

YOUNG ADULTS WITH DYSLEXIA AND THEIR
ABILITY TO IDENTIFY STRESSED SYLLABLES
WITHIN A POETRY TASK

By

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Title of Study: YOUNG ADULTS WITH DYSLEXIA AND THEIR ABILITY TO
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Abstract: The purpose of the study was to compare the abilities of young adults with and without a dyslexia diagnosis to accurately identify lexical stress in the context of poetry, including nursery rhymes. Review of the literature displays phonological deficits and oral reading deficits prolonging into adulthood for people with a childhood dyslexia status. Thirty-eight young adults completed the task, 15 of whom reported a history of dyslexia. Materials for stress marking included nursery rhymes like “Mary, Mary quite contrary” and “Little Jack Horner”, as well as portions of the poems “The Princess” by Alfred Lord Tennyson and “Country Music” by Michael Robbins. Overall accuracy for the task was 72.2% accuracy, indicating that it was generally difficult for all participants. Although the task was not a statistically significant predictor of dyslexia status, a stepwise regression indicated that oral reading fluency was significantly related to participant’s performance. Oral language was also implicated via participants’ scores on the CELF-5 Word Definitions task. Sensitivity to lexical stress may help understand oral reading fluency and the abilities of adults with dyslexia.

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CHAPTER I

Literature Review

Childhood dyslexia is often known as just that: a childhood problem. However, the research within our profession would argue that dyslexia, and the symptoms associated with it, will often span across an individual's life. Our study continues to explore the manifestation of dyslexia in adults by looking at college student's ability to recognize prosodic stress, which is stress at the word or sentence level and is integral for reading, for example, in poetry, including nursery rhymes. With my audience in mind, I am considering this a hybrid paper: It is a summary of my thesis with an emphasis on the clinical applications of the research.

Definition of Dyslexia in Children

According to the International Dyslexia Association (IDA), dyslexia is a neurobiological learning disorder that is often unexpected due to typical development in other areas of cognition. This means that the child is characterized by typical intelligence and typical development, which makes the reading difficulties unexpected. Dyslexia is characterized by deficits in decoding and spelling (which then can cascade to problems in other areas).

These core deficits are considered to be the result of a deficit in the phonological system of language. This definition aligns with the American Speech and Hearing Association (ASHA) definition of a “word recognition disorder.” This term of “word recognition” is important as it relates to another skill impactful to reading: phonological awareness. Phonological awareness, among a variety of things, is needed in order for a child to decode letters to sounds in order to read words.

The impairments of dyslexia are often first noticed as phonological awareness deficits. ASHA defines phonological awareness as “the awareness of the sound structure of a language and the ability to consciously analyze and manipulate this structure.” This ability is believed to be impaired with children with dyslexia. Catts et al. (2006) claim that children with dyslexia demonstrate difficulties in measures of phonological awareness and word reading and spelling deficits. They found the inability to manipulate sounds in nonword repetition skills were lower in children with dyslexia (Catts et al., 2006). Phonological awareness skills are important because they are considered, along with random automatized naming, as a predictor of reading development (Pennington et al. as cited by O’Brien and Yeatman, date).

In terms of describing the scope of dyslexia, phonological awareness is only one factor, in terms of deficit, seen in children with dyslexia. In O’Brien and Yeatman’s (2019) article it was argued that dyslexia could not be easily defined with just one factor like phonological awareness. It was asserted that there is a multifactorial model in which

phonological awareness is one deficit which is a part of many deficits including ones that are impairments of nonlinguistic aspects of cognition like sensory deficits. This is to acknowledge that dyslexia, as a language/learning disorder as a whole, amasses a variety of characteristics. For this study, our definition of dyslexia relies on the model that is a core phonological impairment which originates from a neurological condition. This model parallels the definition set by the International Dyslexia Association (dyslexiaida.org). This means that dyslexia, once diagnosed at childhood, is expected to persist throughout the life of the person.

Dyslexia in Adults

Oral reading fluency in an adult with dyslexia, as it compares to the typical adult reader, may appear slower or more laborious. Meyer and Felton (1999) defined oral reading fluency as “the ability to read connected text rapidly, smoothly, effortlessly, and automatically with little conscious attention to the mechanics of reading, such as decoding.” Paige et al. (2014) include prosody as an indicator of oral reading fluency with arguments that prosody increases the naturalness of the reading in order for it to sound like normal speech. The authors ~~file~~ detail how prosody – within the context of reading a passage out loud – can affect how readers process units of information at a syntactic and comprehension level. They found that in adolescent populations that there is a correlation between reading prosody and comprehension. It appears that in order to

read fluently and for reading to sound like natural speech, a person's prosodic understanding needs to be fully developed.

Studies also seem to show that in adulthood the core deficit of phonology is still seen in adults – which contributes to the word reading deficits in adult dyslexia. Del Tufo and Earle (2020) focused on determining the skill profiles of college students with developmental language disorders and/or developmental dyslexia. The study explored what tasks best described both developmental disorders (normally diagnosed at a young age) at the adult level. The study found dyslexia in college students appears to be most closely related to phonological-based problems and were most identifiable against college students with a developmental language disorder diagnosis through phonological processing, nonword repetition and random automatized naming (RAN). This is consistent with other studies like Felton et al. (1990) showing adults with dyslexia as compared with adults without dyslexia were most distinguished by rapid and sequenced retrieval of verbal labels, phonetic decoding of nonwords and the manipulation of phonemes. The studies mentioned above strengthen an argument of core deficits that suggest things like reading unfamiliar words, word finding, and RAN would all be realistic contexts in which adults with dyslexia may still struggle. A meta-analysis of 1788 studies by Reis et al. (2020) found that adults with dyslexia had deficits in all reading and writing measures except reading comprehension. Thus, word reading, text reading (scholastic or textbook reading) and pseudoword reading were all lower when compared to readers without a childhood dyslexia diagnosis. This presents the case that

as adults with dyslexia mature, and their skills grow, difficulties at the reading level may still be found due to the complex nature and combining of skills needed for fluent reading.

