Spanish Prosody in *The Cat in the Hat*

by

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Abstract

The book, *The Cat in the Hat*, is a popular pick for children under 3 years old. Predictable metric and rhyming structure is composed of multiple metric levels. Prosodic cues such as intensity, duration, pitch and intonation create these distinct metric levels in a language. This study aims to analyze whether Spanish speakers employ prosodic cues to construct a metrical hierarchy, and if so, how. Metrical hierarchy in a language conveys information regarding the location of beat and stress in an utterance. Spanish speakers were asked to read *El Gato Ensombrerado*, the Spanish translation of *The Cat in the Hat*. The recordings were then analyzed, specifically looking at duration, intensity, and pitch. Where we found significant effects in all of these dependent variables, which were intensity, duration, and pitch. Our findings can contribute to the understanding of child directed speech structure to help children's language acquisition.

Introduction

The Cat in the Hat, written by Dr. Seuss in 1957, is a popular book for children under 3 years old (Nel, 2004). The book has a simple prosodic and hierarchical metric structure, making it predictable for its child audience. A hierarchical metric structure refers to how words are grouped in strong or weak metric levels in phrases (Prieto, 2010). Hierarchical metric structures predict word intensity in an utterance by producing a meter which enhances rhythmic predictability in speech (Hayes, 1989). A meter is a stress pattern that focuses on the rhythm of syllables, whether a syllable is stressed or unstressed, in an utterance(Fitzroy & Breen, 2019). Intensity, duration, pitch and intonation are prosodic cues which create the metric levels in a meter. Metric levels are assigned to syllables by taking into consideration whether it is stressed, accented, and its duration (Prieto, 2010). The higher the metric level, the more attention is allocated to that specific syllable(Fitzroy & Sanders, 2018). When creating the book, Dr. Seuss used about 300 out of 400 words from a list of vocabulary that all 6 year olds should know (Nell, 2004), and this led to the creation of a book distinguished by its predictable prosodic, metric and rhyming structure. The objective of employing hierarchical metric and rhythmic structures is to further develop a child's understanding of a language by providing a consistent speech pattern.

In language acquisition, patterns, such as hierarchical metric and rhythmic structure, help children develop their understanding of language(Breen, 2018). *The Cat in the Hat* uses metric structures with temporal and phonological predictability. We hypothesized that these patterns are able to guide a child's attention as an adult reads to them. This in turn facilitates the child's language and reading learning process as they gain skills to predict these structural patterns (Fitzroy & Breen, 2019). Prosodic structure is an essential part of rhythmic and acoustic effects

in language. The metric structure communicates to the speaker or listener important information such as whether a specific word is in a strong or weak beat position in an utterance. These strong and weak beats can be used as indicators for the listener to predict when important details will be shared or indicate when a sentence will end (Fitzroy & Breen, 2019).

English speakers emphasize words depending on the word's position in the metrical hierarchy meaning that English is a stressed-timed lexical language (Breen, 2018). "Stressed languages have rhythmic structure that serves as an organized framework for an utterance's phonological and phonetic realization" (Hayes,1989). Stress is a major component of a metrical hierarchy. Three important cues for stress include stress perception, duration and pitch (Hayes,1989). Loudness does not have as great of an impact on stress perception, in comparison to duration and pitch. Right-most boundaries of phrases typically receive longer durations (Hayes,1989). Stress differences in languages are influenced by syllable duration, vowel quality, and spectral tilt (Prieto, 2006). In this study we addressed whether Spanish speakers signal hierarchical metric structure using prosodic cues like intensity, duration, and pitch.

In the case of child directed poetry/text, stressed syllables are characterized by an increase in duration and a decrease in intensity and pitch(Fitzroy & Breen, 2019). An example of the English version of *The Cat in the Hat*'s metrical structure can be seen in the following stanza:

English Metric Structure

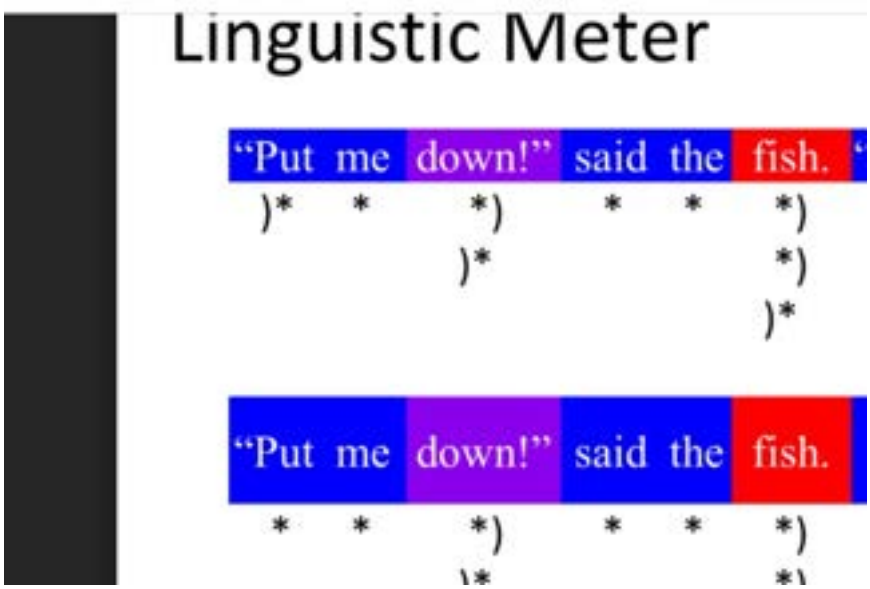


Table 1. English Metrical hierarchy of a stanza in *The Cat in the Hat* provided by (Breen, 2018) based on Fabb and Halle method (Fabb & Halle, 2008).

The Cat in the Hat is written in an anapestic tetrameter format and by observing the stress of the words a metric structure can be created. To further elaborate, in this stanza there are two couplets and each line in the couplets has 2 weak syllables and 1 strong syllable, creating an anapestic tetrameter. An anapestic tetrameter can be observed in this stanza by looking at its "weak-weak-strong, weak-weak-strong" pattern. Based on whether a syllable is in a metrically strong position, the syllable is either left at Metric level 1 or moved to higher levels. *The Cat in the Hat*'s metric structure is somewhat different in Spanish, due to differences in the phonological structure of English and Spanish.

