# Supplementary Materials

# Appendix A

Additional Descriptive Statistics for Independent and Dependent Measures

This appendix contains additional descriptive statistics for the independent (i.e., neighborhood measures) and dependent (i.e., PACT values) measures used in the multisyllabic and CVC analyses. The neighborhood measures include the original neighborhood density for CVC (Table A1) and multisyllabic () words. In addition, the alternative neighborhood measures for multisyllabic words include the Phonological Levenshtein Distance 20 (), the Phoneme Feature Distance 20 (), and the Stress-Onset Nucleus neighborhood density (). When creating the dependent measure, the frequency values of the phonological forms are used (). We present the PACT values across all words (Table A7). Finally, the dependent measure contained the CVC (Table A8) and multisyllabic (Table A9) PACT values. Computer code used to create these measures, and all other code used in this project, can be found at: http://github.com/melissa-rajaram/jcl-multisyllabic-neighborhoods-2021/.

Table A1. Descriptive statistics of original neighborhood density (ND) values for the consonant-vowel-consonant (CVC) words used by children.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Age in Years | Range | Mean (Std) | Median | Mode (Count) |
| Three | 0 to 22 | 7.65 (3.73) | 7 | 6 (51) |
| Four | 0 to 22 | 8.00 (3.86) | 8 | 7 (44) |
| Six | 1 to 22 | 9.50 (4.41) | 9 | 6 (49) |

Table A2. Descriptive statistics of neighborhood density (ND) for the multisyllabic words used by children.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Age in Years | Range | Mean (Std) | Median | Mode (Count) |
| Three | 0 to 7 | 0.56 (1.07) | 0 | 0 (445) |
| Four | 0 to 8 | 0.55 (1.07) | 0 | 0 (494) |
| Six | 0 to 10 | 0.65 (1.25) | 0 | 0 (663) |

Table A3. Descriptive statistics of Phonological Levenshtein Distance 20 (PLD20) values for the multisyllabic words used by children.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Age in Years | Range | Mean (Std) | Median | Mode (Count) |
| Three | 1.65 to 6.9 | 3.06 (0.96) | 2.85 | 2.80 (30) |
| Four | 1.60 to 6.7 | 3.05 (0.97) | 2.85 | 1.95 (43) |
| Six | 1.50 to 8.3 | 3.01 (0.97) | 2.85 | 2.90 (48) |

Table A4. Descriptive statistics of Phoneme Feature Distance 20 (P-FEAT20) values for the multisyllabic words used by children.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Age in Years | Range | Mean (Std) | Median | Mode (Count) |
| Three | 0.76 to 2.92 | 1.57 (0.39) | 1.54 | 1.25 (4) |
| Four | 0.67 to 2.71 | 1.56 (0.41) | 1.53 | 1.10 (4) |
| Six | 0.67 to 2.54 | 1.49 (0.37) | 1.48 | 0.86 (6) |

Table A5. Descriptive statistics of Stress: Onset Nucleus Neighborhood Density (SON-ND) values for the multisyllabic words used by children.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Age in Years | Range | Mean (Std) | Median | Mode (Count) |
| Three | 0 to 19 | 5.70 (4.42) | 5 | 2 (77) |
| Four | 0 to 17 | 5.90 (4.29) | 5 | 2 (86) |
| Six | 0 to 22 | 7.83 (5.54) | 7 | 9 (85) |

Table A6. Descriptive statistics of Percent Transcripts values for all words used by both children and adults across transcripts.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Age | Group | Range (%) | Mean (%) (Std) | Median (%) | Mode (%) (Count) |
| Three | Child | 0.13 to 94.51 | 4.16 (10.67) | 0.54 | 0.13 (354) |
| Adult | 0.13 to 90.36 | 6.16 (13.18) | 0.94 | 0.13 (243) |
| Four | Child | 0.15 to 97.66 | 4.79 (11.79) | 0.58 | 0.15 (402) |
| Adult | 0.15 to 97.08 | 6.28 (13.63) | 0.88 | 0.15 (298) |
| Six | Child | 0.14 to 98.71 | 4.43 (11.30) | 0.57 | 0.14 (503) |
| Adult | 0.14 to 95.26 | 5.06 (11.85) | 0.72 | 0.14 (404) |

