

**Supplemental Material S1.** Details of the Bayesian repeated measures ANCOVA with nonverbal intelligence as the covariate. These data allow readers to compare outcomes when nonverbal intelligence is included as a covariate.

### **Bayesian Repeated Measures ANCOVA With Nonverbal Intelligence as the Covariate.**

Intelligence played a much larger role for interpreting the results of the dyslexia+DLD group than other groups. This is because the models that included nonverbal intelligence were much stronger for the visuospatial versus the phonological tasks and the group with dyslexia+DLD struggled with the visuospatial tasks. Nonverbal IQ scores that are low, but within normal limits, are a defining feature of children with DLD (Gallinat & Spaulding, 2014) and therefore not unexpected for this population. The primary reason we covariated nonverbal intelligence was to ensure that any differences between the TD and dyslexia groups were not due differences in nonverbal IQ. Results suggest that they were not. Following are the ANCOVA results by each task. The means and effect sizes are the same as those reported for the ANOVAs in the main document. Interactions are reported only when there was more than anecdotal evidence for a group by condition interaction. Results include Bayes factors and interpretations of those factors based on the guidelines of Wagenmakers et al. (2018) and Hedge’s *g* for significant differences.

#### *Results of Bayesian Repeated Measures ANCOVAs for the Naming Task.*

|                      | <b>Word Length</b>   | <b>Phonological<br/>Similarity</b>                        | <b>Visual<br/>Similarity</b>                              | <b>Location</b>  | <b>Orthography</b>  | <b>Verbs</b>  |
|----------------------|--|---|---|--|---|---|
| Group                | Groups Differ<br>(Very Strong;<br>BF <sub>Inc</sub> = 38.99) | Groups Differ<br>(Extreme; BF <sub>Inc</sub><br>= 147.13) | Groups Differ<br>(Moderate;<br>BF <sub>Inc</sub> = 13.15) | Groups Differ<br>(Moderate; BF <sub>Inc</sub><br>= 4.47) | Groups Differ<br>(Strong; BF <sub>Inc</sub> =<br>25.51)   | Groups Differ<br>(Extreme; BF <sub>Inc</sub><br>= 141.35) |
| Condition            | Extreme; BF <sub>Inc</sub><br>= 4.835e +38                   | Moderate (Null);<br>BF <sub>Inc</sub> = 0.13              | Extreme;<br>BF <sub>Inc</sub> = 627.28                    | Anecdotal; BF <sub>Inc</sub><br>= 2.66                   | Extreme; BF <sub>Inc</sub><br>= 7.80e +14                 | n/a   |
| Group x<br>Condition |  |   |   |  | Groups Differ<br>(Extreme; BF <sub>Inc</sub><br>= 210.13) |   |
| Covariate            | Very Strong;<br>BF <sub>Inc</sub> = 62.94                    | Moderate; BF <sub>Inc</sub><br>= 5.36                     | Very Strong;<br>BF <sub>Inc</sub> = 96.49                 | Moderate; BF <sub>Inc</sub><br>= 7.23                    | Extreme; BF <sub>Inc</sub><br>= 337.78                    | Extreme; BF <sub>Inc</sub> =<br>169.85                    |

*Results of Bayesian Repeated Measures ANCOVAs for the Mispronunciation Detection Task.*

|           | <b>Word Length</b>   | <b>Phonological Similarity</b>               | <b>Visual Similarity</b>                         | <b>Location</b>                              | <b>Orthography</b>                            | <b>Verbs</b>   |
|-----------|--|--|--|--|---|--|
| Group     | Groups tend <u>Not</u> to Differ (Anecdotal; $BF_{Inc} = 0.45$ ) | Groups Differ (Moderate; $BF_{Inc} = 3.21$ ) | Groups Differ (Very Strong; $BF_{Inc} = 30.06$ ) | Groups Differ (Moderate; $BF_{Inc} = 6.14$ ) | Groups Differ (Extreme; $BF_{Inc} = 124.84$ ) | Groups Do <u>Not</u> Differ (Moderate; $BF_{Inc} = 0.14$ ) |
| Condition | Extreme; $BF_{Inc} = 2.167e+6$                                   | Strong Evidence (null); $BF_{Inc} = 0.09$    | Moderate (null); $BF_{Inc} = 0.24$               | Strong (null); $BF_{Inc} = 0.13$             | Anecdotal (null); $BF_{Inc} = 0.40$           | n/a  |
| Covariate | Extreme; $BF_{Inc} = 257.30$                                     | Anecdotal; $BF_{Inc} = 2.43$                 | Anecdotal; $BF_{Inc} = 1.15$                     | Anecdotal; $BF_{Inc} = 1.41$                 | Anecdotal; $BF_{Inc} = 0.63$                  | Very Strong; $BF_{Inc} = 52.73$                            |