Like English, the Spanish language has a metre composed of a sequence of stressed and unstressed syllables (Navarro, 2018). Often nouns, verbs, adjectives, or adverbs, also known as content, or open-class words are stressed words in Spanish and prepositions, conjunctions, articles, some pronouns , also known as function, or closed-class, words and determiners are

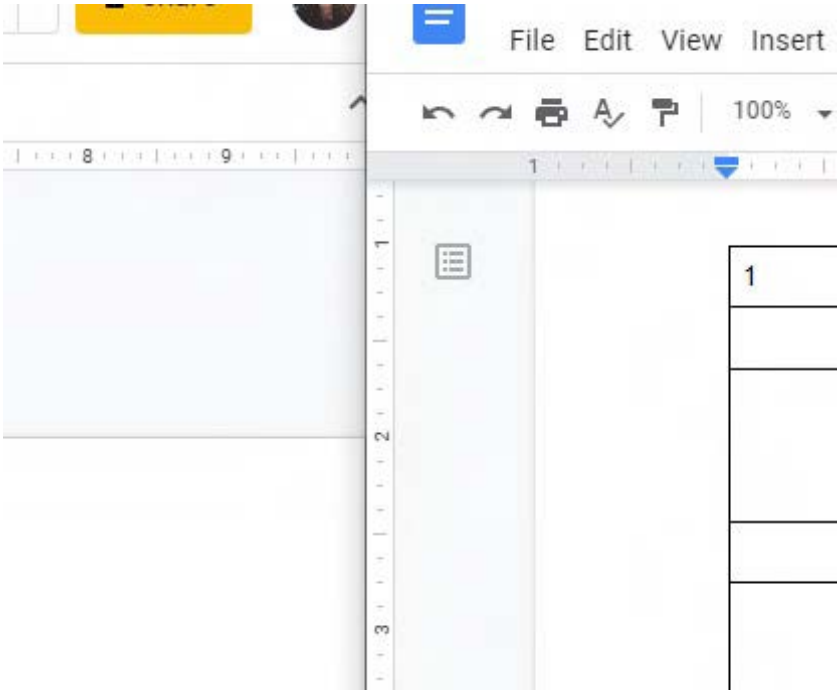
unstressed. When dissecting metrically stressed syllables in El Gato Ensombrerado we have to look for the stressed syllable of each word in the context of the verse. Stand alone words all have a stressed syllable, but when a group of words is taken into consideration not all of the words are stressed, only syllables located in metrically strong positions in the hierarchy will be stressed.

In studies conducted by Fitzroy and Breen, results showed that speakers provide acoustic cues to the metric structure of the English version of *The Cat in the Hat*(Fitzroy & Breen 2019). Seeing these results motivated this experiment, asking whether the same relationships hold in the Spanish version. Although some might argue that the Spanish translation of an English text might not be ideal for this study, due to the text not being natively written in Spanish, we believe there is value in using it. We chose to use the Spanish translation of *The Cat in the Hat* instead of an original work in Spanish because of the value in using something that is as closely related to the original as possible. Similarities between the two include word complexity, structure and ideas/storyline.

Spanish is a syllable-timed stressed language(Prieto, 2010) meaning that speakers time the onset of

syllables to give each an equal duration. Knowing this, we analyzed the same stanza in the Spanish version of the book and created a hypothetical metric structure following Fabb and Halle's method(Fabb & Halle, 2008) explained below:

Spanish Hypothesized Hierarchical Metric Structure



Piera, in Fabb & Halle, 2008

Table 2. Hypothetical Spanish Hierarchical metric structure of a stanza in *El Gato Ensombrerado* using the Fabb and Halle method.

A difference we can see between the English and Spanish metric structure is that the English structure, as seen in the first figure, has 4 strong syllables per couplet, meanwhile the predicted Spanish metric structure has 6 strong syllables per couplet. The Spanish language has individual multisyllabic words that have one stressed syllable, which is rare in English version. We modeled our predictions after the method proposed by Fabb and Halle(Fabb & Halle, 2008). Fabb and Halle used an endecasílabo, 10 syllable format, where they assigned the syllables of one line to one of 10 slots as seen in the figure above. Syllables are assigned to slots according to their metric level(Fabb & Hale, 2008). As seen in Figure 2, all stressed syllables are assigned to

either slot 3, 6 or 9. This representation illustrates the right-most boundaries of phrases having the highest metric level. We believe that in these higher metric level syllable slots will have the longest duration. Based on previous research, we also expect that durational differences across languages will also influence the structure of the phrases, leading us to predict an increased duration in stressed syllables in the Spanish language.

The role of duration in hierarchical metric structure in the English language was addressed by Breen, 2018. They investigated metric structure's role in predicting duration in utterances. For this study our independent variable will be the metric levels to see how our dependent variables, duration, loudness and pitch of the syllables. English is a stressed-timed lexical language, meaning that the unit of timing is stressed syllables, therefore the syllables between these stressed syllables have more variable durations. Breen and Fitzroy(2019), showed evidence of a hierarchical metric structure being employed in *The Cat in the Hat*. Our goal is to test whether this hierarchical metric effect is present universally in other languages, such as Spanish. Spanish is a lexical stressed language meaning that there is a nuclear stress on each word. There are multiple lexically stressed languages, but some of these lexical languages may have a more consistent location for stress.As described before, English is a stressed-timed language and Spanish is a syllable timed language(Prieto, 2010).These notable differences between Spanish and English are predicted to influence the metric structures of each language differently.

The Spanish metric structure is most likely influenced by synaloepha and diaeresis, both of which are present in Spanish, Portuguese and Italian, but not English(Navarro-Colorado, 2018). Synaloepha refers to "a natural phonetic phenomenon in which two syllables are pronounced as a single one," meaning there is a "blend" of what were two separate syllables to

one syllable causing the verse/phrase to lose a syllable. On the other hand diaeresis refers to " a single syllable [being] pronounced as two separate syllables"(Navarro-Colorado, 2018). In our endecasilabo metric format, some slots remain empty in order for the lines to fit a consistent metric structure, and this is due to diaeresis. These types of syllables have two vowel sounds creating the perception of two separate syllables and therefore causing the diaeresis phenomena to occur. A foreseeable example of a synaloepha in *El Gato Ensombrerado* is: "Y todo lo que hicimos."

In this short line we can see a potential blend of the syllable que and hi, leading the reader to produce both syllables as one by pronouncing them as quehi. We believe that the empty slots in Figure 2 are due to diaeresis. Therefore, suggesting that the speakers might lengthen syllables to fill up the empty slots. We predicted that we will be more likely to observe cases of synalepha. As participants in an attempt to make words fit into a metric structure, will merge 2 syllables, making it another distinct quality that differs the Spanish from the English language. Taking this phenomena into account, we made predictions concerning our hypothetical Metric Structure.

We believe that Spanish speakers will emphasize words in proportion to their position in the metric structural hierarchy. We reached this prediction because Spanish and English are both lexical stress languages and we expect their structure to be similar but not the same due to the differences in metric feet and rhyming class. We created a hypothesized metric structure of *El Gato Ensombrerado*. The proposed study aims to answer the quantitative questions, How do Spanish speakers realize phrasing metric structure and rhyme in *El Gato Ensombrerado*? Do Spanish speakers realize phrasing metric structure and rhyme in *El Gato Ensombrerado* the same way that English speakers do in *The Cat in the Hat*? Do Spanish speakers signal linguistic

structure in *El Gato Ensombrerado* through their prosody and do we see similar patterns to English speakers?

Based on previous research discussed in the introduction, we believed that Spanish speakers would emphasize words in proportion to their position in a metric structural hierarchy since Spanish speakers emphasize metrically strong syllables with their prosody. We also believed that Spanish speakers use similar metric structural hierarchy to the hierarchy used by English speakers. Afterwards, with the data collected from the participants in this study we were able to analyze whether there is a frequent metric pattern used throughout the group of participants and then compare it with our hypothesised metric structure. The data collected during our study largely relied on a performance test in which our independent variables were the metric weights, also known as the metric levels, and the dependent variables were the duration, loudness and pitch of the syllables.