Table A7. Descriptive statistics of the Proxy for Acquisition from Conversational Transcripts (PACT) values for *all* the words used by children.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Age in Years | Range | Mean (Std) | Median | Mode (Count) |
| Three | -3.31 to 1.95 | 0 (0.68) | -0.01 | -0.20 (185) |
| Four | -3.63 to 1.98 | 0 (0.65) | -0.05 | -0.15 (221) |
| Six | -4.60 to 2.60 | 0 (0.67) | -0.02 | -0.22 (284) |

Table A8. Descriptive statistics of the Proxy for Acquisition from Conversational Transcripts (PACT) values for the consonant-vowel-consonant (CVC) words used by children.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Age in Years | Range | Mean (Std) | Median | Mode (Count) |
| Three | -2.40 to 1.95 | 0.10 (0.68) | 0.16 | -0.20 (35) |
| Four | -3.63 to 1.98 | 0.04 (0.70) | 0.05 | -0.15 (34) |
| Six | -2.61 to 2.38 | 0.08 (0.68) | 0.08 | -0.22 (42) |

Table A9. Descriptive statistics of the Proxy for Acquisition from Conversational Transcripts (PACT) values for the multisyllabic words used by both children and adults.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Age in Years | Range | Mean (Std) | Median | Mode (Count) |
| Three | -2.64 to 1.62 | -0.06 (0.68) | -0.20 | -0.20 (116) |
| Four | -2.81 to 1.76 | -0.05 (0.61) | -0.15 | -0.15 (141) |
| Six | -4.60 to 2.60 | -0.07 (0.67) | -0.18 | -0.22 (195) |

# Appendix B

Phoneme and Vowel Phoneme Features

This appendix contains tables of phoneme features for vowels (Table B1) and consonants (Table B2) used when calculating the Phoneme Feature Distance 20 (P-FEAT20) neighborhood measure. In addition, these tables provide the one-to-one mapping between Arpabet-represented phonemes, used in the CMU Pronunciation Dictionary, to Klattese, used in this study.

Table B1. Vowel features used when calculating the P-FEAT20 neighborhood measure: tongue height, front-back, rounding and tenseness, constructed from the International Phonetic Association Handbook (1999). Also includes Arpabet, IPA and Klattese equivalents.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Arpabet | IPA | Klattese | Height | Front-Back | Rounding | Tenseness |
| AA | a | a | Low | Back | Unrounded | Lax |
| AE | æ | @ | Low | Front | Unrounded | Lax |
| AH | ǝ | ^ | Mid | Central | Unrounded | Lax |
| AO | ɔ | c | Mid | Back | Rounded | Lax |
| AW | aʊ | W | Low-Mid | Back-Back | Unrounded | Tense |
| AI | aɪ | Y | Low-High | Front-Front | Unrounded | Tense |
| EH | ɛ | E | Mid | Front | Unrounded | Lax |
| ER | ɝ | R | Mid | Central | Rhotic | Rhotic |
| IH | ɪ | I | High | Front | Unrounded | Lax |
| IY | i | i | High | Front | Unrounded | Tense |
| OW | o | o | Mid | Back | Rounded | Tense |
| OY | oɪ | O | Mid-High | Back-Front | Unrounded | Tense |
| UH | ʊ | U | High | Back | Rounded | Lax |
| UW | u | u | High | Back | Rounded | Tense |
| EY | e | e | Mid | Front | Unrounded | Tense |
| N/A | N/A | N/A | Null | Null | Null | Null |