Compensation for Dyslexia Across the Lifespan

Dyslexia can change shape through the life of a person. There are a variety of reasons why an adult's cognitive-linguistic and reading skills could improve. Factors including intervention from school staff, natural practice inherent in age and compensation skills are all variables that could help improve cognitive-linguistic skills over time. Since a dyslexia diagnosis involves normal intelligence, it would be expected people with dyslexia who are able to compensate for their phonological deficits within reading or general school activities, perhaps, on their own without intervention.

Kearns et al. (2019) details that intervention – specifically based on word-reading and decoding – can change the actual pathways of the brain and result in neurological differences along with behavioral differences. Intervention means specialized instruction aimed at strengthening deficits in reading and other language areas. This means that adults with dyslexia who have undergone intervention could have changed their neurological pathways which then would affect how we are seeing them as adults. It is important to recognize that it is possible that intervention may strengthen skills to a point of “typical proficiency” with the core deficit still in place, even if it is not causing the troubles it was before.

It is also important to note that we expect that children with dyslexia are able to find their own compensation skills. One example is morphological awareness – the ability to recognize the smaller, meaningful units of words. For example, “un-“ and “-lock” make up the word unlock. Morphological awareness in adults appears to be relied upon when phonological skills are at a deficit level (Law et al. 2015). This research suggests that adults with dyslexia who have phonological deficits have become better at reading words as a whole as a result of memorization and recognizing morphological units of words rather than individual units of sounds. This would be known as compensating for dyslexia. This should be considered a reason why adults with dyslexia standardized testing scores possibly look different than expected. This should also be considered in oral reading fluency that people with dyslexia may not be reading fluently in terms of bypassing phonological units and transforming orthography straight to meaning: as proficient readers can do.

Overall, these examples are not all-encompassing of the literature on intervention, neurological changes and compensation skills in dyslexia. However, they serve as reminders as why in the literature there are various tasks and findings on adults with dyslexia skill that represent a vast amount of skills. This leads to a bigger picture idea that adults with dyslexia’s skills and deficits may reach beyond the capacities of standardized tests (especially tests that have been reused throughout their youth).

Lexical Stress

Phonological awareness skills are well-documented to be affected in people with dyslexia. The ability to identify phonemes individually and manipulate them is a skill at the segmental level of phonology and this skill is well-documented to be affected in people with dyslexia, as discussed above. There is less research on how dyslexia, a phonological disorder, affects the phonological system at a prosodic or suprasegmental level (suprasegmental referring to stress as well as intonation, pitch, timing and rhythm). Anastasiou and Protopapas (2015) found that adolescents with dyslexia were significantly less accurate in stress diacritic placement in words and pseudowords as compared to their peers. This study was done in Greek: a language with a relatively transparent orthography. This is not something to be said about the English language. The English language does not have stress markers built into the orthography and is not as transparent of a language as Greek where the stress is implicitly marked. This is a phonological component of English spoken language that does not readily connect to written language. For example, the difference between the noun REC.ord and the verb re.CORD is in the stress and would not be explicitly clear in the written word “record”. Because stress is not as readily seen, and perhaps not as explicitly taught, it is possible adults with dyslexia would struggle with identifying the stressed prosody from a written text.

Leong and colleagues (2011) theorized that people with dyslexia should have impaired basic auditory processing of rise time in syllables which would then be an indicator of deficits in perceiving syllable stress. Rise time is the change in intensity or energy as the nucleus of the syllable is produced. Rise time is related to prosody because the change in

intensity of the word is how we perceive the suprasegmental feature of prosody. The rise time is what allows us to perceive the stress change in the words and it is a function that has been theorized to appear as a deficit in people with dyslexia. In the study by Leong et al, (2011) they ran two experiments to test for the rise time perception and detection of syllables in adults with developmental dyslexia. In the first experiment, there were twenty adults with dyslexia and twenty in the control group. The participants with dyslexia were significantly less sensitive to auditory rise time and to frequency (or pitch, in the context of this study it was the ability to tell which sound was higher or lower pitch) than their control group. However, there was no statistical significant difference for intensity discrimination (in relation to this task it was the ability to tell which sound was louder or softer). They found people with dyslexia had trouble determining the difference in stress patterns between two items and often misidentified two stress patterns as the same pattern. In the second experiment, the same participants and conformational tasks were used with the addition of the stress judgment task was based on pairs of two different words. They found that judgment on same/different tasks in stress was lower in people with dyslexia with the control being over 80% accurate and people with dyslexia being in the 60%-range. This is important to the stress marking task because of its relevance to people with dyslexia and their ability to identify and discriminate between types of stress.

Why Poetry and College Students?

This earlier research posits that people with dyslexia would struggle with accurately identifying stress within a multisyllabic word. Specifically, the earlier mentioned studies Anastasiou and Protopapas (2015) and Leong et al. (2013) indicated that discriminating between stressed syllables and unstressed syllables within words was difficult. It was also seen in the meta-analysis by Reis et al. (2020) that difficulty with stress was identified at the word level. The context of poetry is different because the stress is dependent on the words as they appear together, but stress is also signaled by the internal rhythm of the rhyme or poem. Another factor is the line break, which segments the words in a different way as compared to a story or passage. As discussed earlier, our target demographic is college students who have already developed college-level and this research hopes to further analyze a more complex and nuanced – less taught – skill.

CHAPTER II

Methods

Participants

Participants consisted of 39 college students all recruited from Oklahoma State University. Fifteen students reported a diagnosis of dyslexia, that is, they identified themselves as having been referred or received services during school for dyslexia. Seventeen participants without dyslexia reported never receiving a referral for any speech, language, hearing, or special education services. Seven others reported a history of a speech, language, or hearing disorder other than dyslexia. The third group consisted of participants reporting hearing loss, articulation disorder, ADD, ADHD and reading issues not named dyslexia. There were five bilingual participants within the study. Two identified Spanish as their second language, one identified as Italian being their second language and one identified as French being their second language. One participant identified as Nepali being their first language and English their second. This information was collected by a demographic questionnaire.