Methods

Participants

We recruited native Spanish speakers from the Mount Holyoke College Students community and from the general population. We successfully recruited a total of 20 participants, but only analyzed the recordings of 14 participants. Six participants were excluded based on whether we were able to transcribe their recordings(due to errors) or if we deemed them non native spanish speakers. In order to be considered a native Spanish speaker, the participants should have been exposed to the Spanish language by the age of 3 and must have used it consistently throughout their life.

We decided to limit the number of Spanish dialects to analyzing in order to limit production variation. We specifically seek out Spanish speakers with dialects from Central, South, and North America. The reasoning behind this decision was influenced by previous research from Prieto, which stated that there is a wide range of speech rhythms in varieties of the same language. Their findings showed “that rhythmic indices can vary systematically between two different speech styles of the same language variety” (Prieto, 2011). Due to the variability among different Spanish dialects, when analizing our data we took into account whether any of the results were modulated by dialect.

Materials

We used the text from the Spanish translation of *The Cat in the Hat*(Dr. Seuss, 1957), *El Gato Ensombrerado*(Dr. Seuss, 2015), which is a 61 paged book. The book contains 75 verses and a total of 1261 words, 411 being unique words. *El Gato Ensombrado* shares the page length and about the same number of stanzas to the English version, but not the same range in syllable number. The English version has a range of 1-3 syllables per word while the Spanish version's words range between 1-5 syllables in length. Participants used a laptop or desktop with a functioning microphone to take the study on the FindingFive platform.

We believe that the basic metric pattern consists of three syllables, one strong and two weak; this is also known as a trimeter. Although we know that we are working with a trimeter we still had to decide how many feet in a line. By feet we are referring to groups of three syllables.We tried to predict how many of those 3 syllable groups are in a line and what is the stress structure of those 3 syllables. For example, will it be strong, weak, weak or weak, weak, strong or weak, strong, weak. English has an anapestic tetrameter metric pattern. Before collecting data we had to decide whether Spanish follows anapestic, dactyl, amphabrac, trochees or iambic feet. On account of the syllable stress variation in Spanish, we assessed *El Gato Ensombrerado*'s stanzas by asking multiple people to provide their predicted metric annotation of the book. This group of individuals was composed of one native bilingual Spanish speaker, one advanced Spanish speaker and 2 intermediate Spanish speakers. All four sets of hypothesized metric structures were then compared with each other and the team discussed which hypothesized metric weights were accepted or ruled out based on the majority and off of

their knowledge of music production and metric hierarchy. Once the metric structure was agreed upon we labeled our finalized hypothesized metric structure for the entire book.

Procedure

We used the online platform FindingFive to distribute our study. Through the FindingFive platform, participants were able to take our study at their own convenience. The study showed participants *El Gato Ensombrerado* book one page at a time and were instructed to read the image out loud. Once they finished reading the page the individual would be able to move on to the next page by clicking the continue button or the space bar. As the participants read the pages out loud, the program recorded and saved the audio for us to analyze later. Once they finished reading the book the participant would take a small survey, so we could gather information about our participant demographic. The final data collected from FindingFive contained the participant's audio recordings and their answers to the survey embedded into our study that focused on the participant's language and musical background. These questions provided demographic information about the participants such as their birthday, which languages they are fluent in, the languages their parents are fluent in, the Spanish dialect they speak and whether they received musical training.

Results

To analyze our results we used linear regression to assess the influence of metric level on duration, intensity, and pitch. We coded the six metric levels using backward-difference coding, meaning that we would only compare a metric level only to the previous level. Metric strength, our independent variable, was assigned to the x-axis across all graphs. Below we have demonstrated the descriptive results and statistics through graphs and tables.

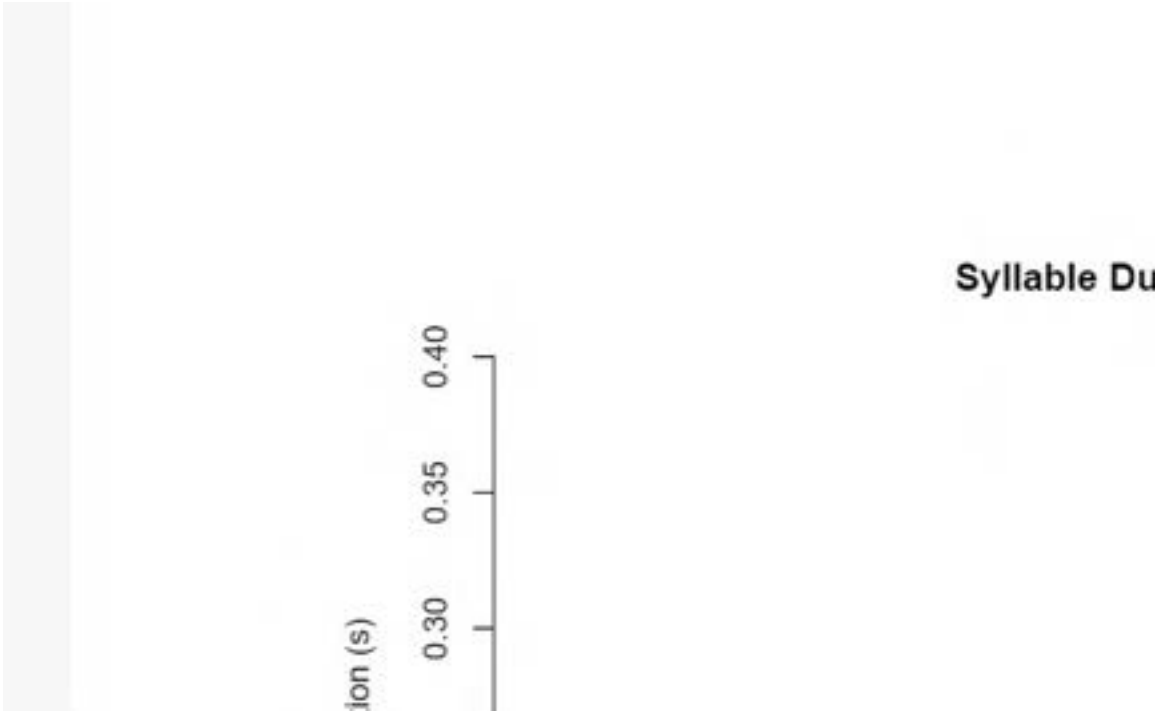


Figure 1. Values of syllable duration across the six levels of the metric hierarchy. Error bars indicate standard error across all durations within a level.