Table B2. Consonant phoneme features used to calculate the P-FEAT20 neighborhood measure: place, sonority-obstruent, manner and voice (Bailey & Hahn, 2005). Also includes Arpabet, IPA and Klattese equivalents.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Arpabet | IPA | Klattese | Place | Sonority-Obstruent | Manner | Voice |
| P | p | p | Labial | Obstruent | Stop | Voiceless |
| B | b | b | Labial | Obstruent | Stop | Voiced |
| F | f | f | Labial | Obstruent | Fricative | Voiceless |
| V | v | v | Labial | Obstruent | Fricative | Voiced |
| M | m | m | Labial | Sonority | Nasal | Voiced |
| W | w | w | Labial | Sonority | Glide | Voiced |
| TH | θ | T | Dental | Obstruent | Fricative | Voiceless |
| DH | ð | D | Dental | Obstruent | Fricative | Voiced |
| T | t | t | Alveolar | Obstruent | Stop | Voiceless |
| D | d | d | Alveolar | Obstruent | Stop | Voiced |
| S | s | s | Alveolar | Obstruent | Fricative | Voiceless |
| Z | z | z | Alveolar | Obstruent | Fricative | Voiced |
| N | n | n | Alveolar | Sonority | Nasal | Voiced |
| L | l | l | Alveolar | Sonority | Lateral | Voiced |
| R | r | r | Alveolar | Sonority | Rhotic | Voiced |
| CH | ʧ | C | Palatal | Obstruent | Affricate | Voiceless |
| ZH | dʒ | Z | Palatal | Obstruent | Affricate | Voiced |
| SH | ʃ | S | Palatal | Obstruent | Fricative | Voiceless |
| JH | ʒ | J | Palatal | Obstruent | Fricative | Voiced |
| Y | y | y | Palatal | Sonority | Glide | Voiced |
| K | k | k | Velar | Obstruent | Stop | Voiceless |
| G | g | g | Velar | Obstruent | Stop | Voiced |
| NG | ŋ | G | Velar | Sonority | Nasal | Voiced |
| HH | h | h | Glottal | Obstruent | Fricative | Voiceless |
| N/A | N/A | N/A | Null | Null | Null | Null |

# Appendix C

CVC Analyses for Alternative Neighborhood Measures

This appendix contain additional analyses for the alternative neighborhood measures and CVC words. The relationship between the alternative neighborhood measures and the CVC PACT values were analyzed in R (R Core Team, 2017) using linear mixed models (lme4; Bates, Mächler, Bolker, & Walker, 2015). In all analyses, the dependent measure was the CVC PACT values. Fixed effects included the children’s age and the PLD20 neighborhood measure (Table C1), the P-FEAT20 neighborhood measure (Table C2) and the SON-ND measure (Table C3). The interaction of age and neighborhood measure, and a random intercepts for the word were also included. In each analysis, there were 539 unique CVC words and a total of 1,262 observations across the three ages. Not all words were present at every age. Statistical significance for each factor was determined using Satterthwaite's method (lmerTest; Kuznetsova, Brockhoff, & Christensen, 2017).

 Across the CVC analyses, we note that the Age(3) and Age(6) intercept terms are only statistically significant in the CVC analysis containing the SOND neighborhood measure (Table C3). To better understand this, we performed a simple linear regression at each age (i.e., three, four and six) for the SOND measure. The models at age three and age six diverged from the model at age four (in terms of intercepts), and so we surmise that in the multi-age model these differences manifests as statistically significant effects. This phenomena is unique to the SOND measure, most likely because it was not designed with CVC words in mind.

Table C1. Summary of the CVC linear mixed model analysis with the PLD20 neighborhood measure.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Predictor | Estimate | 95% CI | SE | t value | Pr(>|t|) |
| Intercept | 0.554 | 0.044 to 1.063 | 0.26 | 2.131 |  0.033 \* |
| Age(6) | -0.046 | -0.526 to 0.433 | 0.245 | -0.189 | 0.851 |
| Age(3) | 0.256 | -0.286 to 0.798 | 0.277 | 0.924 | 0.356 |
| PLD20 | -0.35 | -0.665 to -0.034 | 0.161 | -2.173 |  0.030 \* |
| Interactions |  |  |  |  |  |
|  Age(6):PLD20 | 0.061 | -0.241 to 0.363 | 0.154 | 0.393 | 0.694 |
|  Age(3):PLD20 | -0.128 | -0.462 to 0.207 | 0.171 | -0.745 | 0.456 |

NOTES: Formula used in R: PACT ~ age \* PLD20 + (1|word). The random effect for word accounted for 27.0% of the variance in the model. Reference level for Age = Four (4). \**p* < .05.

