0.002091 |  |
| Residual |  | 5.734e-02 | 0.239452 |  |
| **Fixed Effects** |
| **Predictor** | **Estimate** | **SE** | **t** | **Pr(>|t|)** |
| (Intercept) | 6.4347553 | 0.0525157 | 122.53 | < .001 |
| Display | -0.0007078 | 0.0078904 | -0.09 | 0.929 |
| Type of Change | -0.0304262 | 0.0079907 | -3.81 | 0.004 |
| Position of Change | 0.0210969 | 0.0080774 | 2.61 | <.01 |
| Trial Order | -0.0307981 | 0.0079027 | -3.90 | < .001 |
| Display ∗ Type of Change | 0.0057726 | 0.0078698 | 0.73 | 0.463 |

Note. Formula: log reaction time ∼ Display ∗ Type of Change + Position of Change + Trial Order + (1 + Type of Change |item) + (1 + Type of Change |participant). Display reference: Horizontal; Type of Change reference: Substitution.

 Output of the linear mixed-effects analyses conducted on the reaction time data, exploring the factor of primetype

utput of the linear mixed-effects analyses conducted on the reaction time data, exploring the factor of primetype[affixed, nonaffixed, unrelated], position [beginning, ending] and individual reading proficiency [read prof].

1. Linear mixed-effects results of the Error data in Experiment 1

B1. Output of the linear mixed-effects analyses conducted on the errors of all same trials in Experiment 1, including a summary of both random and fixed effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Groups** | **Name** | **Variance** | SD |  |
| Item | (Intercept) | 0 | 0 |  |
| Participant | (Intercept) | 1.022 | 1.011 |  |
| **Predictor** | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| (Intercept) | -2.80488 | 0.30329 | -9.25 | <.001 |
| Display | 1.24840 | 0.23460 | 5.32 | <.001 |
| Character Type | -0.21651 | 0.28083 | -0.77 | 0.441 |
| Trial Order | 0.04366 | 0.08132 | 0.54 | 0.591 |
| Display ∗ Character Type | -0.22944 | 0.34435 | -0.67 | 0.505 |

Note. Formula: error rate ∼ Display ∗ Character Type + Trial Order + (1|item) + (1|participant). Display reference: Horizontal; Character Type reference: Letters

B2. Output of the linear mixed-effects analyses conducted on the errors of all different trials in Experiment 1, including a summary of both random and fixed effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Groups** | **Name** | **Variance** | **SD** |  |
| Item | (Intercept) | 0.0006055 | 0.02461 |  |
|  | Type of Change | 0.0882474 | 0.29706 |  |
| Participant | (Intercept) | 0.2712704 | 0.52084 |  |
|  | Type of Change | 0.0104320 | 0.10214 |  |
| **Predictor** | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| (Intercept) | -1.891372 | 0.169465 | -11.16 | < .001 |
| Display | -0.003779 | 0.049673 | -0.08 | 0.939 |
| Character Type  | -0.041140 | 0.050045 | -0.82 | 0.411 |
| Type of Change | -0.630483 | 0.063677 | -9.90 | < .001 |
| Position of Change | 0.275166 | 0.044275 | 6.21 | < .001 |
| Trial Order | -0.055575 | 0.047554 | -1.17 | 0.243 |
| Display ∗ Character Type | -0.155589 | 0.049635 | -3.14 | 0.002 |
| Display ∗ Type of Change  | -0.173209 | 0.049672 | -3.49 | <.01 |
| Character Type ∗ Type of Change | -0.181742 | 0.054195 | -3.35 | 0.001 |
| Display ∗ Character Type ∗ Type of Change | -0.083354 | 0.049648 | -1.68 | 0.093 |

Note. Formula: error rate ∼ Display ∗ Character Type ∗ Type of Change + Position of Change + Trial Order + (1+Type of Change |item) + (1+Type of Change |participant). Display reference: Horizontal; Character Type reference: Letters; Type of Change reference: Substitution.