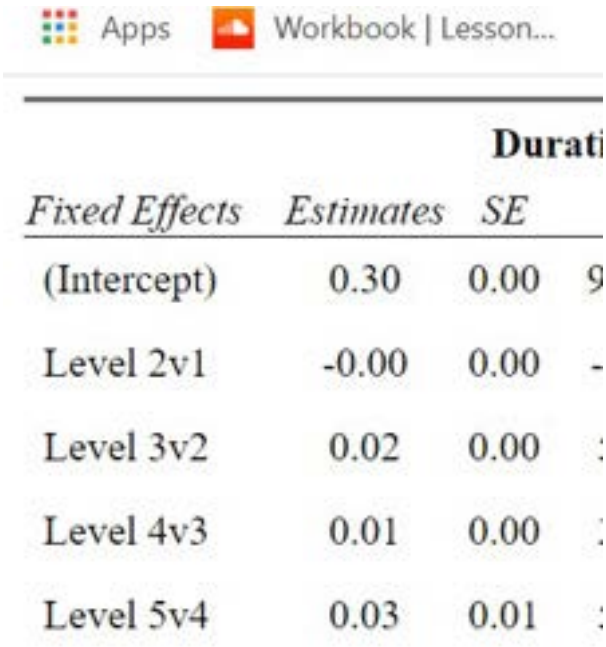


Table 3. Regression analysis summary for linguistic features predicting syllable duration

Figure 1 presents the average values across participants and Table 1 presents the results of the modeling. A distinct pattern can be observed in the data, suggesting that as metric level increases, so does the duration of syllables aligned with them. Syllables aligned with metric level 2 did not differ in duration from metric level 1, $B = 0.00$, $p > 0.05$. Syllables aligned with metric level 3 were produced with longer durations than syllables aligned with metric level 2, $B = 0.02$, $p < 0.001$. Syllables aligned with metric level 4 were produced with longer durations than syllables aligned with metric level 3, $B = 0.01$, $p = 0.001$.Syllables aligned with metric level 5 were produced with longer durations than syllables aligned with metric level 4, $B = 0.03$, $p < 0.001$. Lastly, syllables aligned with metric level 6 did not differ in duration from metric level 5, $B = 0.00$, $p > 0.05$.

Word class, frequency and syllable number were also taken into consideration when looking at duration of syllables. The intention behind the word class and duration comparison was to see if word class, open vs closed class syllables, influences duration. Syllables in open

and closed-class words did not differ in duration, B = -0.00, p >0.05.When looking at syllable frequency, it differed in syllable duration, B = -0.02, p < 0.001. Its high significance and its negative estimate communicates the claim that the more frequent a word is the shorter its duration. Syllable Number,looks at how many syllables are in a word. Words with a greater syllable count, differed in syllable duration, B = -0.03, p < 0.001. its significant effect and its negative estimate, leading us to conclude that the more syllables are in a word the shorter each syllable duration within that word.

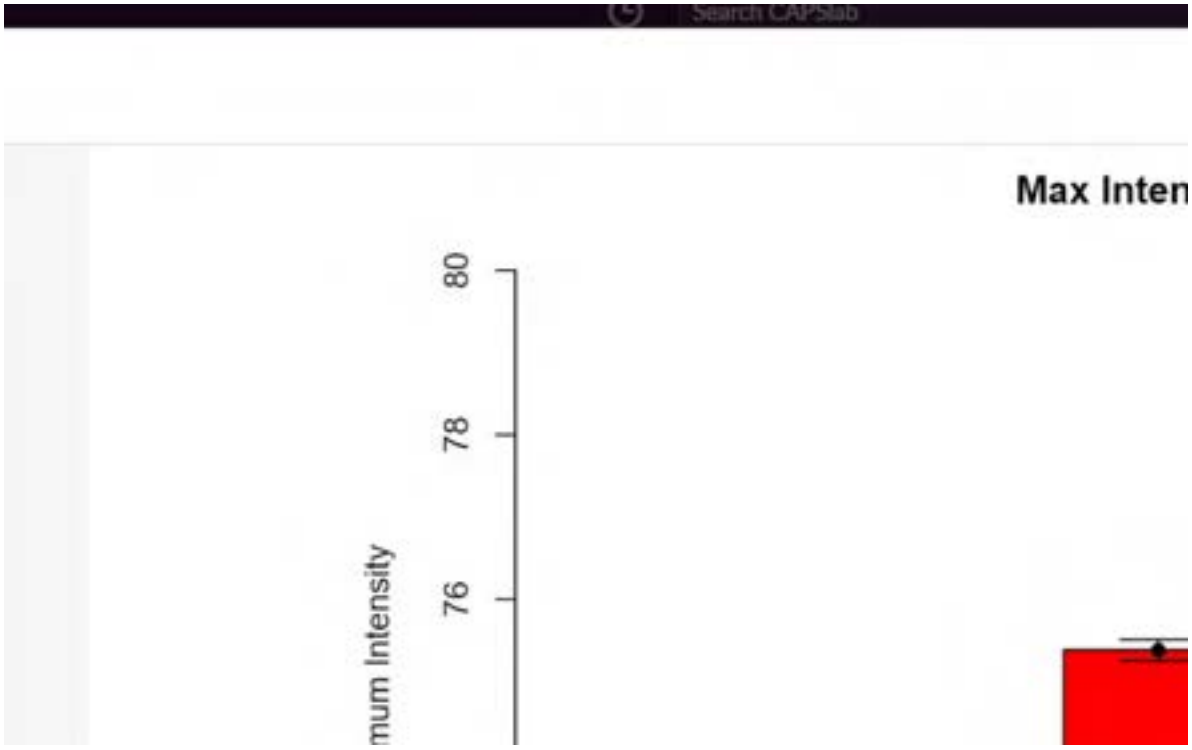


Figure 2. Values of syllable Max Intensity across the six levels of the metric hierarchy. Error bars indicate standard error across all Max Intensity within a level.

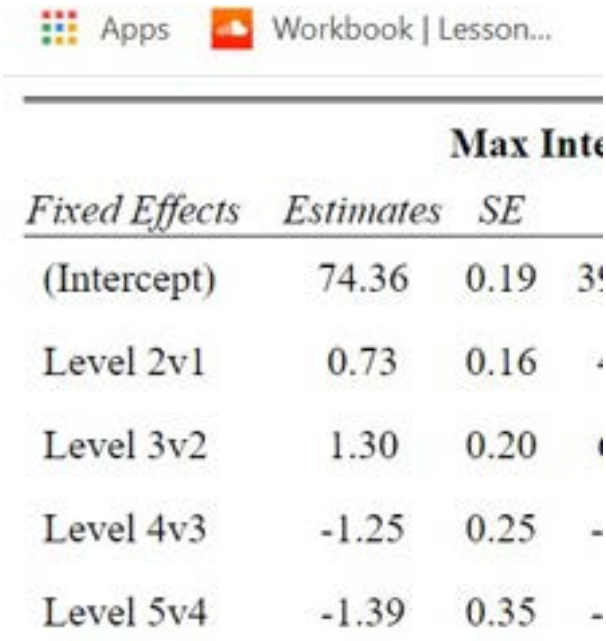


Table 4. Regression analysis summary for linguistic features predicting Max Intensity

Figure 2 and Table 2 shows that as an utterance progresses with its metric level the syllable's max intensity decreases. Syllables aligned with metric level 2 were produced with a higher max intensity than syllables aligned with metric level 1, B = 0.73, $p < 0.001$. Syllables aligned with metric level 3 were produced with a higher max intensity than syllables aligned with metric level 2, B = 1.30, $p < 0.001$. Syllables aligned with metric level 3 were produced with higher max intensity than syllables aligned with metric level 4, B = -1.25, $p < 0.001$. Syllables aligned with metric level 4 were produced with longer durations than syllables aligned with metric level 5, B = -1.39, $p < 0.001$. Lastly, syllables aligned with metric level 5 did differ in duration from metric level 6, B = -0.89, $p <0.05$.