Confirmation Tasks

The following tasks were given to assess the abilities of participants in a variety of skills including reading skills, oral language skills and other cognitive-language abilities. These tasks are used for diagnosis of dyslexia as well as differential diagnosis of dyslexia and other language disorders. Italics are used to identify standardized tests; plain text is used to identify non-standardized tasks. Please see Table 1 score averages by dyslexia status.

Table 1. Standardized tests given to participants of stress marking task. The three groups are separated by typical development (no dyslexia or other diagnosis), Dyslexia (dyslexia status) and Other Diagnosis (diagnosis listed but not dyslexia such as ADHD, Hearing Loss, etc.). The numbers represent group averages and the parenthetical numbers represent standard deviation.

	Typical Development	Dyslexia	Other Diagnosis	
WRMT-III Word Identification	103.12 (9.49)	93.20 (15.55)	97.64 (11.94)	
WRMT-III Word Attack	98.59 (13.14)	82.27 (14.43)	91.49 (15.50)	
WRMT-III Reading Fluency	112.35 (11.85)	98.43 (12.40)	105.13 (15.84)	
WRMT-III Listening Comprehension	103.50 (9.88)	97.80 (10.98)	100.42 (11.15)	
CELF-5 Repeating Sentences	11.25 (3.32)	10.82 (2.63)	10.58 (2.04)	
CELF-5 Word Definitions	12.71 (3.04)	12.46 (2.74)	12.17 (2.61)	
TONI-3 Nonverbal Intelligence	105.47 (16.45)	109.29 (16.81)	105.37 (11.40)	
CTOPP-2 Elision (phonological awareness)	10.06 (1.95)	8.14 (2.74)	9.19 (3.56)	

The *Woodcock Reading Mastery Tests III* is a battery of tasks designed to test a wide variety of reading skills. The following four subtests were chosen because of their ability to detect dyslexia.

- *WRMT - Word Identification Task*. This task was used to assess a person's ability to decode real words with increasing complexity and decreasing familiarity. For example, a college student (based on grade-level) would begin with words like epidemic, proximity and embassy. If the participant was able to complete the task the final words are difficult words like scintillant, zeitgeist and oeuvre. It tests a person's ability to decode very uncommon words.
- *WRMT - Word Attack Task*. This task was used to assess a person's ability to decode non-words with increasing complexity. Compared to real word reading, nonword reading requires good sound-symbol association to sound out words that are unfamiliar. Nonword reading is important in identifying decoding skills and phonological skills compared to word-memorization. Based on grade-level, participants would begin with bufty, vunhip and knaf and – if completed through the task's entirety – ended with words such as monglustamer, pnir and ceisminadolt.
- *WRMT - Woodcock Oral Reading Fluency*. It is theorized that dyslexia in adults can be characterized by slower and less fluent reading ability. This task consists of the participant reading a passage aloud. The task measures rate of speed in reading as well as number of errors made.
- *WRMT - Woodcock - Listening Comprehension*. This test examined the participants' receptive language and ability to comprehend a passage. It is possible

that years of difficulty with decoding and spelling may cause subclinical difficulties with comprehension (Simmons & Singleton, 2000). The example reads this passage aloud: Ben's mom said "When your homework is finished, we'll watch a movie." The question following this passage is read as: When will Ben and his mom watch a movie. The tasks become much more complex with the passages becoming paragraphs and the content becoming more nonfiction, expository pieces.

Test of Nonverbal Intelligence - 3rd edition (TONI-3). This is a test of intelligence which uses a series of geometric patterned puzzles to test abstract and figural problem solving. The TONI-3 was used to verify normal intelligence which is needed in a dyslexia diagnosis.

The Clinical Evaluation of Language Fundamentals - 5th edition (CELF-5). The CELF-5 is a comprehensive standardized test of language skills. Based on previous research identifying language disorders in adults (Fidler, Plante, & Vance, 2011; McGregor, Arbisi-Kelm, Eden, & Oleson, 2020) two subtests were chosen to be used in this study to gain information about people with dyslexia's ability to do these language tasks while also checking the participant for characteristics for other language deficits like phonological memory and vocabulary.

- *CELF-5: Sentence Recall*: The experimenter would read a sentence and the participant would repeat the sentence. This was a test of the participant's ability to comprehend and repeat language information. An example reads: The student who won the award at the art show was very excited. The research assistant read

the sentence to the participant and they immediately recalled the sentence back to the assistant.

- *CELF-5*: Word Definitions: The participant would be given a word and the word in a sentence and asked to define the word. The test offers appropriate answers to the questions for scoring. This was targeted at understanding the participant's ability to define words which is a vocabulary task. An example would be the word cactus. The research assistant would say a phrase (including the word and example sentence) such as: "The word is cactus. Grandpa said, 'Don't touch the cactus.'" The participant would need to define the word cactus with the criteria of being a plant that grows in a hot, arid climate and that it has spines or needles (the responses can vary in language if they are semantically relevant).

Comprehensive Test of Phonological Processing - 2nd edition. (CTOPP-2) - The CTOPP-2 is a standardized test that evaluates phonological processing as it relates to further reading skills. The elision subtest was used from this test to examine the participant's ability to manipulate words at the syllabic and phonemic level: an indicator of decoding abilities. This also has been to be a differential diagnosis between dyslexia and DLD. An example would be: "Say 'sling.' Now say 'sling' without saying /l/." The client would then, if correct, say the word "sing."

This study was a task done throughout a larger study conducted in the Phon Farm lab in the Communication Sciences Department at Oklahoma State University. Other tasks that participants were involved in included an auditory lexical decision task, a visual lexical decision task, a lexical organization task, a spelling task and a nonword repetition task, none of which are reported here.

Materials

The poetry task was designed to determine the participant's abilities to identify stress and if they are able to define it well enough to differentiate it in an applied context such as nursery rhymes and poems. Nursery rhymes were chosen due to their natural rhythm and music-like qualities as well as their potential to have been heard before by the participants and, therefore, recall phonological memories. The nursery rhymes generally had predictable, alternating stress patterns. The nursery rhymes chosen for the study were Hickory Dickory Dock, Twinkle Twinkle Little Star, Little Jack Horner and Mary, Mary Quite Contrary.