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| B2 continued |
| *Simple Main Effects of the Display ∗ Character Type interaction* |
|  | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| Display: Letters | 0.15937 | 0.07325 | 2.18 | 0.030 |
| Display: Symbols | -0.15181 | 0.06705 | -2.26 | 0.024 |
| Character Type: Horizontal Display | 0.19673 | 0.07319 | 2.69 | 0.007 |
| Character Type: Vertical Display | -0.11445 | 0.06767 | -1.69 | 0.091 |
| *Simple Main Effects of the Character Type ∗ Type of Change interaction* |
|  | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| Type of Change: Letters | 0.81223 | 0.08718 | 9.32 | < .001 |
| Type of Change: Symbols | 0.44874 | 0.07989 | 5.62 | < .001 |
| Character Type: Substitution | 0.22288 | 0.08323 | 2.68 | 0.007 |
| Character Type: Transposition | -0.14060 | 0.06289 | -2.24 | 0.025 |
| *Simple Main Effects of the Display ∗ Type of Change interaction* |
|  | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| Type of Change: Horizontal Display | 0.80369 | 0.08346 | 9.63 | < .001 |
| Type of Change: Vertical Display | 0.45727 | 0.07797 | 5.87 | < .001 |
| Display: Substitution | 0.1770 | 0.0793 | 2.23 | 0.026 |
| Display: Transposition | -0.16943 | 0.05984 | -2.83 | 0.005 |

C. Linear mixed-effects results of the Reaction Time data in Experiment 2

C1. Output of the linear mixed-effects analyses conducted on the RT of all same trials in Experiment 2, including a summary of both random and fixed effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Groups** | **Name** | **Variance** | SD |  |
| Item | (Intercept) | 0.002496 | 0.04996 |  |
| Participant | (Intercept) | 0.049417 | 0.22230 |  |
| Residual |  | 0.066423 | 0.25773 |  |
| **Predictor** | **Estimate** | **SE** | **t** | **Pr(>|t|)** |
| (Intercept) | 6.416759 | 0.049115 | 130.65 | < .001 |
| Display | -0.052329 | 0.006921 | -7.56 | <.001 |
| Character Type | 0.015472 | 0.007681 | 2.01 | 0.044 |
| Trial Order | -0.047338 | 0.007014 | -6.75 | <.001 |
| Display ∗ Character Type | -0.003994 | 0.006923 | -0.58 | 0.564 |

Note. Formula: log reaction time ∼ Display ∗ Character Type + Trial Order + (1|item) + (1|participant). Display reference: Horizontal; Character Type reference: Letters

C2. Output of the linear mixed-effects analyses conducted on the RT of all different trials in Experiment 2, including a summary of both random and fixed effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Groups** | **Name** | **Variance** | **SD** |  |
| Item | (Intercept) | 0 | 0 |  |
|  | Type of Change | 6.626e-15 | 8.140e-08 |  |
| Participant | (Intercept) | 2.773e-02 | 1.665e-01 |  |
|  | Type of Change | 2.068e-04 | 1.438e-02 |  |
| Residual |  | 5.411e-02 | 2.326e-01 |  |
| **Predictor** | **Estimate** | **SE** | **t** | **Pr(>|t|)** |
| (Intercept) | 6.477646 | 0.038504 | 168.23 | < .001 |
| Display | 0.007029 | 0.005549 | 1.27 | 0.205 |
| Character Type  | 0.002180 | 0.005535 | 0.39 | 0.694 |
| Type of Change | -0.020808 | 0.006380 | -3.26 | 0.001 |
| Position of Change | 0.015475 | 0.005033 | 3.07 | 0.002 |
| Trial Order | -0.052818 | 0.005422 | -9.74 | <.001 |
| Display ∗ Character Type | 0.020054 | 0.005517 | 3.63 | <.01 |
| Display ∗ Type of Change  | -0.006636 | 0.005511 | -1.20 | 0.229 |
| Character Type ∗ Type of Change | -0.004068 | 0.005513 | -0.74 | 0.461 |
| Display ∗ Character Type ∗ Type of Change | -0.011669 | 0.005514 | -2.12 | 0.034 |