The results display no significance in the fixed effects of word class and frequency. Word class did not differ in max intensity, B = 0.01, $p > 0.05$. Frequency also did not differ in max intensity, B = -0.06, $p > 0.05$. Words with a greater syllable count differed in max intensity, B = -

0.40, $p < 0.001$. This supports the claim that single syllable words have higher intensity than multisyllabic words.

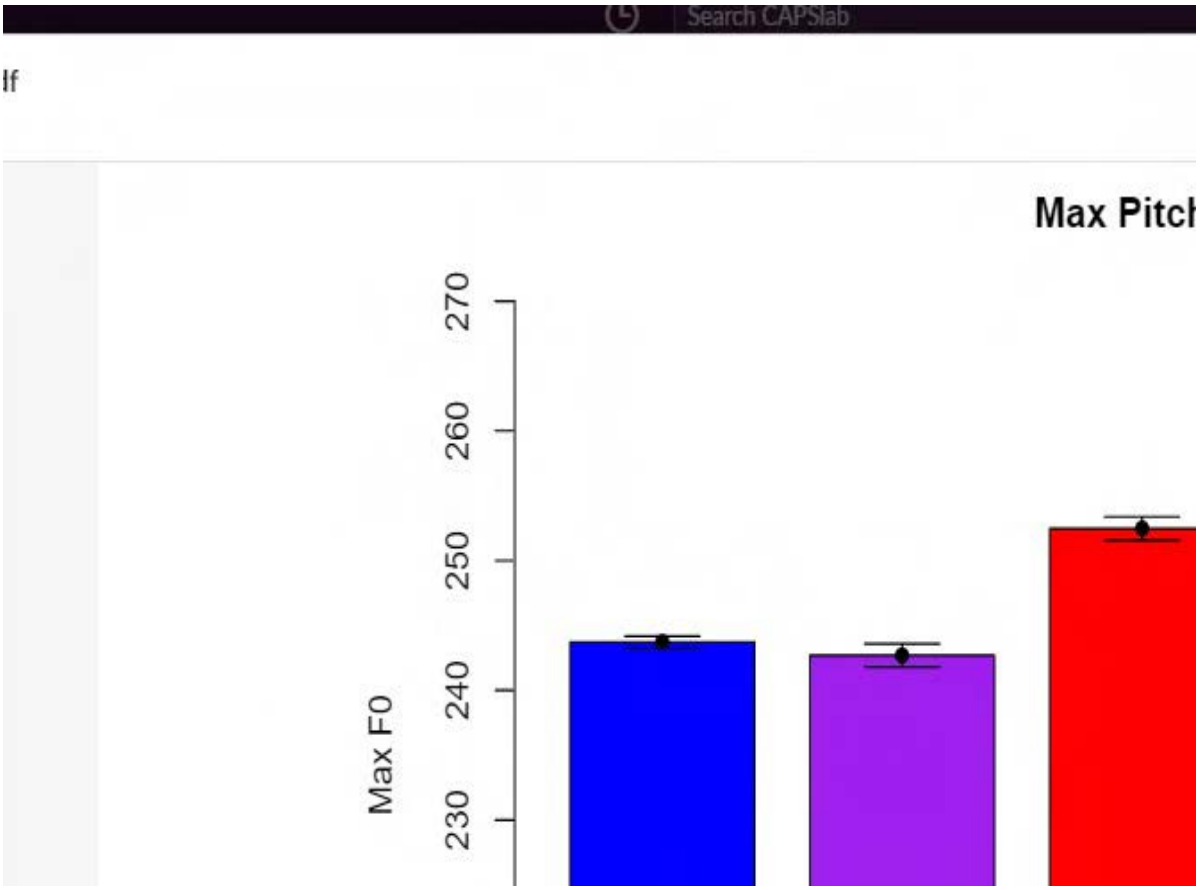


Figure 3. Values of mean pitch across the six levels of the metric hierarchy. Error bars indicate standard error across all mean pitch within a level.

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			Mean Pi
Fixed Effects	*Estimates*	*SE*	
(Intercept)	212.57	1.14	18
Level 2v1	1.13	0.94	1.
Level 3v2	6.59	1.20	5.
Level 4v3	-11.96	1.49	-8
Level 5v4	-14.14	2.06	-6

Table 5. Regression analysis summary for linguistic features predicting syllable mean pitch

Figure 3 and Table 3 shows that as an utterance progresses with its metric level the syllable's mean pitch decreases. Syllables aligned with metric level 2 did not differ in mean pitch from metric level 1, B = 1.13, $p > 0.05$. Syllables aligned with metric level 3 were produced with a higher mean pitch than syllables aligned with metric level 2, B = 6.59, $p < 0.001$. Syllables aligned with metric level 4 were produced with a higher mean pitch than syllables aligned with metric level 3, B = -11.96, $p < 0.001$. Syllables aligned with metric level 4 were produced with higher mean pitch than syllables aligned with metric level 5, B = -14.14, $p < 0.001$. Lastly. syllables aligned with metric level 6 did not differ in duration from metric level 5, B = -2.42, $p > 0.05$.

The results display no significance in the fixed effects of word class and syllable number. Word class did not differ in mean pitch, B = -1.47, $p > 0.05$. Syllable also did not differ in mean pitch, B = -0.06, $p > 0.05$. Words with a larger syllable count differed in mean pitch, B = -0.31, p

> 0.05. This supports the claim that single syllable words have higher intensity than multisyllabic words. Word class and syllable number do not have significant effects, but frequency's small but significant p-value and estimate of 1.01 suggests that as the frequency of a word increases the mean pitch increases along with it. Overall the mean pitch and max intensity effects are similar.

Discussion

The purpose of the current study was to test whether Spanish speakers signal linguistic structure in *El Gato Ensombrerado* through their prosody like, and whether it resembles that of English speakers. Being aware of the results from the English study, we predicted that higher metric syllable slots from the endecasilabo format will have the longest duration and higher intensity and pitch. To analyze our recordings a linear regression model was used and the results depicted a hierarchical metric structure and its effect on syllable duration, max intensity and mean pitch and aspects such as word class, syllable frequency and syllable number were also included in our analysis. Our results align with our hypothesis showing that the right-most boundaries receive longer duration and a pattern was also observed in the max intensity and mean pitch variables. These patterns point towards the likeness that they are being used by speakers and allow listeners to make predictions about the prosodic structure of a phrase. Overall the results support our claim that Spanish speakers emphasize syllables depending on their slot position in our hierarchical metric structure, similar to the structure used by English speakers.

The data collected from the recordings, supports our predicted hierarchical metric structure format, modeled after Fabb and Hales's endecasilabo format(2008). The presence of synaloepha in the recordings was observed since the EasyAlign extension of Praat would often combine 2 syllables pronounced by the readers into one. An example is the reader's pronunciation of y el as yel. The 2 syllables being combined into 1. Diaeresis wes also observed in our metric structure, being locations in which the empty slots can be interpreted as locations where speakers employ this phenomena.