*Results of Bayesian Repeated Measures ANCOVAs for the Visual Feature Recall Task.*

|           | <b>Word Length</b>                                       | <b>Phonological Similarity</b>                           | <b>Visual Similarity</b>                                   | <b>Location</b>  | <b>Orthography</b>  | <b>Verbs</b>   |
|-----------|--|--|--|--|---|--|
| Group     | Groups Do <u>Not</u> Differ (Strong; $BF_{Inc} = 0.10$ ) | Groups Do <u>Not</u> Differ (Strong; $BF_{Inc} = 0.09$ ) | Groups Do <u>Not</u> Differ (Moderate; $BF_{Inc} = 0.11$ ) | Groups Do <u>Not</u> Differ (Moderate; $BF_{Inc} = 0.21$ ) | Groups Tend <u>Not</u> Differ (Anecdotal; $BF_{Inc} = 0.62$ ) | Groups Do <u>Not</u> Differ (Moderate; $BF_{Inc} = 0.16$ ) |
| Condition | Moderate (null); $BF_{Inc} = 0.102$                      | Strong (null); $BF_{Inc} = 0.09$                         | Extreme; $BF_{Inc} = 346.87$                               | Anecdotal; $BF_{Inc} = 1.45$                               | Moderate (null); $BF_{Inc} = 0.11$                            | n/a  |
| Covariate | Extreme; $BF_{Inc} = 828749.67$                          | Extreme; $BF_{Inc} = 33623.61$                           | Extreme; $BF_{Inc} = 1.733e +6$                            | Extreme; $BF_{Inc} = 38335.08$                             | Extreme; $BF_{Inc} = 3639.67$                                 | Very Strong; $BF_{Inc} = 50.81$                            |

*Results of Bayesian Repeated Measures ANCOVAs for the Visual Difference Decision Task.*

|           | <b>Word Length</b>  | <b>Phonological Similarity</b>                                      | <b>Visual Similarity</b>                         | <b>Location</b>   | <b>Orthography</b>  | <b>Verbs</b>  |
|-----------|---|---|--|---|---|---|
| Group     | Groups tend <u>Not</u> to Differ<br>(Anecdotal; $BF_{Inc} = 0.56$ ) | Groups tend <u>Not</u> to Differ<br>(Anecdotal; $BF_{Inc} = 0.60$ ) | Groups Differ (Very Strong; $BF_{Inc} = 63.25$ ) | Groups tend <u>Not</u> to Differ<br>(Anecdotal; $BF_{Inc} = 0.71$ ) | Groups Do <u>Not</u> Differ<br>(Moderate; $BF_{Inc} = 0.15$ ) | Groups Do <u>Not</u> Differ<br>(Moderate; $BF_{Inc} = 0.27$ ) |
| Condition | Moderate (null); $BF_{Inc} = 0.22$                                  | Moderate (null); $BF_{Inc} = 0.15$                                  | Extreme; $BF_{Inc} = 5.529e + 6$                 | Moderate (null); $BF_{Inc} = 0.14$                                  | Strong (null); $BF_{Inc} = 0.10$                              | n/a   |
| Covariate | Extreme; $BF_{Inc} = 515.19$  | Moderate; $BF_{Inc} = 4.57$   | Very Strong; $BF_{Inc} = 44.34$                  | Very Strong; $BF_{Inc} = 65.48$                                     | Extreme; $BF_{Inc} = 1066.20$                                 | Extreme; $BF_{Inc} = 464.30$                                  |

*Results of Bayesian Repeated Measures ANCOVAs for the Phonological Visual Linking Task.*

|           | <b>Word Length</b>  | <b>Phonological Similarity</b>                                      | <b>Visual Similarity</b>  | <b>Location</b>   | <b>Orthography</b>                                       | <b>Verbs</b>  |
|-----------|---|---|---|---|--|---|
| Group     | Groups tend <u>Not</u> to Differ<br>(Anecdotal; $BF_{Inc} = 0.58$ ) | Groups tend <u>Not</u> to Differ<br>(Anecdotal; $BF_{Inc} = 0.48$ ) | Groups tend <u>Not</u> to Differ<br>(Anecdotal; $BF_{Inc} = 0.41$ ) | Groups tend <u>Not</u> to Differ<br>(Anecdotal; $BF_{Inc} = 0.37$ ) | Groups Tend to Differ<br>(Anecdotal; $BF_{Inc} = 1.17$ ) | Groups Do <u>Not</u> Differ<br>(Moderate; $BF_{Inc} = 0.15$ ) |
| Condition | Extreme; $BF_{Inc} = 1740.58$                                       | Extreme; $BF_{Inc} = 367.06$  | Anecdotal; $BF_{Inc} = 2.92$  | Moderate (NULL); $BF_{Inc} = 0.102$                                 | Extreme; $BF_{Inc} = 24980.57$                           | n/a   |
| Covariate | Strong; $BF_{Inc} = 14.61$  | Extreme; $BF_{Inc} = 1740.58$                                       | Extreme; $BF_{Inc} = 16321.79$                                      | Extreme; $BF_{Inc} = 676360.80$                                     | Extreme; $BF_{Inc} = 840.70$                             | Very Strong; $BF_{Inc} = 78.43$                               |

## References

- Gallinat, E., & Spaulding, T. J. (2014). Differences in the performance of children with specific language impairment and their typically developing peers on nonverbal cognitive tests: A meta-analysis. *Journal of Speech, Language, and Hearing Research*, 57, 1363–1382.
- Wagenmakers, E.-J., Love, J., Marsman, M., Jamil, T., Ly, A., Verhagen, J., . . . Morey, R. D. (2018). Bayesian inference for psychology. Part II: Example applications with JASP. *Psychonomic Bulletin and Review*, 25, 58–76. <https://doi.org/10.3758/s13423-017-1323-7>