Note. Formula: log reaction time ∼ Display ∗ Character Type ∗ Type of Change + Position of Change + Trial Order + (1+Type of Change |item) + (1+Type of Change |participant). Display reference: Horizontal; Character Type reference: Letters; Type of Change reference: Substitution.

C3. Output of the linear mixed-effects analyses conducted on the RT of all different trials in the horizontal display condition in Experiment 2

|  |
| --- |
| **Random Effects** |
| **Groups** | **Name** | **Variance** | **SD** |  |
| Item | (Intercept) | 0.0002382 | 0.01544 |  |
|  | Type of Change | 0.0019842 | 0.04454 |  |
| Participant | (Intercept) | 0.0285200 | 0.16888 |  |
|  | Type of Change | 0.0016408 | 0.04051 |  |
| Residual |  | 0.0494808 | 0.22244 |  |
| **Fixed Effects** |
| **Predictor** | **Estimate** | **SE** | **t** | **Pr(>|t|)** |
| (Intercept) | 6.481945 | 0.040959 | 158.25 | < .001 |
| Character Type  | 0.022516 | 0.007757 | 2.90 | 0.004 |
| Type of Change | -0.027609 | 0.012141 | -2.27 | 0.023 |
| Position of Change | 0.017848 | 0.006709 | 2.66 | 0.008 |
| Trial Order | -0.052787 | 0.007519 | -7.02 | < .001 |
| Character Type ∗ Type of Change | -0.016384 | 0.008245 | -1.99 | 0.047 |
| *Simple Main Effects of the Character Type ∗ Type of Change interaction* |
|  | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| Type of Change: Letters | 0.04399 | 0.01427 | 3.08 | 0.002 |
| Type of Change: Digits | 0.01123 | 0.01508 | 0.75 | 0.457 |
| Character Type: Substitution | -0.006132 | 0.009578 | -0.64 | 0.522 |
| Character Type: Transposition | -0.03890 | 0.01283 | -3.03 | 0.002 |

Note. Formula: log reaction time ∼ Character Type ∗ Type of Change + Position of Change + Trial Order + (1+ Type of Change |item) + (1 + Type of Change |participant). Character Type reference: Letters; Type of Change reference: Substitution.

C4. Output of the linear mixed-effects analyses conducted on the RT of all different trials in the vertical display condition in Experiment 2

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| --- |
| **Random Effects** |
| **Groups** | **Name** | **Variance** | **SD** |  |
| Item | (Intercept) | 0 | 0 |  |
|  | Type of Change | 1.433e-14 | 1.197e-07 |  |
| Participant | (Intercept) | 2.800e-02 | 1.673e-01 |  |
|  | Type of Change | 3.903e-05 | 6.248e-03 |  |
| Residual |  | 5.548e-02 | 2.355e-01 |  |
| **Fixed Effects** |
| **Predictor** | **Estimate** | **SE** | **t** | **Pr(>|t|)** |
| (Intercept) | 6.475210 | 0.040787 | 158.76 | < .001 |
| Character Type | -0.019064 | 0.007887 | -2.42 | 0.016 |
| Type of Change | -0.013478 | 0.007961 | -1.69 | 0.090 |
| Position of Change | 0.012178 | 0.007565 | 1.61 | 0.107 |
| Trial Order | -0.050031 | 0.007839 | -6.38 | <.001 |
| Character Type ∗ Type of Change | 0.008760 | 0.007820 | 1.12 | 0.263 |

Note. Formula: log reaction time ∼ Character Type ∗ Type of Change + Position of Change + Trial Order + (1 + Type of Change |item) + (1 + Type of Change |participant). Character Type reference: Letters; Type of Change reference: Substitution.