The location where readers place stress is largely influenced by cues such as intensity, duration, and pitch. We predicted that intensity would not have as great of an impact on stress perception when comparing it to duration and pitch, but our results showed a strong similarity between mean pitch and max intensity. Our findings are consistent with the expectations of our hypothesized hierarchical metric structure. When creating our hypothesised metric structure we assigned slots 3,6 and 9 as the stressed/emphasized slots in the structure, giving them metric levels 3, 2, and 4,5 or 6 respectively. We hypothesized that readers would begin at a higher max intensity in metric levels. This can be seen in metric level 3 since and then decreases as the sentence progresses. This also shows a pattern which is consistent with our hypothesized metric structure and depicts the stress structure of syllables depending on their metric level.

The results demonstrate that although Spanish speakers do utilize metric structure and rhyme through prosody, they do not follow the same metric structure used by English speakers. The difference in metric structure between the two languages can be attributed to the English version having more monosyllabic words in comparison to the Spanish version which is multisyllabic. This claim can be seen in the Spanish results, displaying an increase in the duration of the syllables as the metric level increases. For example, the duration increases alongside the metric level. Following the pattern of a metric level having a longer duration in comparison to syllables in metric levels that came before. We expected the Right-most boundaries of phrases to receive longer durations and we were able to see this in our results.

These findings concerning duration instigate the question regarding the reasons why speakers produce metric levels with certain duration. A possible explanation for this could be based on the reader's understanding of the audience the book is aimed to. Since the *El Gato Ensombrerado* is a children’s book, the reader is aware of the level of knowledge a child has and

therefore follows this pattern. In the English study, the readers would be more likely to reduce the duration of rhyme targets that their children knew compared to targets they didn't know. This same assumption could be made when taking into consideration the syllable duration depending on the metric level.

Stressed syllables are characterized by a longer duration, as described above, and are also characterized by higher intensity and pitch, this pattern is often seen in text like *El Gato Ensombrerado*. Both the pitch and intensity are consistent with our predictions regarding our hypothesized structure. This is consistent with our results. The patterns linked to the prosodic cues we tested aid listener's attention and allow them to predict the rest of the metric structure of an utterance. A hierarchical metric structure allows for a deeper understanding of the text between the reader and the listener.

For future research, like the English study, we could collect recordings of readers reading both alone and to an audience of children ages 4-5. This was not possible for our study due to the current COVID pandemic. Although our study was modeled after the English study, we did not test for mixed effects of words that were capitalized. Results from the English study showed that readers would place emphasis on words that were written in full capital letters. We are not able to check if the Spanish speakers produced words fully written in capitalized letters with longer durations, in comparison to words that were lowercased/not emphasized, like the English speakers. A possible next step to look into more factors of metrical hierarchy we could conduct a test to see how metric level is influenced by the usage of capitalization on a word.

Future work will be directed to understanding the relationship between metric structure, predictability, and attention, to more fully explain the link between rhyming, rhythmically regular texts and reading ability. The present data indicate that readers of these books are

providing more information about linguistic structure to their audience than previously known. This knowledge will help generate better-informed models of the relationship between language experience and reading skill.

As previously explained, our choice to utilize a book which is a Spanish translation of an original book written in English brings forward concerns of the book's original language origins and whether the findings can be applied to work originally written in Spanish. The reasoning behind our decision to use the Spanish translation of *The Cat in the Hat* was due to its word complexity, structure and storyline. Future work, to extend our understanding of Spanish prosody, is seeing whether the results found in this study would also be similar for a book written originally in Spanish. This will also give us insight on whether the book we worked with is influenced by the fact that is a translation from the English original. Through this possible future project we will be able to see if the same patterns observed in our current study are shared with a rhyming book written originally in Spanish.

Another potential study to take under consideration would be to test whether children who are exposed to *El Gato Ensombrerado* acquire reading skill more quickly than children who are not. This would provide insight on the importance clarity and predictability of a structure on reading in the Spanish language.Knowing the importance of predictability and a metric pattern will allow for a development in the creation of programs which could potentially facilitate a child’s language learning progress.

To expand on our understanding of language acquisition, it would be beneficial to conduct similar studies across languages. Possibly providing us with more information on whether certain languages follow specific hierarchical metric structure patterns. There could also

be more or different variables that influence the metric structure other than duration, intensity and pitch.

Conclusion

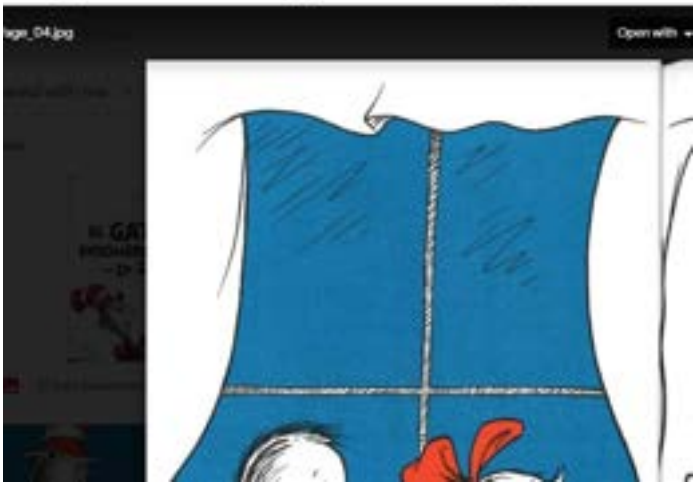
As previously described, language metric hierarchy allows listeners to make predictions about when important information will occur. Previous research points towards metric structure being able to predict the prosody of a verse/phrase and playing a large role in a child's development and acquisition of language. We believe children are able to make predictions concerning the prosody in a phrase. By being exposed to a language's metric structure constantly, a child is able to develop this strategy and receive/understand the utterance which they are listening to.

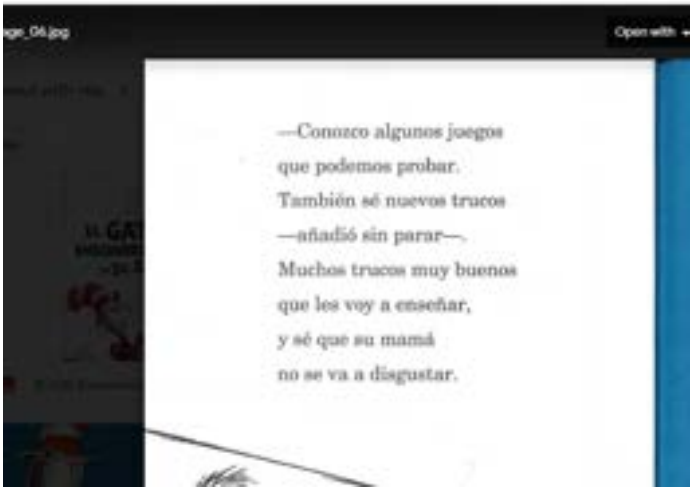
The importance of this study is largely sustained by the potential of gaining more knowledge about not only how child directed speech structure helps children in their language learning development, but also how they learn to organize speech in time and to understand what kind of information children get when they hear people read nursery rhyme books. Further analyzing the Spanish metric structure, we will be able to know its rules and format. This will shed light on the role of language, music, and cognition in attention and how to make language acquisition more efficient for children.