Table C2. Summary of the CVC linear mixed model analysis with the PFEAT-20 neighborhood measure.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Predictor | Estimate | 95% CI | SE | t value | Pr(>|t|) |
| Intercept | 0.285 | -0.048 to 0.618 | 0.170 | 1.679 | 0.093 |
| Age(6) | 0.048 | -0.281 to 0.378 | 0.168 | 0.286 | 0.775 |
| Age(3) | 0.089 | -0.246 to 0.425 | 0.171 | 0.521 | 0.603 |
| PFEAT20 | -0.316 | -0.668 to 0.037 | 0.180 | -1.754 | 0.080 |
| Interactions |  |  |  |  |  |
|  Age(6):PFEAT20 | 0.013 | -0.345 to 0.372 | 0.183 | 0.072 | 0.943 |
|  Age(3):PFEAT20 | -0.047 | -0.403 to 0.31 | 0.182 | -0.256 | 0.798 |

NOTES: Formula used in R: PACT ~ age \* PFEAT20 + (1|word). The random effect for word accounted for 27.3% of the variance in the model. Reference level for Age = Four (4). \**p* < .05.

Table C3. Summary of the CVC linear mixed model analysis with the SON-ND neighborhood measure.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Predictor | Estimate | 95% CI | SE | t value | Pr(>|t|) |
| Intercept | -0.115 | -0.22 to -0.009 | 0.054 | -2.128 |  0.034 \* |
| Age(6) | 0.172 | 0.067 to 0.277 | 0.054 | 3.205 |  0.001 \*\* |
| Age(3) | 0.109 | 0.005 to 0.213 | 0.053 | 2.047 |  0.041 \* |
| SON | 0.020 | 0.004 to 0.035 | 0.008 | 2.478 |  0.013 \* |
| Interactions |  |  |  |  |  |
|  Age(6):SON | -0.018 | -0.033 to -0.004 | 0.007 | -2.515 |  0.012 \* |
|  Age(3):SON | -0.011 | -0.027 to 0.004 | 0.008 | -1.434 | 0.152 |

NOTES: Formula used in R: PACT ~ age \* SON + (1|word). The random effect for word accounted for 27.6% of the variance in the model. Reference level for Age = Four (4). \**p* < .05; \*\**p*< .01.

# Appendix D

Univariate Analyses for CVC and Multisyllabic Words

This appendix contains statistics from a univariate analysis of the CVC and multisyllabic results. See the Methods section for a detailed description of the measures used in these analyses.

## Statistical Analysis

 The CVC and multisyllabic data were analyzed using ordinary least squares regression. In all analyses, the dependent measure was the PACT values, and the independent measure was a neighborhood measure. Bootstrapping was used to determine the 95% confidence interval for the variance$(r^{2})$ captured by the independent variable.

 The CVC analyses consisted of three separate linear regressions. At each age, the original neighborhood density values of CVC words were entered into a linear regression as a predictor of the PACT values at that age. Each regression was treated as independent, and therefore no Bonferroni correction was used for the CVC words (i.e., α = 0.05).The multisyllabic analyses consisted of nine separate linear regressions. The P-FEAT20, PLD20, and SON-ND neighborhood measure values of multisyllabic words were entered into separate linear regressions as predictors of their PACT values at each age. A Bonferroni correction was used within each age to account for multiple comparisons (α = 0.017; [0.05/3]). An *a priori* power analysis with an $α$ = 0.017, power = 0.8, and a conservative $r^{2}$= 0.02 showed that a minimum of 524 multisyllabic words was needed for the simple linear regression; this value was exceeded at all three ages.

## Results

Table D1 presents the CVC analyses. There were 386 CVC words at age three, 393 CVC words at age four, and 483 CVC words at age six. The effect of original neighborhood density was statistically significant at all three ages. Neighborhood density captured between 1.3% and 2.1% of the variance.