Two poems were chosen for the task: *Sweet and Low* by Lord Alfred Tennyson and *Country Music* by Michael Robbins. Please see Appendix A for full poems. The two poems were chosen because of their consistent rhythmic patterns. This was believed to be a strength because our task was looking to assess the client's ability to identify stress in a plausible, real-life context way.

The poetry tasks were divided up by rhythmic line. Multisyllabic words had periods in the middle of the words which split them into syllables. For example, please see Figure 1.

Twinkle Twinkle Little Star

**T w i n k . l e , t w i n k . l e , l i t . t l e s t a r ,
H o w I w o n d e r w h a t y o u a r e .
U p a . b o v e t h e w o r l d s o h i g h ,
L i k e a d i a . m o n d i n t h e s k y .
T w i n k . l e , t w i n k . l e , l i t . t l e s t a r ,
H o w I w o n d e r w h a t y o u a r e .**

Figure 1. Example of Poem with Answers for Accurate Stress Markings.

The nursery rhymes and poems had letters with extra space between each so there was less risk of confusion when the participant was circling, and the research assistant was scoring. Both poems were presented on paper the way they were written by the author. However, both were shortened due to time management of the study as well not wanting to overwork the participant.

Procedure

Recruitment

Participants were recruited through emails sent by disability services and flyers posted around campus departments (Communication Sciences and Disorders and Engineering). Due to recruitment being done in a female-dominated department such as Communication Sciences and Disorders, recruitment was also conducted in the College of Engineering, a male-dominated field, to balance the men-to-women ratio. All participants that responded to recruitment materials were used in the experiments.

Due to the number of tasks, the task was given over two separate sessions. To provide counter-balancing, the order of tasks were switched between participants with four different possible orders.

Regarding the poetry task, the research assistants provided directions to the participants on the task design including how to circle stressed syllables. See Appendix B and C for examples of the tasks given to participants. The participants were instructed to read the poem out loud. In reading the poem out loud it was hoped that participants would be cued to the phonetic qualities of the circled, stressed syllables. After that, the participants were allowed to start marking the rhymes and poem without any time limit. They were instructed that reading the nursery rhymes aloud was an option but not required. The participants were asked to read the poem aloud. The participants read the nursery rhymes and then the poem and circled the stressed syllables in both. They circled the units based on how they were divided up by the periods unless it was a one syllable word then they circled the entire word. The research assistant scored the task by counting the number of circled units in the nursery rhyme or poem. See Appendix D for examples of scored nursery rhymes and poems. The unstressed syllables were also counted; however, this was based on the participant not marking the unit. So, correct responses included both circling the stressed syllables and not marking the unstressed syllables.

Data Analyses

The number of correctly identified syllables was the primary dependent variable. The first analysis done was a repeated measures ANOVA testing passage (poem, nursery rhyme) and syllable type (stressed syllables, unstressed syllables) as within-subjects

measures and dyslexia status (whether the subject had dyslexia or not) as a between-subjects measure. Note that the group without dyslexia included the participants with other diagnoses. Because of concerns related to compensation for dyslexia described in the literature review, the second analysis done was a stepwise regression to determine if any of the standardized reading or language tasks given could predict accuracy.

CHAPTER III

FINDINGS

Overall, our participants were 72.2% accurate in marking stress within our poetry task, with an accuracy range between 67.8% to 76.6% (95% confidence interval).

The main analysis was a repeated-measures 2 x 2 x 2 ANOVA to look at the three factors: dyslexia status, syllable type and passage type, syllable type and passage type (poem or nursery rhymes) as repeated-measures factors, and dyslexia status as a between-subjects factor.

There was a significant main effect of syllable type $F(1, 35) = 111.00, p < .001$, partial $\eta^2 = .760$. Participants were more accurate for unstressed syllables ($M = 89.0\%$) compared to stressed syllables ($M = 55.4\%$). There was a significant main effect of passage type $F(1,35) = 5.09, p = .030$, partial $\eta^2 = .127$. Participants were more accurate in nursery rhymes ($M = 74.7\%$) compared to the poems ($M = 69.7\%$). There was no significant effect of dyslexia status ($p > .200$).

Regarding interactions, I will state each significant interaction followed by their simple effects and then I will report nonsignificant interactions. The first significant interaction was between the passage type and syllable type factors, $F(1, 35) = 12.206, p < .001$,

partial $\eta^2 = .259$. Please see Figure 2. Simple effects were analyzed by looking at the data for stressed and unstressed syllables separately. The analysis of passage type for stressed syllables was $F(1, 35) = 11.304, p = .002$, partial $\eta^2 = .239$. Participants were more accurate in marking stressed syllables in nursery rhymes ($M = 60.9\%$) than in the poems ($M = 52.4\%$). For the analysis of passage type for unstressed syllables, $F(1, 35) = .45, p = .509$, there was not a significant difference in accuracy between the nursery rhymes ($M = 89.1\%$) compared to poems ($M = 87.7\%$).