These findings could potentially make reading and language acquisition for adults easier if they are trying to learn a new language. By training adults and children with the specific patterns seen in the languages they are trying to learn, the learning process could become more smooth and efficient. The future studies will also explore the relationship between language and music and its results will have implications for models of attention during reading.

Appendix A

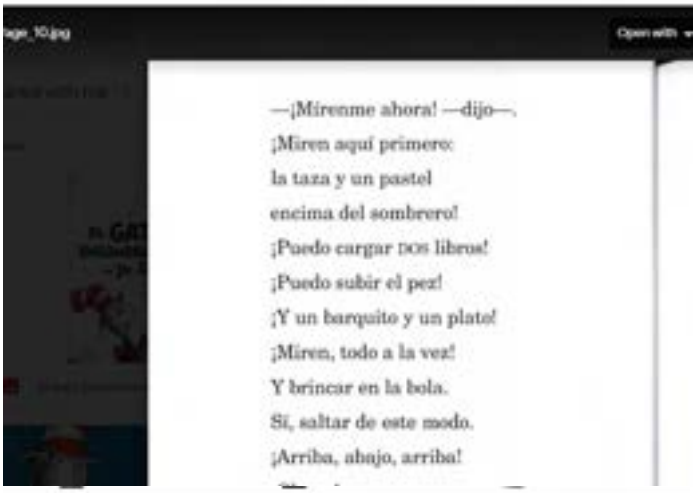
Experiment Stimuli- *El Gato Ensombrerado* by Dr. Seuss Book Pages

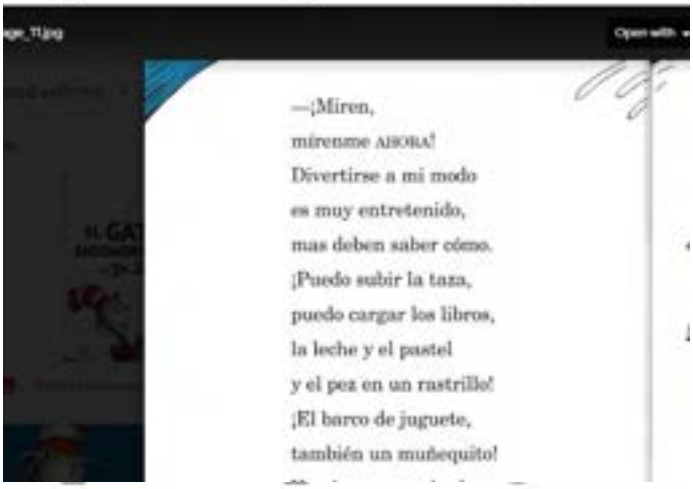


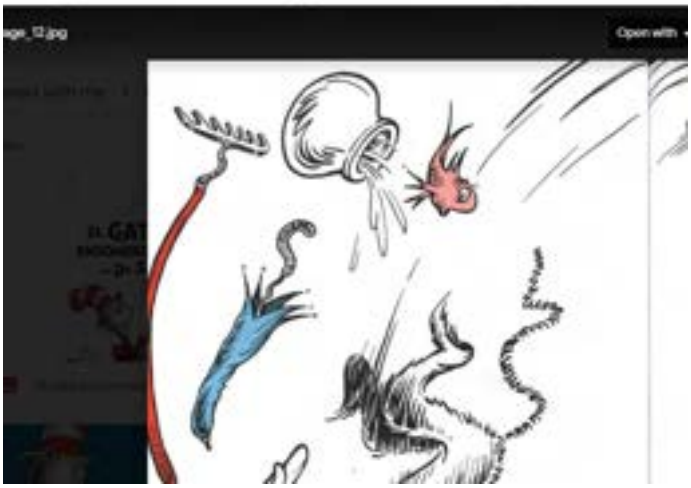

—Conozco algunos juegos
que podemos probar.
También sé nuevos trucos
—añadió sin parar—.
Muchos trucos muy buenos
que les voy a enseñar,
y sé que su mamá
no se va a disgustar.


—¡Vamos, no teman! —dijo
el Gato Ensombrerado—.
No son malos los trucos
que tengo preparados.
Podemos divertirnos
muchísimo los tres
con un juego que llamo
¡ARRIBA-ARRIBA-EL-PEZ!
12


—No te vas a caer.
No temas —dijo el gato—.
Parado en la pelota
te sostendré bien alto.
¡La taza en el sombrero
y un libro en una mano!
Pero eso no es TODO . . .


—¡Mírenme ahora! —dijo—.
¡Miren aquí primero:
la taza y un pastel
encima del sombrero!
¡Puedo cargar DOS libros!
¡Puedo subir el pez!
¡Y un barquito y un plato!
¡Miren, todo a la vez!
Y brincar en la bola.
Sí, saltar de este modo.
¡Arriba, abajo, arriba!


—¡Miren,
mírenme AHORA!
Divertirse a mi modo
es muy entretenido,
mas deben saber cómo.
¡Puedo subir la taza,
puedo cargar los libros,
la leche y el pastel
y el pez en un rastrillo!
¡El barco de juguete,
también un muñequito!




Open with
¡Y así en una tetera
el pobre pez cayó!
—No me gusta esto —dijo—.
¡No y no! ¡Claro que no!
Esto no es un buen juego
—dijo cuando salió—.
Ni un poquito me gusta.
No, no. ¡Claro que no!


Open with


Open with

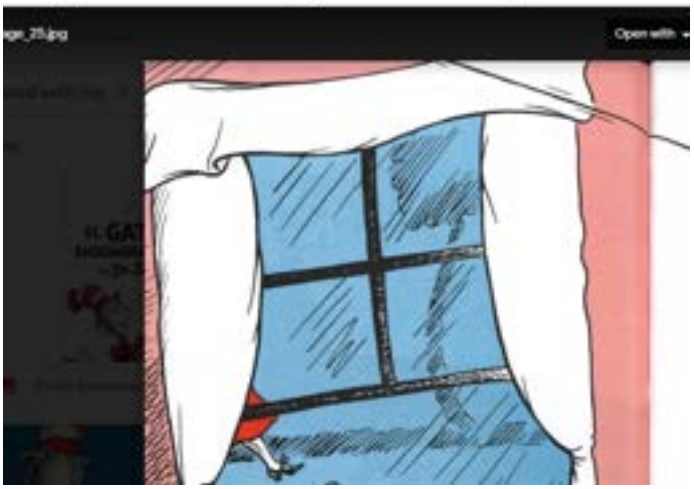

No sabiendo qué hacer
mi hermana Sara y yo,
les dimos nuestra mano
a Cosa Uno y Cosa Dos.
Estrechamos sus manos,
pero el pez dijo: —¡No!
¡Las cosas deben irse
de esta casa! ¡Las dos!
34