C5. Output of the linear mixed-effects analyses conducted on the RT of all different trials with letters in Experiment 2

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| --- |
| **Random Effects** |
| **Groups** | **Name** | **Variance** | **SD** |  |
| Item | (Intercept) | 0.0001098 | 0.01048 |  |
|  | Type of Change | 0.0008874 | 0.02979 |  |
| Participant | (Intercept) | 0.0288838 | 0.16995 |  |
|  | Type of Change | 0.0002122 | 0.01457 |  |
| Residual |  | 0.0518944 | 0.22780 |  |
| **Fixed Effects** |
| **Predictor** | **Estimate** | **SE** | **t** | **Pr(>|t|)** |
| (Intercept) | 6.476384 | 0.040666 | 159.26 | < .001 |
| Display  | 0.027025 | 0.007411 | 3.65 | <.01 |
| Type of Change | -0.024296 | 0.008553 | -2.84 | 0.005 |
| Position of Change | 0.015760 | 0.006451 | 2.44 | 0.015 |
| Trial Order | -0.049132 | 0.007272 | -6.76 | <.001 |
| Display ∗ Type of Change | -0.017760 | 0.007393 | -2.40 | 0.016 |
| *Simple Main Effects of the Display ∗ Type of Change interaction* |
|  | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| Type of Change: Horizontal Display | 0.04206 | 0.01133 | 3.71 | <.01 |
| Type of Change: Vertical Display | 0.006536 | 0.011279 | 0.58 | 0.562 |
| Display: Substitution | -0.009265 | 0.009202 | -1.01 | 0.314 |
| Display: Transposition | -0.04479 | 0.01160 | -3.86 | <.01 |

Note. Formula: log reaction time ∼ Display ∗ Type of Change + Position of Change + Trial Order + (1 + Type of Change |item) + (1 + Type of Change |participant). Display reference: Horizontal; Type of Change reference: Substitution.

C6. Output of the linear mixed-effects analyses conducted on RT of all different trials with digits in Experiment 2

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| --- |
| **Random Effects** |
| **Groups** | **Name** | **Variance** | **SD** |  |
| Item | (Intercept) | 5.488e-05 | 0.007408 |  |
|  | Type of Change | 2.455e-05 | 0.004955 |  |
| Participant | (Intercept) | 2.719e-02 | 0.164895 |  |
|  | Type of Change | 3.826e-06 | 0.001956 |  |
| Residual |  | 5.602e-02 | 0.236687 |  |
| **Fixed Effects** |
| **Predictor** | **Estimate** | **SE** | **t** | **Pr(>|t|)** |
| (Intercept) | 6.481069 | 0.041136 | 157.55 | < .001 |
| Display | -0.012369 | 0.008364 | -1.48 | 0.139 |
| Type of Change | -0.017962 | 0.008313 | -2.16 | 0.031 |
| Position of Change | 0.014982 | 0.008062 | 1.86 | 0.063 |
| Trial Order | -0.055829 | 0.008217 | -6.79 | < .001 |
| Display ∗ Type of Change | 0.005401 | 0.008237 | 0.66 | 0.512 |

Note. Formula: log reaction time ∼ Display ∗ Type of Change + Position of Change + Trial Order + (1 + Type of Change |item) + (1 + Type of Change |participant). Display reference: Horizontal; Type of Change reference: Substitution.