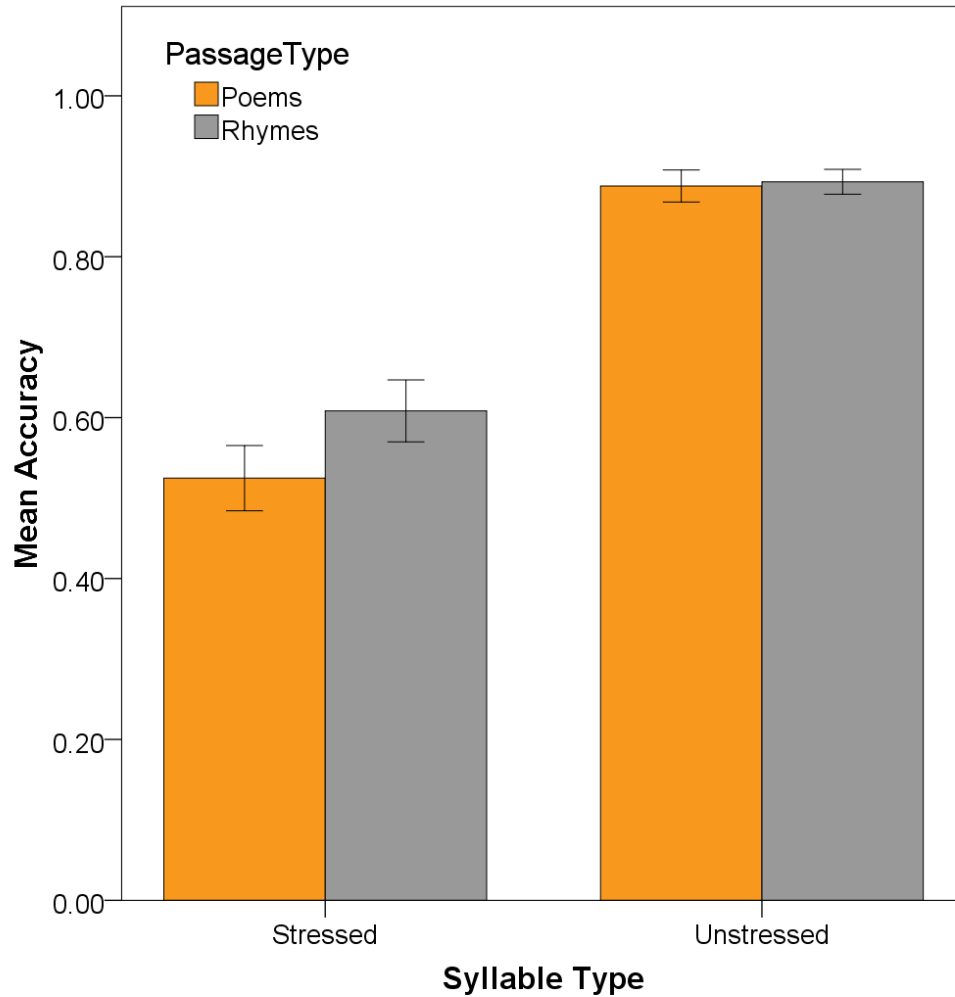


Figure 2. Accuracy of Stressed and Unstressed Syllables Among Passage Type.

The second interaction was between dyslexia status and syllable type $F(1, 35) = 5.311, p = .027$, partial $\eta^2 = .259$. Simple effects were analyzed by looking at the data for stressed and unstressed syllable types separately. For stressed syllables, participants with dyslexia status were numerically less accurate (49.1%) than participants with no dyslexia status

(60.9%), but the effect was not significant, $F(1, 36) = 2.257, p = .142, \text{partial } \eta^2 = .059$. The simple effect of dyslexia status for unstressed syllables was also not significant, $F(1,35) = .793, p = .379, \text{partial } \eta^2 = .022$. Participants with dyslexia were numerically more accurate (90.7%) compared to participants without dyslexia (88.1%). All other interactions were not significant ($ps > .200$).

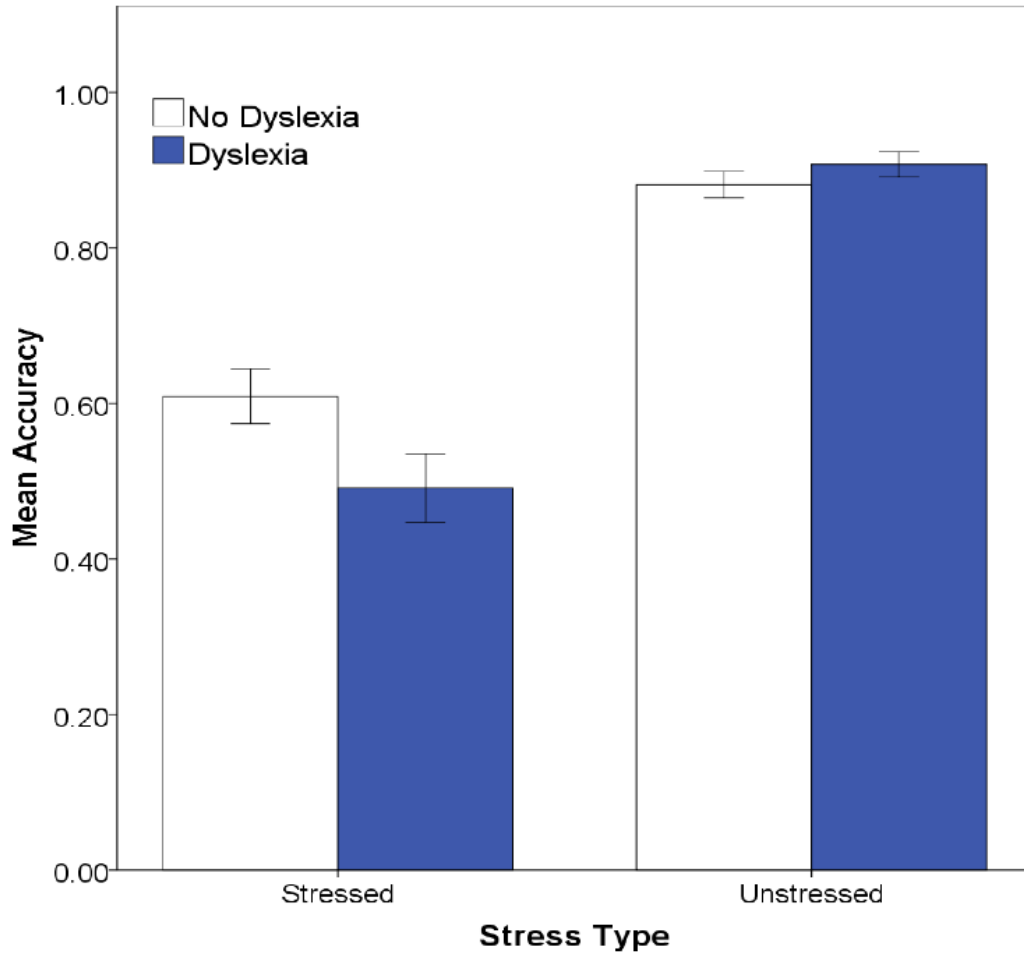


Figure 3. Interaction Between Stress Type and Accuracy in Marking Stress.