Table D1. Summary of the CVC simple linear regression analyses.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Years | DF | *F*-value | *p*-value | $r^{2}$ (95% CI) |
| Three | (1,384) | 8.29 | 0.0042\* | 0.021 (0.00092-0.064) |
| Four | (1,391) | 5.93 | 0.015\* | 0.015 (0.00036-0.048) |
| Six | (1,481) | 6.10 | 0.014\* | 0.013 (0.00077-0.043) |

NOTES: Formula used at each age: PACT ~ ND. \**p* < .05.

Table D2 presents the multisyllabic analyses. There were a total of 644 multisyllabic words at age three, 717 multisyllabic words at age 4 and 983 multisyllabic words at age six. The P-FEAT20 and SON-ND neighborhood measures were not significantly associated with multisyllabic PACT values at any age. The PLD20 neighborhood measure was significantly associated with multisyllabic PACT values at age six, but not at ages three and four. The results of bootstrapping (*r2*values) suggested that all alternative neighborhood measures had a negligible impact on the PACT values.

Table D2. Summary of the multisyllabic simple linear regression analyses.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Years | DF | Neighborhood Measure | *F*-value | *p*-value | $r^{2}$ (95% CI) |
| Three | (1,642) | P-FEAT20 | 5.13 | 0.024 | 0.0079 (0.00027-0.026) |
| PLD20 | 2.99 | 0.084 | 0.0046 (0.0-0.02) |
| SON-ND | 0.26 | 0.61 | 0.0004 (0.0 – 0.0084) |
| Four | (1,715) | P-FEAT20 | 0.56 | 0.45 | 0.00078 (0.0 - 0.0094) |
| PLD20 | 1.42 | 0.23 | 0.002 (0.0 - 0.014) |
| SON-ND | 0.22 | 0.64 | 0.00031 (0.0-0.0075) |
| Six | (1,981) | P-FEAT20 | 5.56 | 0.019 | 0.0056 (0.00024 - 0.018) |
| PLD20 | 9.94 | 0.0017\* | 0.01 (0.0015-0.025) |
| SON-ND | 0.14 | 0.71 | 0.00015 (0.0 - 0.0055) |

NOTES: Formula used at each age: PACT ~ P-FEAT20; PACT ~ PLD20; PACT ~ SON-ND. \**p* < .017.

# Appendix E

Additional Analyses to Address the Potential for Multicollinearity in the Multisyllabic Analysis

This appendix contains additional analyses to provide further support that multicollinearity is not a factor in the in the multisyllabic mixed model analysis. We performed four separate mixed model analyses, and calculated the 95% confidence interval of the estimates. We found that the 95% confidence interval overlapped for all of the neighborhood measures in the single-measure analyses (i.e., SOND in Table E1, PLD20 in Table E2, ND in Table E3, and PFEAT20 in Table E4) and the full model (Table 5), suggesting that the parameters were not poorly estimated due to multicollinearity. Additionally, these analyses provide a congruent interpretation: none of the neighborhood measures are statistically significant.

Table E1. Summary of the multisyllabic linear mixed model analysis for the SOND neighborhood measure. The 95% CI of the fixed effect of SOND overlapped with the fixed effect of SOND in the original multisyllabic analysis (Table 4).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Predictor | Estimate | 95% CI | SE | t value | Pr(>|t|) |
| (Intercept) | -0.112 | -0.187 to -0.037 | 0.038 | -2.921 |  0.004 \* |
| Age(6) | 0.045 | -0.039 to 0.128 | 0.043 | 1.050 | 0.294 |
| Age(3) | -0.045 | -0.133 to 0.043 | 0.045 | -0.993 | 0.321 |
| SOND | 0.001 | -0.009 to 0.011 | 0.005 | 0.155 | 0.877 |
| Interactions |  |  |  |  |  |
|  Age(6):SOND | -0.001 | -0.011 to 0.009 | 0.005 | -0.187 | 0.851 |
|  Age(3):SOND | 0.004 | -0.008 to 0.016 | 0.006 | 0.633 | 0.527 |

NOTES: Formula used in R: PACT ~ age \* SOND + (1|word). The random effect for word accounted for 21% of the variance in the model. Reference level for Age = Four (4). \**p* < .05.