 Output of the linear mixed-effects analyses conducted on the reaction time data, exploring the factor of primetype

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1. Linear mixed-effects results of the Error data in Experiment 2

D1. Output of the linear mixed-effects analyses conducted on the errors of all same trials in Experiment 2, including a summary of both random and fixed effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Groups** | **Name** | **Variance** | SD |  |
| Item | (Intercept) | 0 | 0 |  |
| Participant | (Intercept) | 0.3914 | 0.6257 |  |
| **Predictor** | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| (Intercept) | -2.59015 | 0.23390 | -11.07 | <.001 |
| Display | 0.31914 | 0.24280 | 1.31 | 0.189 |
| Character Type | -0.37888 | 0.28877 | -1.31 | 0.189 |
| Trial Order | 0.06259 | 0.09398 | 0.67 | 0.505 |
| Display ∗ Character Type | -0.05487 | 0.38623 | -0.14 | 0.887 |

Note. Formula: error rate ∼ Display ∗ Character Type + Trial Order + (1|item) + (1|participant). Display reference: Horizontal; Character Type reference: Letters

D2. Output of the linear mixed-effects analyses conducted on the errors of all different trials in Experiment 2, including a summary of both random and fixed effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Groups** | **Name** | **Variance** | **SD** |  |
| Item | (Intercept) | 0.00382 | 0.06181 |  |
|  | Type of Change | 0.00694 | 0.08331 |  |
| Participant | (Intercept) | 0.26380 | 0.51361 |  |
|  | Type of Change | 0.08379 | 0.28947 |  |
| **Predictor** | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| (Intercept) | -1.38453 | 0.15307 | -9.05 | < .001 |
| Display | -0.03413 | 0.04069 | -0.84 | 0.402 |
| Character Type  | -0.12040 | 0.04105 | -2.93 | 0.003 |
| Type of Change | -0.61899 | 0.07717 | -8.02 | < .001 |
| Position of Change | 0.31208 | 0.03713 | 8.40 | < .001 |
| Trial Order | -0.14894 | 0.04024 | -3.70 | <.01 |
| Display ∗ Character Type | -0.08282 | 0.04068 | -2.04 | 0.042 |
| Display ∗ Type of Change  | -0.13451 | 0.04069 | -3.31 | <.01 |
| Character Type ∗ Type of Change | -0.12806 | 0.04112 | -3.11 | 0.002 |
| Display ∗ Character Type ∗ Type of Change | -0.06243 | 0.04066 | -1.54 | 0.125 |

Note. Formula: error rate ∼ Display ∗ Character Type ∗ Type of Change + Position of Change + Trial Order + (1+Type of Change |item) + (1+Type of Change |participant). Display reference: Horizontal; Character Type reference: Letters; Type of Change reference: Substitution.

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| D2 continued |
| *Simple Main Effects of the Display ∗ Character Type interaction* |
|  | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| Display: Letters | 0.11695 | 0.05775 | 2.03 | 0.043 |
| Display: Digits | -0.04869 | 0.05733 | -0.85 | 0.396 |
| Character Type: Horizontal Display | 0.2032 | 0.0590 | 3.44 | <.01 |
| Character Type: Vertical Display | 0.03758 | 0.05655 | 0.67 | 0.506 |
| *Simple Main Effects of the Character Type ∗ Type of Change interaction* |
|  | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| Type of Change: Letters | 0.74705 | 0.08804 | 8.49 | < .001 |
| Type of Change: Digits | 0.49093 | 0.08684 | 5.65 | < .001 |
| Character Type: Substitution | 0.24846 | 0.06329 | 3.93 | < .001 |
| Character Type: Transposition | -0.007656 | 0.052404 | -0.15 | 0.884 |
| *Simple Main Effects of the Display ∗ Type of Change interaction* |
|  | **Estimate** | **SE** | **z** | **Pr(>|z|)** |
| Type of Change: Horizontal Display | 0.75350 | 0.08826 | 8.54 | < .001 |
| Type of Change: Vertical Display | 0.4845 | 0.0862 | 5.62 | < .001 |
| Display: Substitution | 0.16863 | 0.06237 | 2.70 | 0.007 |
| Display: Transposition | -0.10038 | 0.05228 | -1.92 | 0.055 |