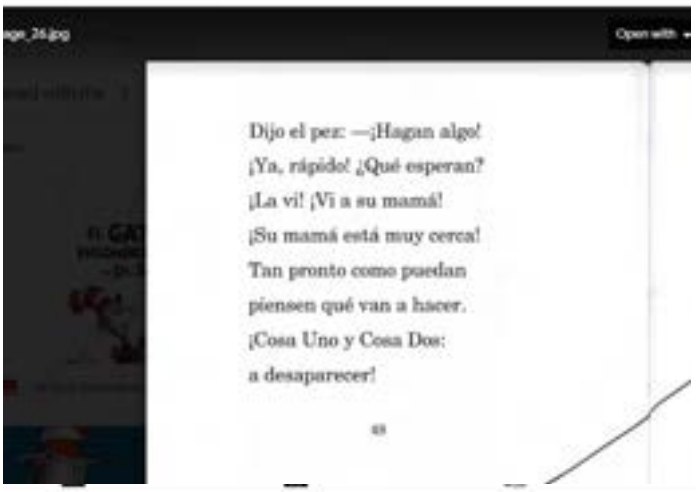

—Miren, este es un juego
que les gusta jugar.
Les gustan las cometas
y echarlas a volar.
35

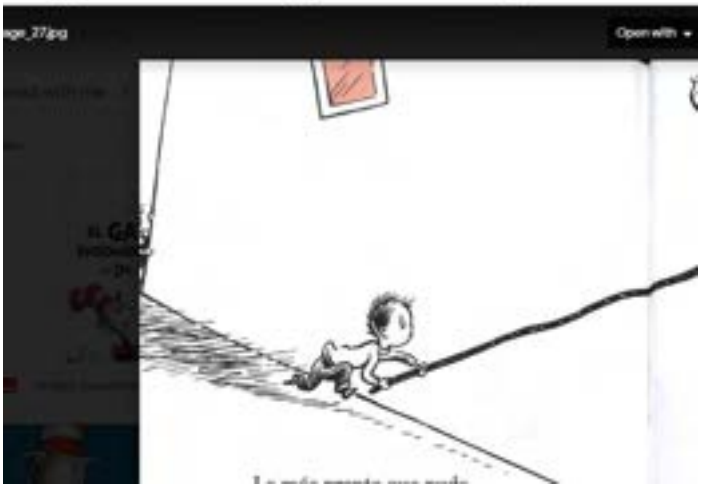

Open with
Sara y yo entonces vimos
a Cosas Uno y Dos


Open with
¡Corrían de un lado a otro


Open with




Dijo el pez: —¡Hagan algo!
¡Ya, rápido! ¿Qué esperan?
¡La vi! ¡Vi a su mamá!
¡Su mamá está muy cerca!
Tan pronto como puedan
piensen qué van a hacer.
¡Cosa Uno y Cosa Dos:
a desaparecer!




Open with
¡PLOP!, y dejé caer


Open with

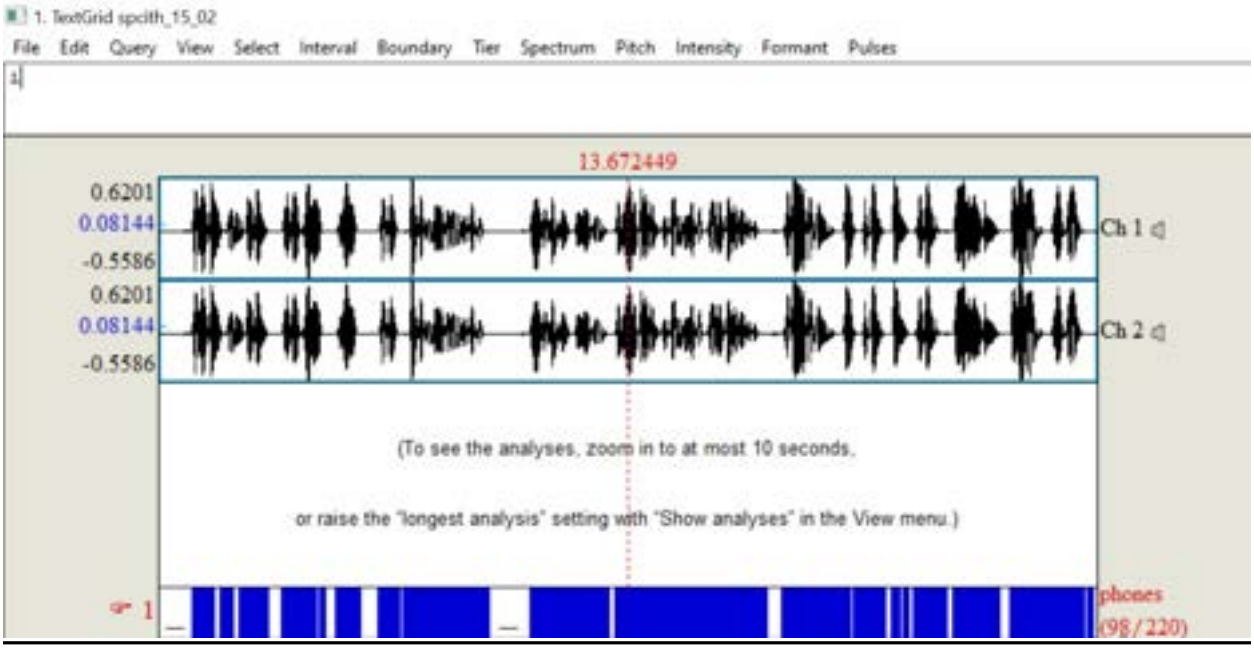

Open with


Lo vimos recoger
lo que se había caído.
Recogió ese pastel,
el traje y el rastrillo,
aquel plato y los libros.


Cuando llegó mamá
nos preguntó a los dos:

Appendix B

Textgrid File of Audio Recording Using Praat and EasyAlign Extension



Appendix C

Survey Questionnaire

Question 1

"¿Cuando es su fecha de nacimiento(mm/dd/yyyy)?"

Question 2

"¿Cuál es su identidad de género (por ejemplo, hombre, mujer, transgénero, género, no binario, otro)?"

Question 3

"¿Cuál es su idioma nativo (el primer idioma que aprendió)?"

Question 4

"¿Dónde creció (Si creció en los Estados Unidos, escriba el estado en el que creció. Si no creció en los Estados Unidos., escriba el país en el que creció)?"

Question 5

"¿Qué idioma(s) hablan sus padres??"

Question 6

"¿Cuál es su idioma dominante?"

Question 7

"¿Qué otro(s) idioma(s) habla, si lo hay?"

Question 8

"¿Alguna vez ha recibido entrenamiento musical(por ejemplo clases de musica)?"

Question 9

"¿A qué edad empezó a recibir clases de música?"

Question 10

"¿Durante cuántos años recibió clases de música?"

Question 11

"Por favor escriba todos los instrumentos (incluyendo la voz) en los que ha recibido clases."

Question 12

"¿Cuántas horas a la semana toca música actualmente?"

Question13

"Por favor elija qué dialecto de español habla:"

Choices:

"Amazonian Spanish",

"Bolivian Spanish",

"Caribbean Spanish",

"Central American Spanish",

"Andean Spanish",

"Chilean Spanish",

"Colombian – Ecuadorian Spanish",

"Mexican Spanish",

"Paraguayan Spanish",

"Peruvian Spanish",

"Puerto Rican Spanish",

"Argentine Spanish",

"Otro"

Question 14

"Si elijió Otro para la pregunta anterior, aclare qué dialecto de Español habla, si esto no aplica a usted, escriba NA"

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