One concern related to the ANOVA is that that dyslexia status may not be informative when accounting for a participant’s current reading abilities (as opposed to their ability when given a diagnosis many years before). It was determined a stepwise regression was needed to find which standardized tasks were predictors of accuracy in the poetry task. A stepwise regression analysis following standardized tests and normative data were

entered into a stepwise regression model to find the best predictors of accuracy for stressed syllables in the nursery rhymes. Accuracy for stressed syllables in nursery rhymes was chosen as the dependent variable for this analysis because the correlation found between dyslexia status and stressed syllables in nursery rhymes was greater than the correlation between dyslexia status and overall accuracy for stress syllables, as well as for accuracy for stressed syllables in the poems. ($r[37] = -.299 > -.243 > -.217$), respectively. In the first model, it was found that the Oral Reading Fluency subtest predicted performance on identifying stressed syllables in the nursery rhymes $R^2 = .227$, $F(1, 27) = 7.627$, $p = .010$, $MSE = .359$. Please see Figure 4.

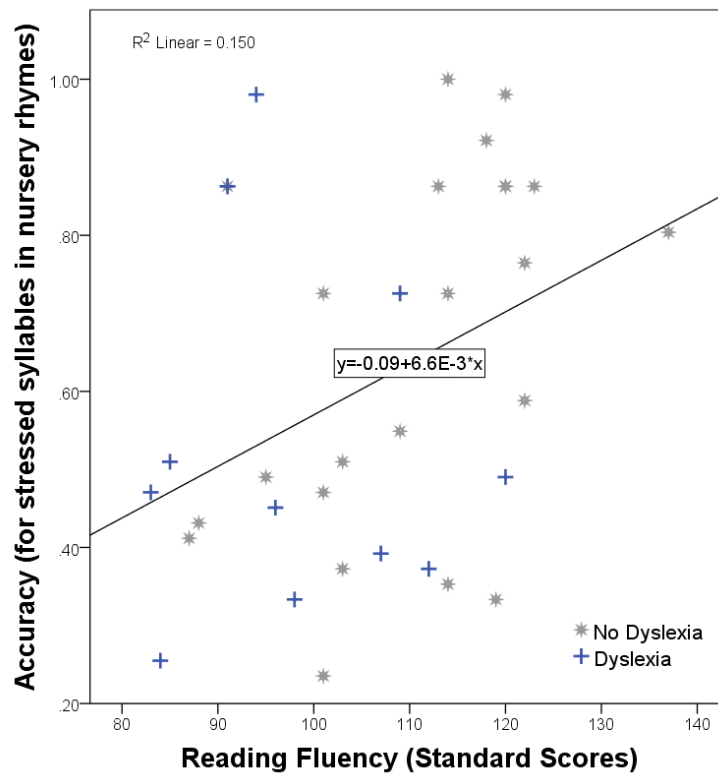


Figure 4. Stepwise Regression for Oral Reading Fluency and Marking Stressed Syllables in Nursery Rhymes.

A second, significant model was also found, $F(2, 25) = 6.70, p = .005, R^2 = .349$, in which Oral Reading Fluency from the Woodcock Reading Mastery Test, $\beta = .448, p = .010$, and the CELF-5 Definitions task, $\beta = .351, p = .040$, were significant predictors. Please see Figure 5 for the correlation between accuracy and the CELF-5 Definitions scaled scores. It seems notable that the best predictor for stressed syllables in nursery rhymes involves oral reading fluency; this is because oral reading fluency is also the primary predictor of dyslexia within the adult population (Del Tufo and Earle, 2020; Felton et al. 1990).

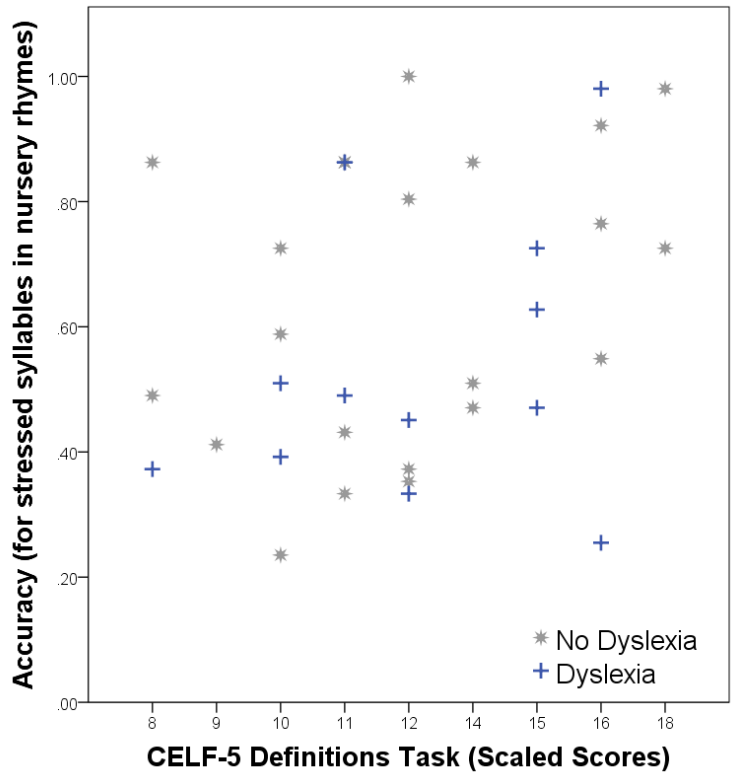


Figure 5. Stepwise Regression for CELF-5 Definitions Task and Accuracy in Marking Stress in Nursery Rhymes.

CHAPTER IV

DISCUSSION

The poetry task was designed to analyze the abilities of adults with and without dyslexia to identify stressed syllables within nursery rhymes and poems. The participants marked stress in nursery rhymes and poems. Using an ANOVA and a stepwise regression model, I found there were no main effects of dyslexia status, but there were correlations between the task accuracy, a measure of oral reading fluency, and a measure of oral language proficiency (CELF-5 Word Definitions). The poetry task is part of a larger study whose goal is to identify deficits and abilities of adults with dyslexia. In this thesis, I will not discuss the possible relationship between the poetry task and oral language proficiency, but we will discuss how identifying stress might relate to oral reading fluency.