Table E2. Summary of the multisyllabic linear mixed model analysis for the PLD20 neighborhood measure. The 95% CI of the fixed effect of PLD20 overlapped with the fixed effect of PLD20 in the original multisyllabic analysis (Table 4).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Predictor | Estimate | 95% CI | SE | t value | Pr(>|t|) |
| (Intercept) | -0.033 | -0.179 to 0.113 | 0.074 | -0.448 | 0.654 |
| Age(6) | 0.173 | 0.014 to 0.331 | 0.081 | 2.139 |  0.033 \* |
| Age(3) | 0.087 | -0.087 to 0.261 | 0.089 | 0.978 | 0.328 |
| PLD20 | -0.023 | -0.068 to 0.022 | 0.023 | -0.989 | 0.323 |
| Interactions |  |  |  |  |  |
|  Age(6):PLD20 | -0.046 | -0.096 to 0.004 | 0.026 | -1.792 | 0.073 |
|  Age(3):PLD20 | -0.036 | -0.091 to 0.019 | 0.028 | -1.280 | 0.201 |

NOTES: Formula used in R: PACT ~ age \* PLD20 + (1|word). The random effect for word accounted for 21% of the variance in the model. Reference level for Age = Four (4). \**p* < .05.

Table E3. Summary of the multisyllabic linear mixed model analysis for the ND neighborhood measure. The 95% CI of the fixed effect of ND overlapped with the fixed effect of ND in the original multisyllabic analysis (Table 4).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Predictor | Estimate | 95% CI | SE | t value | Pr(>|t|) |
| (Intercept) | -0.121 | -0.171 to -0.071 | 0.025 | -4.740 |  0.000 \*  |
| Age(6) |  0.031 | -0.023 to 0.086 | 0.028 |  1.130 | 0.259 |
| Age(3) | -0.013 | -0.072 to 0.047 | 0.030 | -0.416 | 0.678 |
| ND |  0.027 | -0.014 to 0.068 | 0.021 |  1.291 | 0.197 |
| Interactions |  |  |  |  |  |
|  Age(6):ND |  0.005 | -0.037 to 0.047 | 0.021 |  0.242 | 0.809 |
|  Age(3):ND | -0.017 | -0.066 to 0.031 | 0.025 | -0.696 | 0.486 |

NOTES: Formula used in R: PACT ~ age \* ND + (1|word). The random effect for word accounted for 21% of the variance in the model. Reference level for Age = Four (4). \**p* < .05.

Table E4. Summary of the multisyllabic linear mixed model analysis with the PFEAT20 neighborhood measure. The 95% CI of the fixed effect of PFEAT20 overlapped with the fixed effect of PFEAT20 in the original multisyllabic analysis (Table 4).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Predictor | Estimate | 95% CI | SE | t value | Pr(>|t|) |
| (Intercept) | -0.035 | -0.211 to 0.141 | 0.090 | -0.391 | 0.696 |
| Age(6) |  0.153 | -0.040 to 0.346 | 0.099 |  1.550 | 0.121 |
| Age(3) |  0.194 | -0.019 to 0.406 | 0.109 |  1.783 | 0.075 |
| PFEAT20 | -0.045 | -0.154 to 0.064 | 0.056 | -0.809 | 0.418 |
| Interactions |  |  |  |  |  |
|  Age(6):PFEAT20 | -0.080 | -0.203 to 0.043 | 0.063 | -1.270 | 0.204 |
|  Age(3):PFEAT20 | -0.138 | -0.270 to -0.006 | 0.068 | -2.042 |  0.041 \* |

NOTES: Formula used in R: PACT ~ age \* PFEAT20 + (1|word). The random effect for word accounted for 21% of the variance in the model. Reference level for Age = Four (4). \**p* < .05.