Task Relation to Reading and Language

The correlation between the accuracy of marking stressed syllables in rhymes and the Oral Reading Fluency task and the CELF-5 definitions task does suggest that the poetry task has potential clinical value. As reviewed in the earlier chapters, oral reading fluency is a characteristic of dyslexia in adolescents and adults. As addressed earlier, the Reis et

al. (2020) meta-analysis found that oral reading fluency (as characterized by difficulties as compared to non-dyslexia status adults with scholastic and textbook reading as well as single word reading) was lower in adults with a dyslexia diagnosis than those without. This meta-analysis shows that in adults with dyslexia we are typically going to see lower reading scores than in adults without a diagnosis. In this study, single word reading remaining lower than typical into adulthood is important because – in relation to ASHA’s definition – dyslexia is often described a word recognition disorder. Studies like Del Tufo and Earle (2020), and Felton et al. (1990) also relayed that tasks assessing reading skills (like phonological processing and RAN tasks) were lower in adults with dyslexia than adults identified as typical readers. This research relays that the skills underlying reading are also impaired, as well as the Reis et al. (2020) study that identified text reading as a persistent issue. These studies build a body of work suggesting that adult dyslexia can be recognized by oral reading fluency measures. Due to the poetry task being correlated with oral reading fluency, it is possible that our task could be related to dyslexia. The current task’s relation to oral reading fluency suggests it could be used to add more details to a potential client’s abilities in reading.

Limitations

Due to the time limit, it was not asked for the clients to read the nursery rhymes as they marked them. This means that we cannot analyze if the participants were reading the rhymes with correct stress and marking them incorrectly or reading and marking them

incorrectly. Another limitation of the study is the participants were not asked if they had heard or been exposed to the nursery rhymes before. This is cited as a limitation because a person's ability to mark stress to a familiar rhyme (as compared to an unfamiliar rhyme) is unknown and therefore we cannot offer if this would have mattered. Nevertheless, familiarity is implicated by the higher accuracy the nursery rhymes compared to the poems. A third limitation relates to the fact that the task measured the client's ability to mark stress and assumed that an unmarked syllable is correctly identifying unstressed syllables. Due to the fact that the participants were not given a number of syllables they had to mark, which allowed some participants to 'opt out' and mark fewer syllables than expected. This created the oddity of people with dyslexia being numerically lower in marking stress but numerically higher in identifying unstressed syllables. The task was designed for marking stressed syllables with the assumption that not marking the syllable meant the participant was identifying that syllable as an unstressed syllable. However, this means that the strategy of not marking clusters of syllables or lines out of uncertainty would create lower stressed syllable scores with higher unstressed syllable scores. Richtsmeier (2022) reports that both undergraduate and graduate students consistently struggle to identify unstressed syllables. This suggests that the task is not providing accurate information about participants' knowledge of unstressed relative to stressed syllables. It is possible that the dyslexia scores point to a hesitancy of stress marking because of an inability to identify stress, but the study does not allow us to provide a definitive answer to this question.

Future studies

Future studies could center around a task with less variables by giving the participant the expected amount of stress per line and having them mark the stress with that information. This would offset a potential issue in non-marking of words leads to a higher unstressed syllable scores. In general, the pressure of having to choose may lead to different data due to participant's marking stress regardless of confidence or ability to count number of stressed syllables independently. Due to our findings, it may be interesting if the practice of poems (with an emphasis on stressed and unstressed syllables) served any function for intervention purposes. As mentioned previously, poetry's unique layout (lines breaks and unique on-page perception as compared to normally written passages) may offer as a different context of reading. In general, future studies regarding the therapeutic efficacy of intervention involving a variety of poetry elements (line breaks, rhymes, nonliteral language, etc.). Another future study could involve time measurements. According to Reis et al. (2020), the primary symptoms of dyslexia are amplified when speed is used as a measure. Their study found that across orthographies (transparent, intermediate or non-transparent) deficits were larger and most homogenous when speed was measured as a factor. It would be interesting to time participants in this task as it may provide a larger gap between the dyslexia status and non-dyslexia status groups.

Clinical Implications

Reis et al. (2020) cited the contexts of textbook reading, word reading and pseudoword reading as impaired in adults with dyslexia. Poems and nursery rhymes, in general, may serve as another context in which to understand a person's oral reading fluency and personal skill set. For example, nursery rhymes may serve as an intermediate task between word reading and textbook reading. As noted previously, poetic aspects like rhyme for intervention purposes needs more research; however, it is possible this could aid in oral reading.

Oral reading fluency, defined previously as the ability to read “rapidly, smoothly, effortlessly, and automatically with little conscious attention” may be impaired by inability to quickly identify stress. Anastasiou and Protopapas (2015) found that the ability to mark stress in pseudowords – fake words that would be unfamiliar to the reader – was more difficult for people with dyslexia as compared to non-dyslexic peers. It is possible that the current stress marking tasks' correlation with the oral reading fluency task highlights their relationship. It is possible that the stress marking task may better predict stress identifying issues, which may lend more information to specific difficulties in oral reading fluency.

Conclusions

It appears that a poem's more complex-nature (including rhyme, vocabulary and length) makes it more difficult to find the stress than a nursery rhyme. This was the result we expected. It is possible that marking stressed syllables was more difficult for people with dyslexia and would align with the greater literature although this cannot be said for certain due to the meager statistical numbers. It appears that there is a connection between our nursery rhyme task and oral reading fluency. This appears to add to the literature of oral reading fluency suggesting that stress perception could add to assessment techniques related to deficits in poor oral reading fluency as well as expressive vocabulary deficits.

Personally, I have seen lexical stress already being identified as an area of weakness in a child with dyslexia and his ability to recognize stressed syllables in multi-syllabic words was targeted to improve his reading ability. For example, he would often struggle to say which syllable had the stress and therapy targeted his ability to identify stress as it related to his overall reading. As I have already viewed it in the clinical environment, this study can ~~aim to~~ lend more to the literature of impaired stress in people with dyslexia. Even more, it is hoped to more clearly state if adults with dyslexia are likely to carry the difficulty of identifying syllable stress into adulthood.

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APPENDICES

APPENDIX A

Full Poems and Nursery Rhymes with Correct Answers

Poems

Country Music / Key

God **ble**ss the **mid**night **bus** depot

The **bust**ed **guitar** **case**

God **ble**ss **diazepam**

Its **dilat**ory **grace**.

God **keep** Carl **Perkins** **warm**

And **Jesus** **Christ** **erase**

My **name** from **all** the **files** in

The **county's** **database**.

Sweet and Low / Key

Sweet and **low**, **sweet** and **low**,

Wind of the **west.ern** **sea**,

Low, **low**, **breathe** and **blow**,

Wind of the **west.ern sea!**
O.ver the **roll.ing wa.ters go,**
Come from the **dy.ing moon,** and **blow,**
Blow him a.**gain to me;**
While my **lit.tle one,** **while** my **pret.ty one,** **sleeps.**

Nursery Rhymes

Mary, Mary, Quite Contrary / key

Mary, Mary

Quite contrary

How does your **garden grow?**

With **silver bells**

And **cockle shells**

And **pretty** maids **all** in a **row.**

Little Jack Horner / Key

Little Jack Horner

Sat in a **corner**

Eating his **Christmas pie**.

He **stuck** in his **thumb**

And **pulled** out a **plumb**,

And **said**, "What a **good** boy am I."

Twinkle Twinkle Little Star / Key

Twinkle, twinkle, little star,

How I wonder what you are.

Up above the world so high,

Like a diamond in the sky.

Twinkle, twinkle, little star,

How I wonder what you are.

Hickory Dickory Dock / Key

Hickory, dickory, dock,

The **mouse** ran **up** the **clock**.

The **clock** struck **one**,

The **mouse** ran **down**,

Hickory, dickory, dock.

APPENDIX B

Stress Marking Task, List 1

For each poem, identify stressed syllables by circling them. When a word has multiple syllables, a period has been placed to show syllable boundaries. Please circle all the sounds in a syllable if you believe the syllable is stressed. An example poem has been provided.

Example Poem: Mary, Mary, Quite Contrary

Mar.y, Mar.y

Quite con.trar.y

How does your gar.den grow?

With sil.ver bells,
and cock.le shells
and pret.ty maids all in a row.

Begin marking stress here - Little Jack Horner

Lit.tle Jack Hor.ner

Sat in a cor.ner

Eat.ing his Christ.mas pie.

He stuck in his thumb

and pulled out a plumb,

and said, "What a good boy am I."

Hickory Dickory Dock

Hick.o.ry, dick.o.ry, dock,
The mouse ran up the clock.
The clock struck one,
The mouse ran down,
Hick.o.ry, dick.o.ry, dock.

Twinkle Twinkle Little Star

Twinkle, twinkle, little star,
How I wonder what you are.
Up a.bove the world so high,
Like a dia.mond in the sky.
Twinkle, twinkle, little star,
How I wonder what you are.

From The Princess: "Sweet and Low" by Alfred, Lord Tennyson

Sweet and low, sweet and low,
Wind of the west.ern sea,
Low, low, breathe and blow,
Wind of the west.ern sea!

Ov.er the roll.ing wat.ers go,
Come from the dy.ing moon, and blow,
Blow him a.gain to me;
While my lit.tle one, while my pret.ty one,
sleeps.

APPENDIX C

Stress Marking Task, List 2

For each poem, identify stressed syllables by circling them. When a word has multiple syllables, a period has been placed to show syllable boundaries. Please circle all the sounds in a syllable if you believe the syllable is stressed. An example poem has been provided.

Example Poem: Little Jack Horner

Lit.tle Jack Hor.ner
Sat in a cor.ner
Eat.ing his Christ.mas pie.
He stuck in his thumb
and pulled out a plumb,
and said, "What a good boy am I."

Begin marking stress here - Mary, Mary, Quite Contrary

M a r . y , M a r . y

Q u i t e c o n . t r a r . y

H o w d o e s y o u r g a r . d e n g r o w ?

W i t h s i . l v e r b e l l s ,

A n d c o c k . l e s h e l l s

A n d p r e t . t y m a i d s a l l i n a r o w .

Hickory Dickory Dock

H i c k . o . r y , d i c k . o . r y , d o c k ,

The mouse ran up the clock.

The clock struck one,

The mouse ran down,

Hick.o.ry, dick.o.ry, dock.

Twinkle Twinkle Little Star

Twink.le, twink.le, lit.tle star,

How I wonder what you are.

Up a.bove the world so high,

Like a dia.mond in the sky.

Twink.le, twink.le, lit.tle star,

How I wonder what you are.

Country Music by Michael Robbins

God bless the mid.night bus de.pot

The bust.ed gui.tar case

God bless di.az.e.pam

Its dil.a.tor.y grace.

God keep Carl Per.kins warm

And Je.sus Christ e.rase

My name from all the files in

The coun.ty's da.ta.base.

APPENDIX D

Example of Completed Nursery Rhyme and Poem

Begin marking stress here - Little Jack Horner

Little Jack Horner
Sat in a cor.ner
Eat.ing his Christ.mas pie
He stuck in his thumb
and pulled out a plumb,
and said, "What a good boy am I."

SS = 12/14
US = 18/20

Hickory Dickory Dock

Twinkle Twinkle Little Star

Twink.le, twink.le, lit.tle star,
How I won.der what you are.
Úp a bove the world so high,
Like a dia.mond in the sky.
Twink.le, twink.le, lit.tle star,
How I won.der what you are.

From The Princess: "Sweet and Low" by Alfred, Lord Tennyson

Sweet and low sweet and low,

Wind of the western sea,

Low, low, breathe and blow,

Wind of the western sea!

Over the rolling waters go,

Come from the dying moon, and blow,

Blow him a gain to me,

While my little one, while my pretty one, sleeps.

VITA

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